

---

# **DHIS2 User Manual**

DHIS core version 2.34

DHIS2 Documentation Team



Copyright © 2008-2021 DHIS2 Team

Última actualización: 2021-07-13

**Warranty:** THIS DOCUMENT IS PROVIDED BY THE AUTHORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHORS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS MANUAL AND PRODUCTS MENTIONED HEREIN, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

**License:** Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.3 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the source of this documentation, and is available here online: <http://www.gnu.org/licenses/fdl.html>

---

## Tabla de contenidos

### What is DHIS2?

DHIS2 Background

Key features and purpose of DHIS2

Use of DHIS2 in HIS: data collection, processing, interpretation, and analysis.

Technical background

Difference between Aggregated and Patient data in a HIS

Free and Open Source Software (FOSS): benefits and challenges

### Using the Data Entry app

About the Data Entry app

Enter data in a data entry form

Mark a data value for follow-up

Edit data values in a completed data entry form

Display a data value's history

Display a data value's audit trail

Create minimum maximum value range manually

Enter data offline

Enable multi-organisation unit data entry

See also

### Control data quality

About data quality checks

Validation rule analysis

Standard deviation outlier analysis

Minimum maximum outlier analysis

Follow-up analysis

### Using the Capture app

About the Capture app

Register an event

Adding a relationship

Edit an event

Delete an event

Modify an event list layout

Filter an event list

Sort an event list

Download an event list

Predefined list views

User assignment

Tracker programs

### Using the Event Capture app

About the Event Capture app

Register an event

Edit an event

Edit events in grid

Share events in edit mode

View an event audit history

Delete an event

Modify an event list's layout

Print an event list

Download an event list

### Using the Tracker Capture app

About the Tracker Capture app

About tracked entity instance (TEI) dashboards

Workflow

---

- 
- Linking to the Tracker Capture App
  - Create a TEI and enroll it in a program
  - Open an existing TEI dashboard
  - Enroll an existing TEI in a program
  - Enter event data for a TEI
  - How to use geometry
  - How to assign a user to an event
  - Manage a TEI's enrollments
  - Send a message to a TEI
  - Mark a TEI for follow-up
  - Edit a TEI's profile
  - Add a relationship to a TEI
  - Share a TEI dashboard
  - Deactivate a TEI
  - Activate a TEI
  - Delete a TEI
  - Configure the TEI dashboard
  - Create reports
  - Data approval
    - Approving and accepting
    - Authorities for approving data
    - Configuring data approval
    - Data visibility
    - Approving data
    - Approving by category option group set
    - Approving by multiple category option group sets
  - Reporting functionality in the reports app
    - Using standard reports
    - Using dataset reports
    - Using reporting rate summary
    - Using resources
    - Using organisation unit distribution reports
  - Using the Data Visualizer app
    - Creating and editing visualizations
    - Change the display of your visualization
    - Adding Assigned Categories
    - Adding more axes
    - Manage saved visualizations
    - Visualization interpretations
    - Share a visualization
    - Download
    - See visualization as map
  - Analyze data in pivot tables
    - About the Pivot Table app
    - Create a pivot table
    - Change the display of your pivot table
    - Manage favorites
    - Download data from a pivot table
    - Embed a pivot table in an external web page
    - Visualize pivot table data as a chart or a map
  - Using the Maps app
    - About the Maps app
    - Create a new map
    - Manage thematic layers
-

---

- [Manage event layers](#)
- [Manage tracked entity layers](#)
- [Manage facility layers](#)
- [Manage boundary layers](#)
- [Manage Earth Engine layer](#)
- [Add external map layers](#)
- [File menu](#)
- [Map interpretations](#)
- [Save a map as an image](#)
- [Search for a location](#)
- [Measure distances and areas in a map](#)
- [Get the latitude and longitude at any location](#)
- [See also](#)
- [Managing dashboards](#)
  - [About dashboards](#)
  - [Dashboard and control bar](#)
  - [Creating a dashboard](#)
  - [Removing items](#)
  - [Saving the dashboard](#)
  - [Editing an existing dashboard](#)
  - [Deleting a dashboard](#)
  - [Viewing a dashboard](#)
  - [Dashboard items with charts, pivot tables and maps](#)
  - [Interpretations](#)
  - [Sharing a dashboard](#)
- [Using the Event Reports app](#)
  - [About the Event Reports app](#)
  - [Create an event report](#)
  - [Select dimension items](#)
  - [Select series, category and filter](#)
  - [Change the display of your table](#)
  - [Download chart data source](#)
  - [Manage favorites](#)
  - [Visualize an event report as a chart](#)
- [Using the Event Visualizer app](#)
  - [About the Event Visualizer app](#)
  - [Create a chart](#)
  - [Select a chart type](#)
  - [Select dimension items](#)
  - [Select series, category and filter](#)
  - [Change the display of your chart](#)
  - [Download a chart as an image or a PDF](#)
  - [Download chart data source](#)
  - [Manage favorites](#)
  - [Visualize a chart as a pivot table](#)
- [Messaging](#)
  - [About messages and feedback messages](#)
  - [Create a message](#)
  - [Read a message](#)
  - [Create a feedback message](#)
  - [Attachments](#)
  - [Manage validation and feedback messages](#)
  - [Configure feedback message function](#)
- [Set user account preferences](#)

---

---

## Configure metadata

- About the Maintenance app
- Manage categories
- Manage data elements
- Manage data sets and data entry forms
- Manage indicators
- Manage organisation units
- [Work in progress] Manage validation rules
- Manage attributes
- Manage constants
- Manage option sets
- Manage legends
- Manage predictors
- Manage push reports
- Manage external map layers
- Manage SQL Views
- Manage Locales
- Edit multiple object groups at once

## Configure programs in the Maintenance app

- About programs
- Configure event programs in the Maintenance app
- Configure tracker programs in the Maintenance app
- Configure program indicators
- Configure program rules
- Configure relationship types
- Configure tracked entity types
- Configure search
- Clone metadata objects
- Delete metadata objects
- Change sharing settings for metadata objects
- Display details of metadata objects
- Translate metadata objects

## Manage users, user roles and user groups

- About user management
- Workflow
- Manage users
- Manage user roles
- Manage user groups
- Enable support for OpenID
- Decentralize user management
- Example: user management in a health system

## User authorities

### About sharing of objects

- Sharing of objects
- Metadata sharing and access control
- Metadata sharing applied
- Data sharing and access control

## Configure the Maps app

- Context
- Importing coordinates

## Configure report functionality

- Data sources for reporting
- How to create report tables
- Report table outcome

---

- Standard reports
- Charts
- Adding the Report to DHIS2
- Some final guidelines
- Designing SQL based standard reports
- Designing HTML based standard reports
- System settings
  - General settings
  - Analytics settings
  - Server settings
  - Appearance settings
  - Email settings
  - Access settings
  - Calendar settings
  - Data import settings
  - Synchronization settings
  - OAuth2 clients
- Data Administration
  - Data integrity
  - Maintenance
  - Resource tables
  - Analytics tables management
  - Data statistics
  - Lock exceptions
  - Min-Max Value Generation
  - Cache Statistics
- Visualize usage statistics
  - About the Usage Analytics app
  - Create a usage analytics graph
- Datastore Manager
  - Using the Datastore Manager
  - Add a new namespace and key to the Datastore Manager
  - Add a key to an existing namespace in the Datastore Manager
  - Delete a namespace or key from the Datastore Manager
  - Search for namespaces or keys
  - Search your JSON library
  - Edit namespaces or keys in the Datastore Manager
- Scheduling
  - Creating a job
  - Configuring a job
  - Deleting a job
  - Job types
- Import/Export App
  - Importing data
  - Exporting data
- Configure metadata synchronizing
  - About data and metadata synchronization
  - Workflow
  - Configure metadata versioning on central instance
  - Connect local instance to central instance
  - Configure automatic metadata synchronization on local instance
  - Create a new metadata version manually on central or local instance
  - Reference information: metadata synchronization configuration parameters

---

---

## Mobile

- DHIS2 Mobile Introduction
- Mobile browser based data entry
- J2ME GPRS/3G Client
- SMS Command
- SMS Service

## About data dimensions

- Data dimensions: Core building blocks in DHIS2
- Data elements: the what dimension
- Organisation units: the where dimension
- Period: the when dimension
- Data collection vs. data analysis
- Extended examples of data elements and forms
- How this works in pivot tables
- Case study: From paper forms to multidimensional datasets - lessons learned

## Additional data dimensions

- About additional data dimensions
- Create or edit an attribute category and its options

## Relationship model

- Relationship Type

## DHIS2 Glossary

- A
- B
- C
- D
- H
- I
- N
- O
- P
- U

## About demo server, live package and database design

- Using the DHIS2 demo server
- Using the DHIS2 live package
- Logging on to DHIS2
- Logging out of DHIS2
- Quick intro to designing a DHIS2 database

## DHIS2 Tutorials

- Create Scorecards using the Pivot Table app
- Working with TextPattern

## DHIS2 Frequently Asked Questions

## Release and upgrade notes



## What is DHIS2?

After reading this chapter you will be able to understand:

- What is DHIS2 and what purpose it serves with respect to health information systems (HIS)?
- What are the major technological considerations when it comes to deploying DHIS2, and what are the options are for extending DHIS2 with new modules?
- What is the difference between patient based and aggregate data?
- What are some of the benefits and challenges with using Free and Open Source Software (FOSS) for HIS?

## DHIS2 Background

DHIS2 is a tool for collection, validation, analysis, and presentation of aggregate and patient-based statistical data, tailored (but not limited) to integrated health information management activities. It is a generic tool rather than a pre-configured database application, with an open meta-data model and a flexible user interface that allows the user to design the contents of a specific information system without the need for programming. DHIS2 is a modular web-based software package built with free and open source Java frameworks.

DHIS2 is open source software released under the BSD license and can be obtained at no cost. It runs on any platform with a Java Runtime Environment (JRE 7 or higher) installed.

DHIS2 is developed by the Health Information Systems Programme (HISP) as an open and globally distributed process with developers currently in India, Vietnam, Tanzania, Ireland, and Norway. The development is coordinated by the University of Oslo with support from NORAD and other donors.

The DHIS2 software is used in more than 40 countries in Africa, Asia, and Latin America, and countries that have adopted DHIS2 as their nation-wide HIS software include Kenya, Tanzania, Uganda, Rwanda, Ghana, Liberia, and Bangladesh. A rapidly increasing number of countries and organisations are starting up new deployments.

The documentation provided herewith, will attempt to provide a comprehensive overview of the application. Given the abstract nature of the application, this manual will not serve as a complete step-by-step guide of how to use the application in each and every circumstance, but rather will seek to provide illustrations and examples of how DHIS2 can be implemented in a variety of situations through generalized examples.

Before implementing DHIS2 in a new setting, we highly recommend reading the DHIS2 Implementation Guide (a separate manual from this one), also available at the main DHIS2 [website](#).

## Key features and purpose of DHIS2

The key features and purpose of DHIS2 can be summarised as follows:

- Provide a comprehensive data management solution based on data warehousing principles and a modular structure which can easily be customised to the different requirements of a management information system, supporting analysis at different levels of the organisational hierarchy.
  - Customisation and local adaptation through the user interface. No programming required to start using DHIS2 in a new setting (country, region, district etc.).
-

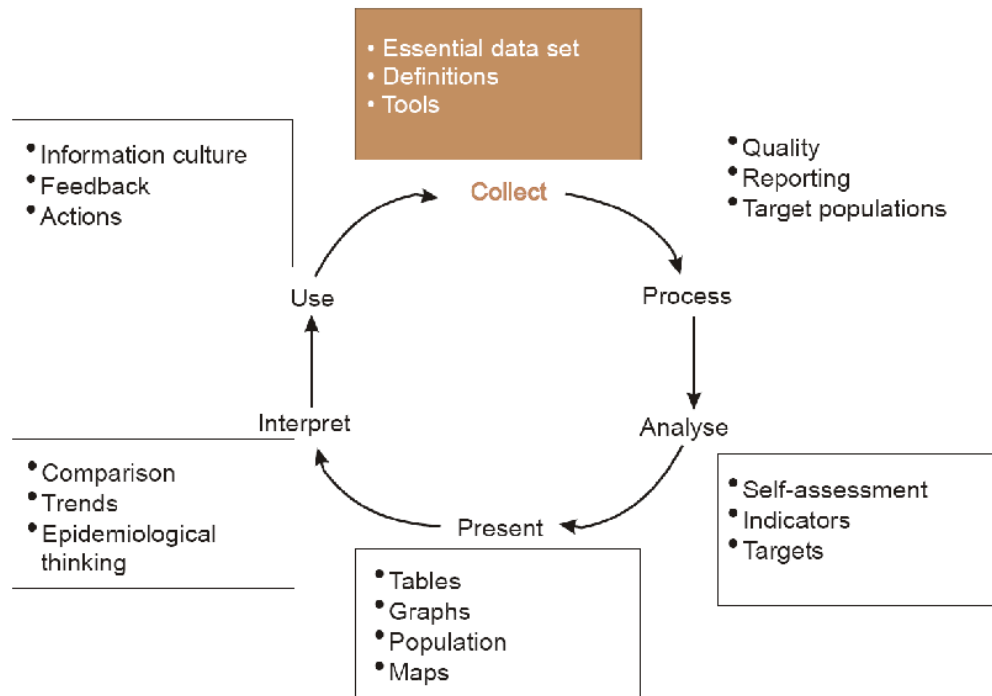
- Provide data entry tools which can either be in the form of standard lists or tables, or can be customised to replicate paper forms.
- Provide different kinds of tools for data validation and improvement of data quality.
- Provide easy to use - one-click reports with charts and tables for selected indicators or summary reports using the design of the data collection tools. Allow for integration with popular external report design tools (e.g. JasperReports) to add more custom or advanced reports.
- Flexible and dynamic (on-the-fly) data analysis in the analytics modules (i.e. GIS, PivotTables, Data Visualizer, Event reports, etc).
- A user-specific dashboard for quick access to the relevant monitoring and evaluation tools including indicator charts and links to favourite reports, maps and other key resources in the system.
- Easy to use user-interfaces for metadata management e.g. for adding/editing datasets or health facilities. No programming needed to set up the system in a new setting.
- Functionality to design and modify calculated indicator formulas.
- User management module for passwords, security, and fine-grained access control (user roles).
- Messages can be sent to system users for feedback and notifications. Messages can also be delivered to email and SMS.
- Users can share and discuss their data in charts and reports using Interpretations, enabling an active information-driven user community.
- Functionalities of export-import of data and metadata, supporting synchronisation of offline installations as well as interoperability with other applications.
- Using the DHIS2 Web-API , allow for integration with external software and extension of the core platform through the use of custom apps.
- Further modules can be developed and integrated as per user needs, either as part of the DHIS2 portal user interface or a more loosely-coupled external application interacting through the DHIS2 Web-API.

In summary, DHIS2 provides a comprehensive HIS solution for the reporting and analysis needs of health information users at any level.

### **Use of DHIS2 in HIS: data collection, processing, interpretation, and analysis.**

The wider context of HIS can be comprehensively described through the information cycle presented in Figure 1.1 below. The information cycle pictorially depicts the different components, stages and processes through which the data is collected, checked for quality, processed, analysed and used.

## The Information Cycle



*The health information cycle*

DHIS2 supports the different facets of the information cycle including:

- Collecting data.
- Running quality checks.
- Data access at multiple levels.
- Reporting.
- Making graphs and maps and other forms of analysis.
- Enabling comparison across time (for example, previous months) and space (for example, across facilities and districts).
- See trends (displaying data in time series to see their min and max levels).

As a first step, DHIS2 serves as a data collection, recording and compilation tool, and all data (be it in numbers or text form) can be entered into it. Data entry can be done in lists of data elements or in customised user defined forms which can be developed to mimic paper based forms in order to ease the process of data entry.

As a next step, DHIS2 can be used to increase data quality. First, at the point of data entry, a check can be made to see if data falls within acceptable range levels of minimum and maximum values for any particular data element. Such checking, for example, can help to identify typing errors at the time of data entry. Further, user can define various validation rules, and DHIS2 can run the data through the validation rules to identify violations. These types of checks help to ensure that data entered into the system is of good quality from the start, and can be improved by the people who are most familiar with it.

---

When data has been entered and verified, DHIS2 can help to make different kinds of reports. The first kind are the routine reports that can be predefined, so that all those reports that need to be routine generated can be done on a click of a button. Further, DHIS2 can help in the generation of analytical reports through comparisons of for example indicators across facilities or over time. Graphs, maps, reports and health profiles are among the outputs that DHIS2 can produce, and these should routinely be produced, analysed, and acted upon by health managers.

## Technical background

### DHIS2 as a platform

DHIS2 can be perceived as a platform on several levels. First, the application database is designed ground-up with flexibility in mind. Data structures such as data elements, organisation units, forms and user roles can be defined completely freely through the application user interface. This makes it possible for the system to be adapted to a multitude of locale contexts and use-cases. We have seen that DHIS2 supports most major requirements for routine data capture and analysis emerging in country implementations. It also makes it possible for DHIS2 to serve as management system for domains such as logistics, labs and finance.

Second, due to the modular design of DHIS2 it can be extended with additional software modules or through custom apps. These software modules/apps can live side by side with the core modules of DHIS2 and can be integrated into the DHIS2 portal and menu system. This is a powerful feature as it makes it possible to extend the system with extra functionality when needed, typically for country specific requirements as earlier pointed out.

The downside of the software module extensibility is that it puts several constraints on the development process. The developers creating the extra functionality are limited to the DHIS2 technology in terms of programming language and software frameworks, in addition to the constraints put on the design of modules by the DHIS2 portal solution. Also, these modules must be included in the DHIS2 software when the software is built and deployed on the web server, not dynamically during run-time.

In order to overcome these limitations and achieve a looser coupling between the DHIS2 service layer and additional software artefacts, a REST-based API has been developed as part of DHIS2. This Web API complies with the rules of the REST architectural style. This implies that:

- The Web API provides a navigable and machine-readable interface to the complete DHIS2 data model. For instance, one can access the full list of data elements, then navigate using the provided URL to a particular data element of interest, then navigate using the provided URL to the list of data sets which the data element is a member of.
- (Meta) Data is accessed through a uniform interface (URLs) using plain HTTP requests. There are no fancy transport formats or protocols involved - just the well-tested, well-understood HTTP protocol which is the main building block of the Web today. This implies that third-party developers can develop software using the DHIS2 data model and data without knowing the DHIS2 2specific technology or complying with the DHIS2 design constraints.
- All data including meta-data, reports, maps and charts, known as resources in REST terminology, can be retrieved in most of the popular representation formats of the Web of today, such as XML, JSON, PDF and PNG. These formats are widely supported in applications and programming languages and gives third-party developers a wide range of implementation options.

## Understanding platform independence

All computers have an Operating System (OS) to manage it and the programs running it. The operating system serves as the middle layer between the software application, such as DHIS2, and the hardware, such as the CPU and RAM. DHIS2 runs on the Java Virtual Machine, and can therefore run on any operating system which supports Java. Platform independence implies that the software application can run on ANY OS - Windows, Linux, Macintosh etc. DHIS2 is platform independent and thus can be used in many different contexts depending on the exact requirements of the operating system to be used.

Additionally, DHIS2 supports three major database management systems (DBMS). DHIS2 uses the Hibernate database abstraction framework and is compatible with the following database systems: PostgreSQL, MySQL and H2. PostgreSQL and MySQL are high-quality production ready databases, while H2 is a useful in-memory database for small-scale applications or development activities.

Lastly, and perhaps most importantly, since DHIS2 is a browser-based application, the only real requirement to interact with the system is with a web browser. DHIS2 supports most web browsers, although currently either Google Chrome, Mozilla Firefox or Opera are recommended.

## Deployment strategies - online vs offline

DHIS2 is a network enabled application and can be accessed over the Internet, a local intranet as well as a locally installed system. The deployment alternatives for DHIS2 are in this chapter defined as i) offline deployment ii) online deployment and iii) hybrid deployment. The meaning and differences will be discussed in the following sections.

### Offline Deployment

An off-line deployment implies that multiple standalone off-line instances are installed for end users, typically at the district level. The system is maintained primarily by the end users/district health officers who enter data and generate reports from the system running on their local server. The system will also typically be maintained by a national super-user team who pay regular visits to the district deployments. Data is moved upwards in the hierarchy by the end users producing data exchange files which are sent electronically by email or physically by mail or personal travel. (Note that the brief Internet connectivity required for sending emails does not qualify for being defined as on-line). This style of deployment has the obvious benefit that it works when appropriate Internet connectivity is not available. On the other side there are significant challenges with this style which are described in the following section.

- **Hardware:** Running stand-alone systems requires advanced hardware in terms of servers and reliable power supply to be installed, usually at district level, all over the country. This requires appropriate funding for procurement and plan for long-term maintenance.
  - **Software platform:** Local installs implies a significant need for maintenance. From experience, the biggest challenge is viruses and other malware which tend to infect local installations in the long-run. The main reason is that end users utilize memory sticks for transporting data exchange files and documents between private computers, other workstations and the system running the application. Keeping anti-virus software and operating system patches up to date in an off-line environment are challenging and bad practices in terms of security are often adopted by end users. The preferred way to overcome this issue is to run a dedicated server for the application where no memory sticks are allowed and use an Linux based operating system which is not as prone for virus infections as MS Windows.
  - **Software application:** Being able to distribute new functionality and bug-fixes to the health information software to users are essential for maintenance and improvement of the
-

---

system. Relying on the end users to perform software upgrades requires extensive training and a high level of competence on their side as upgrading software applications might a technically challenging task. Relying on a national super-user team to maintain the software implies a lot of travelling.

- **Database maintenance:** A prerequisite for an efficient system is that all users enter data with a standardized meta-data set (data elements, forms etc). As with the previous point about software upgrades, distribution of changes to the meta-data set to numerous off-line installations requires end user competence if the updates are sent electronically or a well-organized super-user team. Failure to keep the meta-data set synchronized will lead to loss of ability to move data from the districts and/or an inconsistent national database since the data entered for instance at the district level will not be compatible with the data at the national level.

### Online deployment

An on-line deployment implies that a single instance of the application is set up on a server connected to the Internet. All users (clients) connect to the on-line central server over the Internet using a web browser. This style of deployment is increasingly possible due to increased availability in (mobile) Internet coverage globally, as well as readily available and cheap cloud-computing resources. These developments make it possible to access on-line servers in even the most rural areas using mobile Internet modems (also referred to as *dongles*).

This on-line deployment style has huge positive implications for the implementation process and application maintenance compared to the traditional off-line standalone style:

- **Hardware:** Hardware requirements on the end-user side are limited to a reasonably modern computer/laptop and Internet connectivity through a fixed line or a mobile modem. There is no need for a specialized server for each user, any Internet enabled computer will be sufficient. A server will be required for on-line deployments, but since there is only one (or several) servers which need to be procured and maintained, this is significantly simpler (and cheaper) than maintaining many separate servers in disparate locations. Given that cloud-computing resources continue to steadily decrease in price while increasing in computational power, setting up a powerful server in the cloud is far cheaper than procuring hardware.
  - **Software platform:** The end users only need a web browser to connect to the on-line server. All popular operating systems today are shipped with a web browser and there is no special requirement on what type or version. This means that if severe problems such as virus infections or software corruption occur one can always resort to re-formatting and installing the computer operating system or obtain a new computer/laptop. The user can continue with data entry where it was left and no data will be lost.
  - **Software application:** The central server deployment style means that the application can be upgraded and maintained in a centralized fashion. When new versions of the applications are released with new features and bug-fixes it can be deployed to the single on-line server. All changes will then be reflected on the client side the next time end users connect over the Internet. This obviously has a huge positive impact for the process of improving the system as new features can be distributed to users immediately, all users will be accessing the same application version, and bugs and issues can be sorted out and deployed on-the-fly.
  - **Database maintenance:** Similar to the previous point, changes to the meta-data can be done on the on-line server in a centralized fashion and will automatically propagate to all clients next time they connect to the server. This effectively removes the vast issues related to maintaining an upgraded and standardized meta-data set related to the traditional off-
-

line deployment style. It is extremely convenient for instance during the initial database development phase and during the annual database revision processes as end users will be accessing a consistent and standardized database even when changes occur frequently.

This approach might be problematic in cases where Internet connectivity is volatile or missing in long periods of time. DHIS2 however has certain features which requires Internet connectivity to be available only part of the time for the system to work properly, such as offline data entry. In general however, DHIS2 does require Internet connectivity of some sort, but this is increasingly an easy problem to solve even in remote locations.

### **Hybrid deployment**

From the discussion so far one realizes that the on-line deployment style is favourable over the off-line style but requires decent Internet connectivity where it will be used. It is important to notice that the mentioned styles can co-exist in a common deployment. It is perfectly feasible to have on-line as well as off-line deployments within a single country. The general rule would be that districts and facilities should access the system on-line over the Internet where sufficient Internet connectivity exist, and off-line systems should be deployed to districts where this is not the case.

Defining decent Internet connectivity precisely is hard but as a rule of thumb the download speed should be minimum 10 Kbyte/second for the client and at least 1 Mbit/sec (dedicated) bandwidth for the server.

In this regard mobile Internet modems which can be connected to a computer or laptop and access the mobile network is an extremely capable and feasible solution. Mobile Internet coverage is increasing rapidly all over the world, often provide excellent connectivity at low prices and is a great alternative to local networks and poorly maintained fixed Internet lines. Getting in contact with national mobile network companies regarding post-paid subscriptions and potential large-order benefits can be a worthwhile effort. The network coverage for each network operator in the relevant country should be investigated when deciding which deployment approach to opt for as it might differ and cover different parts of the country.

### **Server hosting**

The on-line deployment approach raises the question of where and how to host the server which will run the DHIS2 application. Typically there are several options:

1. Internal hosting within the Ministry of Health
2. Hosting within a government data centre
3. Hosting through an external hosting company

The main reason for choosing the first option is often political motivation for having “physical ownership” of the database. This is perceived as important by many in order to “own” and control the data. There is also a wish to build local capacity for server administration related to sustainability of the project. This is often a donor-driven initiatives as it is perceived as a concrete and helpful mission.

Regarding the second option, some places a government data centre is constructed with a view to promoting and improving the use and accessibility of public data. Another reason is that a proliferation of internal server environments is very resource demanding and it is more effective to establish centralized infrastructure and capacity.

Regarding external hosting there is lately a move towards outsourcing the operation and administration of computer resources to an external provider, where those resources are accessed over the network, popularly referred to as “cloud computing” or “software as a service”. Those resources are typically accessed over the Internet using a web browser.

The primary goal for an on-line server deployment is provide long-term stable and high-performance accessibility to the intended services. When deciding which option to choose for server environment there are many aspects to consider:

1. Human capacity for server administration and operation. There must be human resources with general skills in server administration and in the specific technologies used for the application providing the services. Examples of such technologies are web servers and database management platforms.
2. Reliable solutions for automated backups, including local off-server and remote backup.
3. Stable connectivity and high network bandwidth for traffic to and from the server.
4. Stable power supply including a backup solution.
5. Secure environment for the physical server regarding issues such as access, theft and fire.
6. Presence of a disaster recovery plan. This plan must contain a realistic strategy for making sure that the service will be only suffering short down-times in the events of hardware failures, network downtime and more.
7. Feasible, powerful and robust hardware.

All of these aspects must be covered in order to create an appropriate hosting environment. The hardware requirement is deliberately put last since there is a clear tendency to give it too much attention.

Looking back at the three main hosting options, experience from implementation missions in developing countries suggests that all of the hosting aspects are rarely present in option one and two at a feasible level. Reaching an acceptable level in all these aspects is challenging in terms of both human resources and money, especially when compared to the cost of option three. It has the benefit that it accommodates the mentioned political aspects and building local capacity for server administration, on the other hand can this be provided for in alternative ways.

Option three - external hosting - has the benefit that it supports all of the mentioned hosting aspects at a very affordable price. Several hosting providers - of virtual servers or software as a service - offer reliable services for running most kinds of applications. Example of such providers are [Linode](#) and [Amazon Web Services](#). Administration of such servers happens over a network connection, which most often anyway is the case with local server administration. The physical location of the server in this case becomes irrelevant as that such providers offer services in most parts of the world. This solution is increasingly becoming the standard solution for hosting of application services. The aspect of building local capacity for server administration is compatible with this option since a local ICT team can be tasked with maintaining the externally hosted server, but with not being burdened with worrying about power supply and bandwidth constraints which usually exist outside of major data centres.

An approach for combining the benefits of external hosting with the need for local hosting and physical ownership is to use an external hosting provider for the primary transactional system, while mirroring this server to a locally hosted non-critical server which is used for read-only purposes such as data analysis and accessed over the intranet.



## **Difference between Aggregated and Patient data in a HIS**

*Patient data* is data relating to a single patient, such as his/her diagnosis, name, age, earlier medical history etc. This data is typically based on a single patient-health care worker interaction. For instance, when a patient visits a health care clinic, a variety of details may be recorded, such as the patient's temperature, their weight, and various blood tests. Should this patient be diagnosed as having "Vitamin B 12 deficiency anaemia, unspecified" corresponding to ICD-10 code D51.9, this particular interaction might eventually get recorded as an instance of "Anaemia" in an aggregate based system. Patient based data is important when you want to track longitudinally the progress of a patient over time. For example, if we want to track how a patient is adhering to and responding to the process of TB treatment (typically taking place over 6-9 months), we would need patient based data.

*Aggregated data* is the consolidation of data relating to multiple patients, and therefore cannot be traced back to a specific patient. They are merely counts, such as incidences of Malaria, TB, or other diseases. Typically, the routine data that a health facility deals with is this kind of aggregated statistics, and is used for the generation of routine reports and indicators, and most importantly, strategic planning within the health system. Aggregate data cannot provide the type of detailed information which patient level data can, but is crucial for planning and guidance of the performance of health systems.

In between the two you have case-based data, or anonymous "patient" data. A lot of details can be collected about a specific health event without necessarily having to identify the patient it involved. Inpatient or outpatient visits, a new case of cholera, a maternal death etc. are common use-cases where one would like to collect a lot more detail that just adding to the total count of cases, or visits. This data is often collected in line-listing type of forms, or in more detailed audit forms. It is different from aggregate data in the sense that it contains many details about a specific event, whereas the aggregate data would count how many events of a certain type, e.g. how many outpatient visits with principal diagnosis "Malaria", or how many maternal deaths where the deceased did not attend ANC, or how many cholera outbreaks for children under 5 years. In DHIS2 this data is collected through programs of the type single event without registration.

Patient data is highly confidential and therefore must be protected so that no one other than doctors can get it. When in paper, it must be properly stored in a secure place. For computers, patient data needs secure systems with passwords, restrained access and audit logs.

Security concerns for aggregated data are not as crucial as for patient data, as it is usually impossible to identify a particular person to a aggregate statistic . However, data can still be misused and misinterpreted by others, and should not be distributed without adequate data dissemination policies in place.

## **Free and Open Source Software (FOSS): benefits and challenges**

Software carries the instructions that tell a computer how to operate. The human authored and human readable form of those instructions is called source code. Before the computer can actually execute the instructions, the source code must be translated into a machine readable (binary) format, called the object code. All distributed software includes the object code, but FOSS makes the source code available as well.

Proprietary software owners license their copyrighted object code to a user, which allows the user to run the program. FOSS programs, on the other hand, license both the object and the source code, permitting the user to run, modify and possibly redistribute the programs. With access to the source code, the users have the freedom to run the program for any purpose, redistribute, probe, adapt, learn from, customise the software to suit their needs, and release improvements to the public for the good of the community. Hence, some FOSS is also known as free software,

where “free” refers, first and foremost, to the above freedoms rather than in the monetary sense of the word.

Within the public health sector, FOSS can potentially have a range of benefits, including:

- Lower costs as it does not involve paying for prohibitive license costs.
- Given the information needs for the health sector are constantly changing and evolving, there is a need for the user to have the freedom to make the changes as per the user requirements. This is often limited in proprietary systems.
- Access to source code to enable integration and interoperability. In the health sector interoperability between different software applications is becoming increasingly important, meaning enabling two or more systems to communicate metadata and data. This work is a lot easier, and sometimes dependent on the source code being available to the developers that create the integration. This availability is often not possible in the case of proprietary software. And when it is, it comes at a high cost and contractual obligations.
- FOSS applications like DHIS2 typically are supported by a global network of developers, and thus have access to cutting edge research and development knowledge.

## Using the Data Entry app

### About the Data Entry app

The **Data Entry** app is where you manually enter aggregated data in DHIS2. You register data for an organisation unit, a period, and a set of data elements (data set) at a time. A data set often corresponds to a paper-based data collection tool. You configure the data sets in the **Maintenance** app.

#### Note

If a data set has both a section form and a custom form, the system displays the custom form during data entry. Users who enter data can't select which form they want to use. In web-based data entry the order of display preference is:

1. Custom form (if it exists)
2. Section form (if it exists)
3. Default form

Mobile devices do not support custom forms. In mobile-based data entry the order of display preference is:

1. Section form (if it exists)
2. Default form

When you close an organisation unit, you can't register or edit data to this organisation unit in the **Data Entry** app.

## Enter data in a data entry form

The screenshot shows the DHIS2 Data Entry app interface. The top navigation bar includes the 'dhis2' logo, the text 'DHIS 2 Demo - Sierra Leone', and icons for 'Apps' and 'Profile'. On the left, a tree view shows the hierarchy of organisation units, with 'Ngelehun CHC' selected. The main content area is titled 'Data Entry' and displays a form for the selected organisation unit. The form includes fields for 'Organisation Unit' (Ngelehun CHC), 'Data Set' (Mortality < 5 years), and 'Period' (December 2014). There are also buttons for 'Prev year' and 'Next year'. To the right of the form are buttons for 'Run validation', 'Print form', and 'Print blank form'. Below the form is a table titled 'default' with two columns: 'Filter in section' and 'Value'. The table lists various diseases and their corresponding value input fields. At the bottom of the form area, there are buttons for 'Complete', 'Incomplete', and 'Run validation'.

1. Open the **Data Entry** app.
2. In the organisation unit tree to the left, select an organisation unit.
3. Select a **Data set**.
4. Select a **Period**.

The available periods are controlled by the period type of the data set (reporting frequency). You can jump a year back or forward by clicking **Prev year** or **Next year**.

### Note


Depending on how you've configured the data entry form, you might have to enter additional information before you can open the data entry form. This can for example be a project derived from a category combination.

5. Enter data in the data entry form.
  - A green field means that the system has saved the value.
  - A grey field means that the field is disabled and you can't enter a value. The cursor will automatically jump to the next open field.

- To move to the next field, press the Tab key or the Down Arrow key.
  - To move back to the previous field, press Shift+Tab or the Up Arrow key.
  - If you type in an invalid value, for example a character in a field that only accepts numeric values, you'll get a pop-up that explains the problem and the field will be coloured yellow (not saved) until you have corrected the value.
  - If you have defined a minimum maximum value range for the field and you enter a value that is outside this range, you'll get a pop-up message that says the value is out of range. The value remains unsaved until you've changed the value or updated the value range and then re-entered the value.
6. When you've filled in the form, click **Run validation** in the top right corner or below the data entry form.

All validation rules which involves data elements in the current data entry form (data set) are then run against the new data. If there are no violations of the validation rules, you'll see a message saying *The data entry screen successfully passed validation*. If there are validation violations, they will be presented in a list.

**Validation** ✕

Validation Result 

The data entry screen has the following validation errors, please correct

| Validation rule   | Left side | Operator | Right side |
|---|-----------|----------|------------|
| Slept under LLIN at measles (fixed < 1y) cannot be higher than measles doses given (fixed < 1y) | 7.0       | <=       | 4.0        |

7. (Optional) Correct validation violations.

**Note**

Zero (0) will delete the value if the data element has been configured to not store zeros.

8. When you've corrected errors and you're done with data entry, click **Complete**.

The system uses this information when generating completeness reports for district, county, province or the national level.

## Mark a data value for follow-up

ANC 1st visit (Fixed)
✕

Comment ★

Save comment

Min-max limits

|  |   |
|--|---|
| <span style="color: green;">■</span> Min limit | <input style="width: 60%;" type="text" value="1"/>  |
| <span style="color: blue;">■</span> Max limit  | <input style="width: 60%;" type="text" value="23"/> |
| <span style="color: yellow;">■</span> Average  | 14.2  |

Stored by Tom Wakiki

Last updated 2014-03-05

Data element history

Audit trail

| Month          | Value |
|----------------|-------|
| January 2013   | 15.0  |
| February 2013  | 5.0   |
| March 2013     | 7.0   |
| April 2013     | 15.0  |
| May 2013       | 20.0  |
| June 2013      | 20.0  |
| July 2013      | 11.0  |
| August 2013    | 17.0  |
| September 2013 | 14.0  |
| October 2013   | 16.0  |
| November 2013  | 20.0  |
| December 2013  | 13.0  |
| January 2014   | 12.0  |

If you for example have a suspicious value that you need to investigate further, you can keep it the system, but mark it for follow-up. In the **Data Quality** app you can then run a follow-up analysis to view and correct all marked values.

1. Open the **Data Entry** app.
2. Open an existing data entry form.
3. Double-click the field with the value you want to mark for follow-up.
4. Click the star icon.

### Edit data values in a completed data entry form

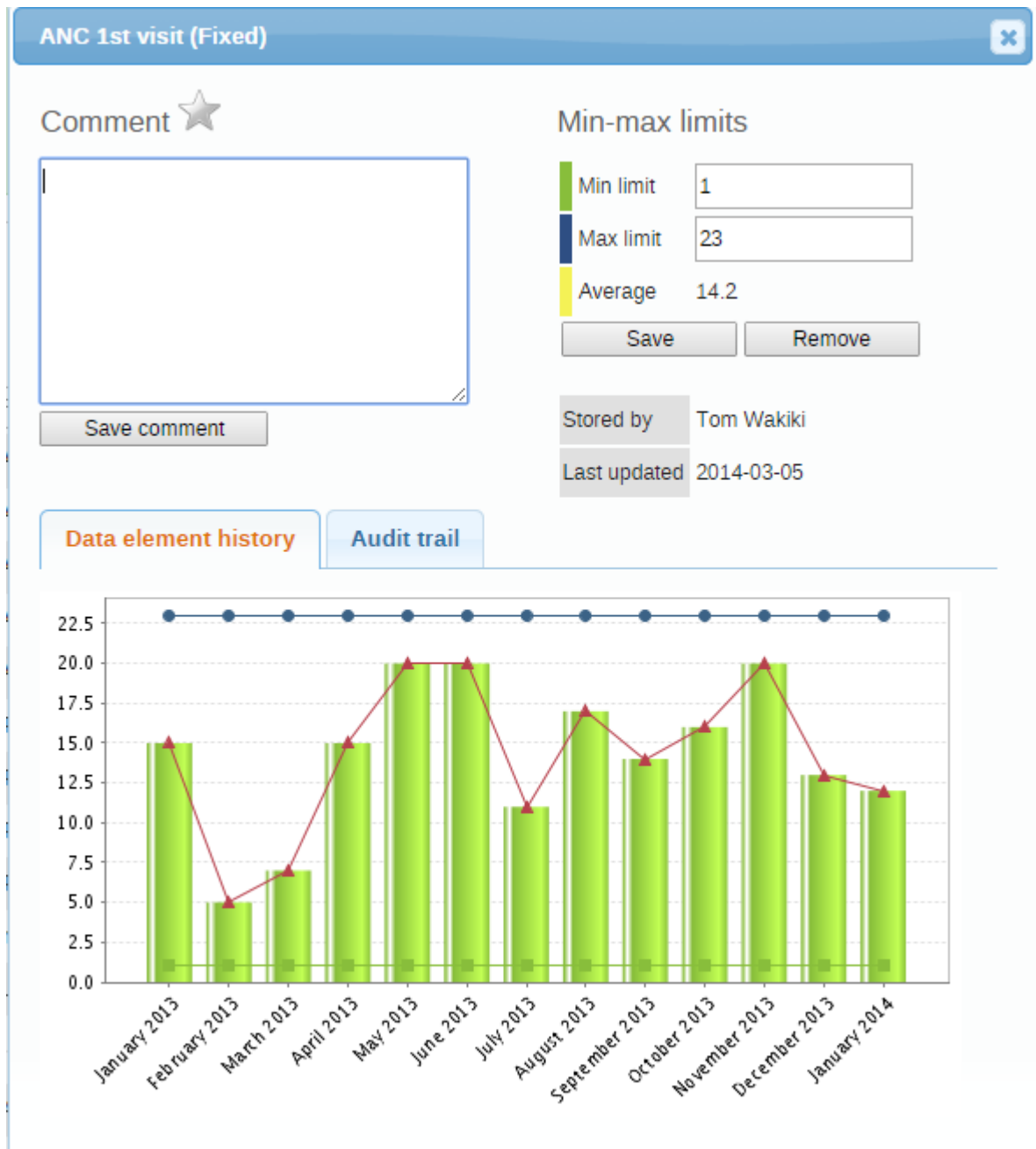
1. Open the **Data Entry** app.
2. Open an existing data entry form.

- Click **Incomplete**.
- 3.
4. Change the relevant data values.

**Note**

Zero (0) will delete the value if the data element has been configured to not store zeros,

5. Click **Complete**.

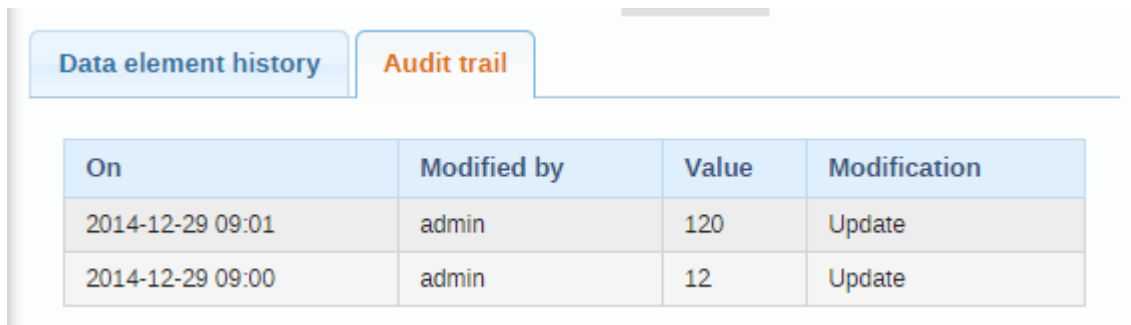
**Display a data value's history**

You can display the last 12 values registered for a field.

1. Open the **Data Entry** app.
2. Open an existing data entry form.

3. Double-click the field with the value you want to view the history for.
4. Click **Data element history**.

### Display a data value's audit trail



| On               | Modified by | Value | Modification |
|------------------|-------------|-------|--------------|
| 2014-12-29 09:01 | admin       | 120   | Update       |
| 2014-12-29 09:00 | admin       | 12    | Update       |

The audit trail allows you to view other data values which have been entered prior to the current value. The audit trail also shows when the data value was altered and which user who made the changes.

1. Open the **Data Entry** app.
2. Open an existing data entry form.
3. Double-click the field with the value you want to view the audit trail for.
4. Click **Audit trail**.



## Create minimum maximum value range manually

ART enrollment stage 1 Male, <15y
✕

**Comment** ★

**Min-max limits**

Min limit

Max limit

Average

Stored by John Traore

Last updated 2016-03-08

Data element history

Audit trail

| Month          | Value 1 (Blue) | Value 2 (Green) |
|----------------|----------------|-----------------|
| February 2015  | 23             | 1               |
| March 2015     | 23             | 1               |
| April 2015     | 23             | 1               |
| May 2015       | 23             | 1               |
| June 2015      | 23             | 1               |
| July 2015      | 23             | 1               |
| August 2015    | 23             | 1               |
| September 2015 | 23             | 1               |
| October 2015   | 23             | 1               |
| November 2015  | 23             | 1               |
| December 2015  | 23             | 1               |
| January 2016   | 23             | 1               |
| February 2016  | 23             | 1               |

1. In the **Data Entry** app, open a data entry form.
2. Double-click the field for which you want to set the minimum maximum value range.
3. Enter **Min limit** and **Max limit**.
4. Click **Save**.

If values don't fall within the new value range the next time you enter data, the data entry cell will appear with an orange background.

5. (Optional) Type a comment to explain the reason for the discrepancy, for example an event at a facility which may have generated a large number of clients.
6. (Optional) Click **Save comment**.

**Tip**

25

Click the star icon to mark the value for further follow-up.

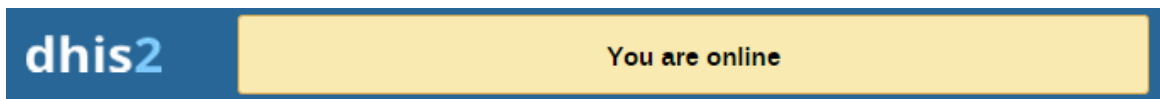
## Enter data offline

The **Data Entry** app works even if you don't have a stable Internet connection during data entry. When you don't have an internet connection, the data you enter is saved to your local computer. When the Internet connection is back, the app will push the data to the server. The total bandwidth usage is reduced since data entry forms no longer are retrieved from the server for each rendering.

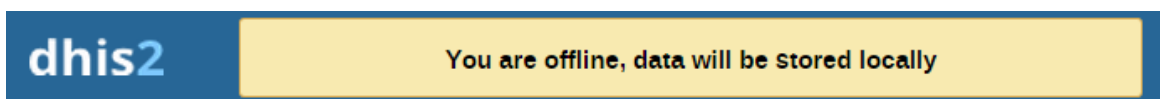
### Note

To use this functionality, you must login to the server while you've an Internet connection.

- When you're connected to the Internet, the app displays this message at the top of the data entry form:

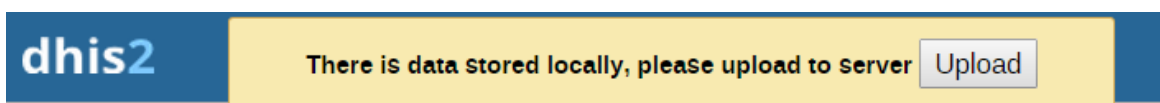


- If your Internet connection breaks during data entry, the app detects it and displays this message:



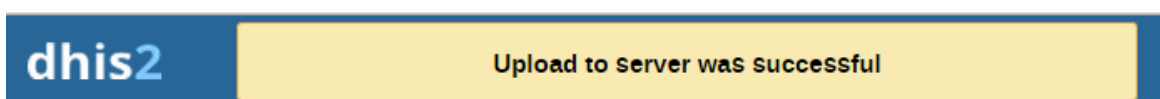
Now your data will be stored locally. You can continue to enter data as normal.

- Once you have entered all necessary data and the app detects that the Internet connection is back, you'll see this message:



Click **Upload** to synchronize data with the server.

- When the data has successfully synchronized with the server, you'll see this confirmation message:



## Enable multi-organisation unit data entry

Data Entry 

Organisation Unit

Data Set

Period

|               | BCG doses given |     |          |     | Fully Immunized child |     |          |     | LLITN gi |     |
|---------------|-----------------|-----|----------|-----|-----------------------|-----|----------|-----|----------|-----|
|               | Fixed           |     | Outreach |     | Fixed                 |     | Outreach |     | Fixed    |     |
|               | <1y             | >1y | <1y      | >1y | <1y                   | >1y | <1y      | >1y | <1y      | >1y |
| Ngelehun CHC  | 12              | 23  | 23       | 23  | 7                     | 23  |          |     |          |     |
| Njandama MCHP | 14              |     |          |     |                       |     |          |     |          |     |

|               | Children getting therapeutic feeding |     |          |     | Children supplied with food supplementes |     |          |     | Mebendazole/Albendazo |     |
|---------------|--------------------------------------|-----|----------|-----|--|-----|----------|-----|-----------------------|-----|
|               | Fixed                                |     | Outreach |     | Fixed                                    |     | Outreach |     | Fixed                 |     |
|               | <1y                                  | >1y | <1y      | >1y | <1y                                      | >1y | <1y      | >1y | <1y                   | >1y |
| Ngelehun CHC  | 8                                    | 16  | 123      |     |  |     |          |     |                       | 14  |
| Njandama MCHP |                                      |     |          |     |  |     |          |     |                       | 12  |

It can be useful to enter data for multiple organisation units in the same data entry form, for instance if there are few data elements in the form and a huge number of organisation units in the hierarchy. In that case, you can enable multi-organisation unit data entry.

### Note

Multi-organisation unit data entry only works for section forms.

1. Open the **System Settings** app.
2. Select **Enable multi-organisation unit forms**.
3. In the **Data Entry** app, select the organisation unit immediately above the organisation unit you want to enter data for in the organisation unit hierarchy.

Data elements will appear as columns and organisation units as rows in the form.

### Note

The data entry forms should still be assigned to the facilities that you actually enter data for, that is the organisation units now appearing in the form.

## See also

- [Control data quality](#)
- [Manage data sets and data entry forms](#)
- [Using the Maintenance app](#)

## Control data quality

### About data quality checks

The **Data Quality** app contains tools to validate the accuracy and reliability of the data in the system. You can assess different dimensions of data quality as outlined in the table below:

| Dimension    | Description   |
|--------------|---|
| Correctness  | Data should be within the normal range for data collected at that facility. There should be no gross discrepancies when compared with data from related data elements.                              |
| Completeness | Data for all data elements for all reporting organisation units should have been submitted.   |
| Consistency  | Data should be consistent with data entered during earlier months and years while allowing for changes with reorganization, increased work load, etc. and consistent with other similar facilities. |
| Timeliness   | All data from all reporting organisation units should be submitted at the appointed time.   |

You can verify data quality in different ways, for example:

- At point of data entry, DHIS 2 can check the data entered to see if it falls within the minimum maximum value ranges of that data element (based on all previous data registered).
- By defining validation rules, which can be run once the user has finished data entry. The user can also check the entered data for a particular period and organization unit(s) against the validation rules, and display the violations for these validation rules.
- By analysing data sets, that is, examine gaps in the data.
- By data triangulation, that is, comparing the same data or indicator from different sources.

### Validation rule analysis

#### About validation rule analysis

A validation rule is based on an expression which defines a relationship between data element values. The expression forms a condition which should assert that certain logical criteria are met.

The expression consist of:

- a left side
- a right side
- an operator

---

A validation rule could assert that "Suspected malaria cases tested" >= "Confirmed malaria cases".

The validation rule analysis tests validation rules against the data registered in the system. Validation violations are reported when the condition defined in the validation rule expression is not met, which means when the condition is false.

You can configure a validation rule analysis to automatically send out information about validation violations to selected user groups. These messages are called *validation notifications* and you create them in the **Maintenance** app. Validation notifications are sent via the internal DHIS 2 messaging system.

### Workflow

1. In the **Maintenance** app, create validation rules and validation rule groups.
2. (Optional) In the **Maintenance** app, create validation notifications.
3. Run the validation rule analysis, either automatically or manually.
  - In the **Scheduler** app, you schedule the validation rule analysis to run automatically for all validation rules included in one or several validation rule groups. After the system has run the analysis, you'll see the validation violations (if any) in the validation notifications sent via the internal DHIS 2 messaging system.
  - In the **Data Quality** app, you run the validation rule analysis manually for selected validation rules. After the analysis process has finished, you'll see a list of validation violations (if any).

### Schedule a validation rule analysis to run automatically

#### Note

Only validation rules that are included in one or several validation notifications will be a part of the validation rule analysis. If there is no corresponding validation notification for a validation rule, no notification will be sent.

#### Note

While running validation rule analysis automatically, any results not already persisted, will be persisted during this run. Persisted results can currently only be accessed through the API. Consult the developers guide for more information about how persisted validation rule violations can be accessed.

1. Verify that you have created all the validation rules, validation rule groups and validation notifications you need.
2. Open the **Scheduler** app and click the add button in the bottom right corner.
3. Choose a suitable Name for the new job.
4. Select the **Monitoring** Job type using the drop-down menu.
5. Select a running frequency for the job, i.e. when and how often the job should run.
6. Fill in the **Parameters** section, including the Validation rule groups.

- Press the **Add job** button to confirm the job creation. For more information on adding jobs, see [Scheduling](#).

### Run a validation rule analysis manually

## Validation Rule Analysis ?

Parent organisation unit

- ▼  Sierra Leone
  - ▼  Bo
    - Badjia
    - Baoma**
    - Bargbe
    - Bargbo
    - Bumpe Ngao
    - Gbo
    - Jaiama Bongor
    - Kakua
    - Komboya
    - Lugbu
    - Niawa Lenga
    - Selenga
    - Tikonko
    - Valunia
    - Wonde
  - Bombali
  - Bonthe
    - Jawa Tengah
  - Kailahun
  - Kambia
  - Kenema

Start Date  
**2018-10-01**

---

End Date  
**2018-11-27**

---

Validation Rule Group  
**[All Validation Rules]**

---

Send Notifications

Persist new results

1. Verify that you have created all the validation rules, validation rule groups and validation notifications you need.
2. Open the **Data Quality** app and click **Validation rule analysis**.
3. Select **Start date** and **End date**.
4. Select which **Validation rule group** you want to include in the analysis.

You can select all validation rules or all validation rules from a single validation rule group.

5. (Optional) Select **Send notifications** to trigger validation notifications.

#### Note

If you want to send out validation notifications, you must first create them in the **Maintenance** app.

6. (Optional) Select *Persist new results* to persist any non-persisted results found during the analysis

Select a **Parent organisation unit**.

7.

8. Click **Validate**.

The analysis process duration depends on the amount of data that is being analysed. If there are no violations of the validation rules, you'll see a message saying *Validation passed successfully*. If there are validation violations, they will be presented in a list.

The screenshot shows a web interface titled "Validation Rule Analysis" with a back arrow and a help icon. At the top right, there are three download options: "DOWNLOAD AS PDF", "DOWNLOAD AS XLS", and "DOWNLOAD AS CSV". Below these is a table with the following columns: Organisation Unit, Period, Importance, Validation Rule, Value, Operator, Value, and Details. The table contains six rows of data, each with an information icon in the Details column.

| Organisation Unit | Period      | Importance | Validation Rule | Value | Operator | Value | Details |
|-------------------|-------------|------------|-----------------|-------|----------|-------|---------|
| Baoma             | October ... | MEDIUM     | Malaria ...     | 10.00 | >        | 91.00 |         |
| Baoma ...         | October ... | MEDIUM     | ANC 2 c...      | 26.00 | <=       | 15.00 |         |
| Blamaw...         | October ... | MEDIUM     | Questio...      | 5.00  | <=       | 4.00  |         |
| Blamaw...         | October ... | MEDIUM     | Early bre...    | 14.00 | <=       | 11.00 |         |
| Blamaw...         | October ... | MEDIUM     | Questio...      | 7.00  | <=       | 5.00  |         |
| Blamaw...         | October ... | MEDIUM     | Questio...      | 19.00 | <=       | 5.00  |         |

9. (Optional) Click the show details icon to get more information about a validation violation. In the pop-up window you'll find information about the data elements included in the validation rules and their corresponding data values. You can use this information to identify the source of the validation rule violation.

10. (Optional) Click **Download as PDF**, **Download as Excel** or **Download as CSV** to download the validation violations list in PDF, Excel or CSV formats.

## See also

- [Manage validation rules](#)
- [Data Administration app](#)

## Standard deviation outlier analysis

### About standard deviation outlier analysis

The standard deviation outlier analysis identifies values that are numerically distant from the rest of the data, potentially indicating that they are outliers. The analysis is based on the standard normal distribution. DHIS 2 calculates the mean of all values for an organisation unit, data element, category option combination and attribute option combination. Outliers can occur by chance of course, but can potentially indicate a measurement or data entry error.

#### Note

As indicated above, this data quality analysis is only appropriate for data which is actually normally distributed. Data which has large seasonal variation, or which may be distributed according to other statistical models (e.g. logistical ) may lead values being flagged which actually should be considered valid. It is therefore recommended to confirm first,

whether the data actually is normally distributed before running a standard deviation outlier analysis.

## Run a standard deviation outlier analysis

Std Dev Outlier Analysis ?

Data Set

- ART monthly summary
- Child Health**
- Clinical Monitoring Checklist
- Emergency Response
- EPI Stock
- Expenditures
- Facility Assessment
- HIV Care Monthly
- HIV Peadiatric monthly summary
- IDSR Weekly
- IDSR Weekly (Start Wednesday)
- Inpatient Morbidity/Mortality Summary
- Life-Saving Commodities
- MNCH Quarterly Report
- Morbidity

Parent organisation unit

- Sierra Leone
  - Bo
  - Bombali
  - Bonthe
    - Jawa Tengah
  - Kailahun
  - Kambia
  - Kenema
  - Koinadugu
  - Kono
  - Moyamba
  - Port Loko
  - Pujehun
  - Tonkolili
  - Western Area

Start Date

2018-07-01

End Date

2018-10-31

Select number of standard deviations

3.0

START

1. Open the **Data Quality** app and click **Std dev outlier analysis**.
2. Select **From date** and **To date**.
3. Select data set(s).
4. Select **Parent organisation unit**.

All children of the organisation unit will be included. The analysis is made on raw data "under" the parent organisation unit, not on aggregated data.

5. Select the number of standard deviations.

This refers to the number of standard deviations the data is allowed to deviate from the mean before it is classified as an outlier.

6. Click **Start**.

The analysis process duration depends on the amount of data that is being analysed. If there are standard deviations outliers, they will be presented in a list.



← Std Dev Outlier Analysis ?

[DOWNLOAD AS PDF](#)   [DOWNLOAD AS XLS](#)   [DOWNLOAD AS CSV](#)

| Data Element        | Organisation Unit | Period         | Min     | Value  | Max    | Mark                     |
|---------------------|-------------------|----------------|---------|--------|--------|--------------------------|
| OPV0 doses given    | Ngelehun CHC      | July 2018      | -152.00 | 245.00 | 237.00 | <input type="checkbox"/> |
| OPV3 doses given    | Mendewa MCHP      | August 2018    | -2.00   | 12.00  | 11.00  | <input type="checkbox"/> |
| Yellow Fever do...  | Yemoh Town CHC    | September 2018 | -324.00 | 466.00 | 427.00 | <input type="checkbox"/> |
| Measles doses ...   | Yemoh Town CHC    | September 2018 | -324.00 | 466.00 | 427.00 | <input type="checkbox"/> |
| Weight for heigh... | Sembehun 17 C...  | July 2018      | -17.00  | 37.00  | 36.00  | <input type="checkbox"/> |

For each outlier, you will see the data element, organisation unit, period, minimum value, actual value and maximum value. The minimum and maximum values refer to the border values derived from the number of standard deviations selected for the analysis.

#### Tip

Click the star icon to mark an outlier value for further follow-up.

## Minimum maximum outlier analysis

### About minimum maximum value based outlier analysis

You can verify the data quality at the point of data entry by setting a minimum/maximum value range for each data value. You can define the value ranges manually or generate them automatically.

The auto-generated minimum maximum value range is suitable only for normally distributed data. DHIS2 will determine the arithmetic mean and standard deviation of all values for a given data element, category option, organisation unit and attribute combination. Then the system will calculate the minimum maximum value range based on the **Data analysis std dev factor** specified in the **System Settings** app.

For data which is highly-skewed or zero inflated (as is often the case with aggregate data), the values which DHIS2 auto-generates may not provide an accurate minimum maximum value range. This can lead to excessive false violations, for example if you analyse values related to seasonal diseases.

#### Note

Minimum maximum value ranges are calculated across all attribute combination options for a given data element, category option and organisation unit combination.

### Workflow

1. Create a minimum maximum value range, either automatically or manually.
  - In the **Data Administration** app, you generate value ranges automatically.
  - In the **Data Entry** app, you may set value ranges manually.
2. In the **Data Quality** app, run the **Min-max outlier analysis**.

## Configure a minimum maximum outlier analysis

### Create minimum maximum value range automatically

### Min-Max Value Generation ?

[Open user guide](#)

**Data Set**

- ART monthly summary
- Child Health
- Clinical Monitoring Checklist
- Emergency Response
- EPI Stock
- Expenditures
- Facility Assessment
- HIV Care Monthly
- HIV Peadiatric monthly summary
- IDSR Weekly
- IDSR Weekly (Start Wednesday)
- Inpatient Morbidity/Mortality Summary
- Life-Saving Commodities

**Organisation Unit Selection**

- ▼  **Sierra Leone**
  - ▶  Bo
  - ▶  Bombali
  - ▶  Bonthe
  - ▶  Kailahun
  - ▶  Kambia
  - ▶  Kenema
  - ▶  Koinadugu
  - ▶  Kono
  - ▶  Moyamba
  - ▶  Port Loko
  - ▶  Pujehun
  - ▶  Tonkolili
  - ▶  Western Area

GENERATE
REMOVE

#### Note

Auto-generated minimum maximum value ranges can be useful for many situations, but it's recommended to verify that the data is actually normally distributed prior to using this function.

You generate minimum maximum value ranges calculated by data set in the **Data Administration** app. The new value ranges override any value ranges that the system has calculated previously.

#### 1. Set the **Data analysis standard deviation (std dev) factor**:

1. Open the **System Settings** app, and click **General**.
2. In the **Data analysis std dev factor** field, enter a value.

This sets the number of standard deviations to use in the outlier analysis. The default value is 2. Higher values indicate a broader distribution, which may lead to outliers not being flagged correctly by the analysis.

#### 2. Open the **Data Administration** app and click **Min-max value generation**.

#### 3. Select data set(s).

#### 4. Select an **Organisation unit**.

Click **Generate**.

5.

New minimum maximum value ranges for all data elements in the selected data sets for all organisation units (including descendants) of the selected organisation units are generated.

### Create minimum/maximum value range manually

ART enrollment stage 1 Male, <15y
✕

**Comment** ★

**Min-max limits**

|  |  |
|--|--|
| <span style="color: green;">■</span> Min limit | <input style="width: 60%;" type="text" value="1"/>   |
| <span style="color: blue;">■</span> Max limit  | <input style="width: 60%;" type="text" value="23"/>  |
| <span style="color: yellow;">■</span> Average  | <input style="width: 60%;" type="text" value="0.0"/> |

Stored by John Traore

Last updated 2016-03-08

Data element history

Audit trail

| Month          | Blue Line Value | Green Line Value |
|----------------|-----------------|------------------|
| February 2015  | 22.5            | 1.0              |
| March 2015     | 22.5            | 1.0              |
| April 2015     | 22.5            | 1.0              |
| May 2015       | 22.5            | 1.0              |
| June 2015      | 22.5            | 1.0              |
| July 2015      | 22.5            | 1.0              |
| August 2015    | 22.5            | 1.0              |
| September 2015 | 22.5            | 1.0              |
| October 2015   | 22.5            | 1.0              |
| November 2015  | 22.5            | 1.0              |
| December 2015  | 22.5            | 1.0              |
| January 2016   | 22.5            | 1.0              |
| February 2016  | 22.5            | 1.0              |

1. In the **Data Entry** app, open a data entry form.
2. Double-click the field for which you want to set the minimum/maximum value range.
3. Enter **Min limit** and **Max limit** in the dialog that appears.
4. Click **Save**.

If values don't fall within the new value range the next time you enter data, the data entry cell will appear with an orange background.

(Optional) Type a comment to explain the reason for the discrepancy, for example an event

5. at a facility which may have generated a large number of clients.

6. (Optional) Click **Save comment**.

### Tip

Click the star icon to mark the value for further follow-up.

### Delete minimum maximum value range

You can permanently delete all minimum maximum value ranges for selected data sets and organisation units in the **Data Administration** app.

1. Open the **Data Administration** app and click **Min-max value generation**.
2. Select data set(s).
3. Select an **Organisation unit**. Note, that the selection cascades to descendant organisation units!
4. Click **Remove**.

### Run a minimum maximum outlier analysis

## Min-Max Outlier Analysis ?

**Data Set**

- ART monthly summary
- Child Health
- Clinical Monitoring Checklist
- Emergency Response
- EPI Stock
- Expenditures
- Facility Assessment
- HIV Care Monthly
- HIV Peadiatric monthly summary
- IDSR Weekly
- IDSR Weekly (Start Wednesday)
- Inpatient Morbidity/Mortality Summary
- Life-Saving Commodities
- MNCH Quarterly Report

**Parent organisation unit**

- ▼  Sierra Leone
  - ▶  Bo
  - ▶  **Bombali**
  - ▶  Bonthe
  - ▶  Kailahun
  - ▶  Kambia
  - ▶  Kenema
  - ▶  Koinadugu
  - ▶  Kono
  - ▶  Moyamba
  - ▶  Port Loko
  - ▶  Pujehun
  - ▶  Tonkolili
  - ▶  Western Area

**Start Date**

2018-09-01

---

**End Date**

2018-11-28

**START**

1. Verify that you've created minimum maximum value ranges.
2. Open the **Data Quality** app and click **Min-max outlier analysis**.
3. Select **From date** and **To date**.
4. Select which data set(s) you want to include in the analysis.

Select **Parent organisation unit**.

5.

All children of the organisation unit will be included. The analysis is made on raw data "under" the parent organisation unit, not on aggregated data.

6. Click **Start**.

The analysis process duration depends on the amount of data that is being analysed. If there are validation violations, they will be presented in a list.

| Data Element    | Organisation Unit | Period         | Min  | Value | Max   | Mark                     |
|-----------------|-------------------|----------------|------|-------|-------|--------------------------|
| ART enrollme... | Ngelehun CHC      | September 2... | 1.00 | 24.00 | 23.00 | <input type="checkbox"/> |

7. (Optional) Click **Download as PDF**, **Download as Excel** or **Download as CSV** to download the list in PDF, Excel or CSV formats.

#### Tip

Click the star icon to mark the value for further follow-up.

## Follow-up analysis

### About follow-up analysis

The follow-up analysis creates a list of all data values marked for follow-up. You can mark a data value for follow-up in the **Data Entry** app and in the result list you get from a standard deviation outlier or minimum maximum outlier analysis.

## Create list of data values marked for follow-up

### Follow-Up Analysis ?

**Data Set**

- ART monthly summary
- Child Health
- Clinical Monitoring Checklist
- Emergency Response
- EPI Stock
- Expenditures
- Facility Assessment
- HIV Care Monthly
- HIV Peadiatric monthly summary
- IDSR Weekly
- IDSR Weekly (Start Wednesday)
- Inpatient Morbidity/Mortality Summary
- Life-Saving Commodities
- MNCH Quarterly Report

**Parent organisation unit**

- ▼  Sierra Leone
  - ▶  Bo
  - ▶  Bombali
  - ▶  Bonthe
  - ▶  Kailahun
  - ▶  Kambia
  - ▶  Kenema
  - ▶  Koinadugu
  - ▶  Kono
  - ▶  Moyamba
  - ▶  Port Loko
  - ▶  Pujehun
  - ▶  Tonkolili
  - ▶  Western Area

**Start Date**  
2018-06-01

---

**End Date**  
2018-11-28

**FOLLOW UP**

1. Open the **Data Quality** app and click **Follow-up analysis**.

2. Select a data set or multiple data sets.

3. Select a parent **Organisation unit**.

The analysis process duration depends on the amount of data that is being analysed. If there are data values marked for follow-up, they will be presented in a list.

4. Select a **Start Date** and **End Date** which defines the periods which you are interested in looking for values which have been marked for follow up.

5. Press **Follow up** to generate a list of values which have been marked for follow up.

6. (Optional) Click **Download as PDF**, **Download as Excel** or **Download as CSV** to download the validation violations list in PDF, Excel or CSV formats.

### ← Follow-Up Analysis ?

[DOWNLOAD AS PDF](#)   [DOWNLOAD AS XLS](#)   [DOWNLOAD AS CSV](#)

| Data Element  | Organisation Unit | Period      | Min  | Value | Max   | Unfollow                 | Comment |
|---------------|-------------------|-------------|------|-------|-------|--------------------------|---------|
| ART enroll... | Ngelehun ...      | Septembe... | 1.00 | 24.00 | 23.00 | <input type="checkbox"/> |         |

**UNFOLLOW**

[DOWNLOAD AS PDF](#)   [DOWNLOAD AS XLS](#)   [DOWNLOAD AS CSV](#)

**Tip**

---

Click the star icon to remove the follow-up tag from the data value. You can also enter a comment in the field to indicate any additional information regarding the value.

## Using the Capture app

### About the Capture app

The Capture app serves as a replacement for the Event Capture app. In the future, the intention is to incorporate the Tracker Capture app and the Data Entry app into the Capture app.

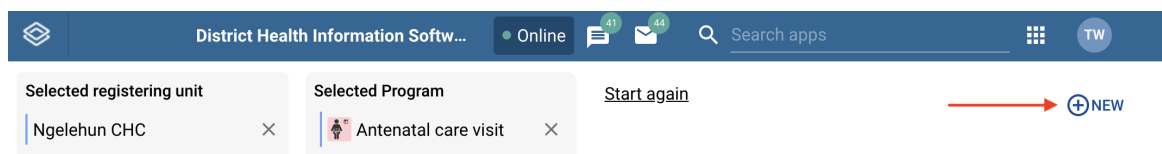
In the Capture app you register events that occurred at a particular time and place. An event can happen at any given point in time. This stands in contrast to routine data, which can be captured for predefined, regular intervals. Events are sometimes called cases or records. In DHIS2, events are linked to a program. The Capture app lets you select the organisation unit and program and specify a date when a event happened, before entering information for the event.

### Register an event

1. Open the **Capture** app.
2. Select an organisation unit.
3. Select a program.

You'll only see programs associated with the selected organisation unit and programs you've access to, and that is shared with your user group through data level sharing.

4. If the program has a category combination set the category option will have to be selected.
5. Click **New**.



*create new event*

6. Fill in the required information. If the programs program stage is configured to capture a location:
  - If the field is a coordinate field you can either enter the coordinates directly or you can click the **map** icon to the left of the coordinate field. The latter one will open a map where you can search for a location or set on directly by clicking on the map.
  - If the field is a polygon field you can click the **map** icon to the left of the field. This will open a map where you can search for a location and capture a polygon (button in the upper righth corner of the map).
7. If desired you can add a comment by clicking the **Write comment** button at the bottom of the form.
8. If desired you can add a relationship by clicking the **Add relationship** button at the bottom of the form. See the section about **Adding a relationship** for more information.
9. Click **Save and exit** or click the arrow next to the button to select **Save and add another**.
  - **Save and add another** will save the current event and clear the form. All the events that you have captured will be displayed in a list at the bottom of the page. When you want to finish capturing events you can, if the form is blank, click the finish button or



if your form contains data click the arrow next to **Save and add another** and select **Save and exit**.

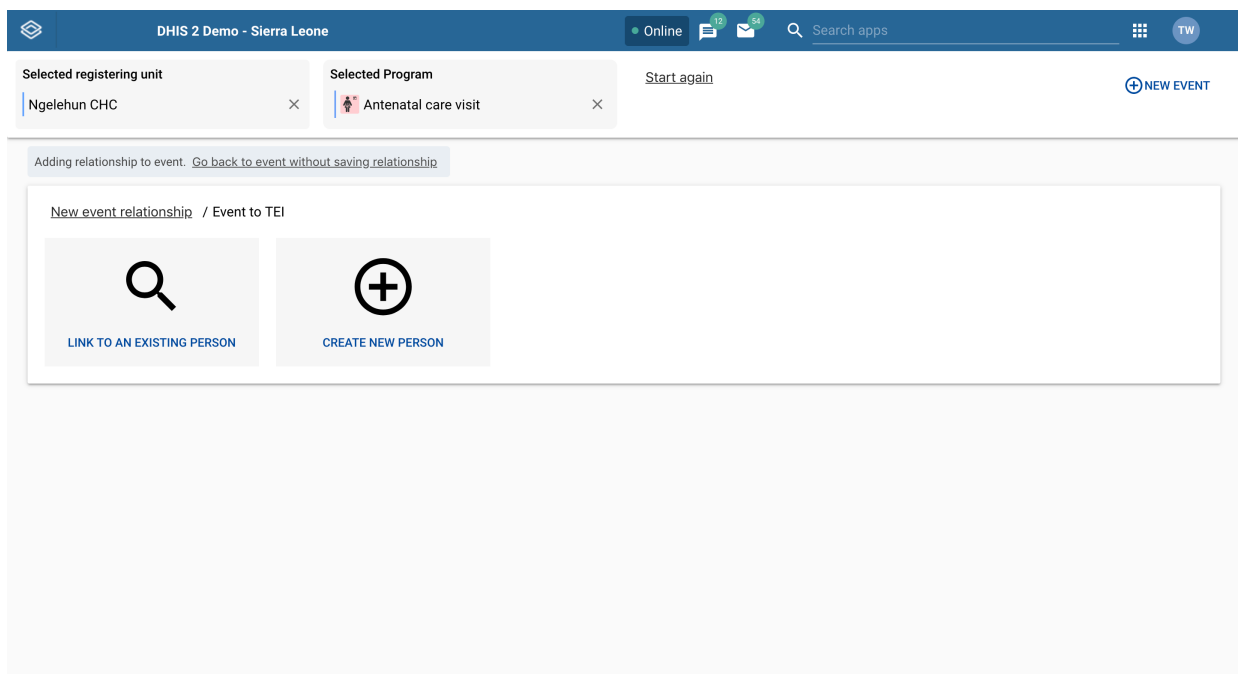
Note 1: Some data elements in an event might be mandatory (marked with a red star next to the data element label). What this means is that all mandatory data elements must be filled in before the user is allowed to complete the event. The exception to this is if the user has the authority called **"Ignore validation of required fields in Tracker and Event Capture"**. If the user has this authority, the mandatory data elements will not be required to be filled in before saving and the red star will not be displayed next to the data element label. Note that super user that have the **"ALL"** authority automatically have this authority.

Note 2: The data entry form can also be displayed in **row view**. In this mode the data elements are arranged horizontally. This can be achieved by clicking the **Switch to row view** button on the top right of the data entry form. If you are currently in **row view** you can switch to the default form view by clicking the **Switch to form view** button on the top right of the data entry form.

## Adding a relationship

Relationships can be added either during registration, editing or viewing of an event. Currently the **Capture App** only supports *Event to Tracked Entity Instance* relationships.

1. While in an event, click **Add relationship**.
2. Select the relationship type you want to create.
3. You now have two options: **Link to an existing Tracked Entity Instance** or **Create new Tracked Entity Instance**.



*relationship options*

## Link to an existing Tracked Entity Instance

1. Click **Link to an existing Tracked Entity Instance**.
2. You should now be presented with some options for searching for a **Tracked Entity Instance**. You have the option to select a **program**. If a **program** is selected the attributes are derived from the selected **program**. If no **program** is selected, only the attributes that belong to the **Tracked Entity Instance** will be visible.

The screenshot shows the DHIS 2 Demo interface for Sierra Leone. At the top, there is a navigation bar with 'Online', notification icons, and a search bar. Below the navigation bar, there are two tabs: 'Selected registering unit' (Ngelehun CHC) and 'Selected Program' (Antenatal care visit). A 'Start again' link and a 'NEW EVENT' button are also visible. The main content area is titled 'Adding relationship to event. Go back to event without saving relationship'. It contains a search form with the following fields and options:

- Breadcrumbs: [New event relationship](#) / [Event to TEI](#) / [Search](#)
- Program: A dropdown menu with an upward arrow.
- Selected program: A text input field.
- Search Unique ID: A dropdown menu with an upward arrow.
- Unique ID \*: A text input field.
- SEARCH UNIQUE ID: A text input field.
- Search by attributes: A dropdown menu with a downward arrow.

### *search for Tracked Entity Instance*

- If the **Tracked Entity Instance** or **program** is configured with a unique attribute, this attribute can be used for finding a specific **Tracked Entity Instance** or **program**. This attribute should be presented alone. When the unique attribute field has been filled out, click the **Search** button located right below the unique attribute field.
  - If the **Tracked Entity Instance** or **program** has attributes these can be used for searching by expanding the **Search by attributes** box. When all desired attribute fields have been filled out, click the **Search by attributes** button located at the bottom. You can also limit the search by setting the **Organisation unit scope**. If set to *All accessible* you will search for the **Tracked Entity Instance** in all organisation units you have access to. If you select *Selected*, you will be asked to select which organisation units to search within.
3. After a successful search you will be presented with a list of **Tracked Entity Instances** matching the search criteria. To create a relationship click the **Link** button on the **Tracked Entity Instance** you would like to create a relationship to.
  4. If you did not find the **Tracked Entity Instance** you were looking for, you can either click the **New search** or **Edit search** buttons. **New search** will take you to new blank search while **Edit search** will take you back to the search you just performed keeping the search criteria.

## Create new Tracked Entity Instance

1. Click **Create new Tracked Entity Instance**.
2. You are now presented with a form for registering a new **Tracked Entity Instance**. You can choose to either register with or without a program. If a program is selected, the new

**Tracked Entity Instance** will be enrolled in said program. You can also change the **Organisation unit** by removing the one that is automatically set and selecting a new one.

*register new Tracked Entity Instance*

3. Fill in the desired (and possibly mandatory) attributes and enrollment details.
4. Click **Create Tracked Entity Instance and Link**.

Note: When filling in data you might face a warning telling you that a possible duplicate has been found. You can click the warning to see these duplicates and if the duplicate is a match you can choose to link that **Tracked Entity Instance** by clicking the **Link** button. If the warning is still present when you are done filling in data, you will not see the **Create Tracked Entity Instance and Link** button. Instead you will be presented with a button called **Review duplicates**. When you click this button a list of possible duplicates will be displayed. If any of these duplicates matches the **Tracked Entity Instance** you are trying to create you can click the **Link** button, if not you can click the **Save as new person** button to register a new **Tracked Entity Instance**.

## Edit an event

1. Open the **Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click the event you want to modify.
5. Click the **Edit event** button.
6. Modify the event details and click **Save**.

## Delete an event

1. Open the **Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click the **triple dot** icon on the event you want to delete.
5. In the menu that is displayed click **Delete event**.

The screenshot shows the District Health Information Software interface. At the top, there is a navigation bar with a logo, the text 'District Health Information Softw...', an 'Online' indicator, and notification icons for messages (41) and emails (44). A search bar labeled 'Search apps' and a 'TW' profile icon are also present. Below the navigation bar, there are two tabs: 'Selected registering unit' (Ngelehun CHC) and 'Selected Program' (Antenatal care visit). A 'Start again' button and a '+ NEW' button are also visible.

The main content area is titled 'Registered events'. It features a table with columns for 'Visit date', 'WHOMCH Smoking', and 'WHOMCH Hemoglobin value'. The table contains three rows of data:

| Visit date | WHOMCH Smoking | WHOMCH Hemoglobin value |     |
|------------|----------------|-------------------------|-----|
| 4/7/2018   | No             | 9                       | ... |
| 4/1/2018   | Yes            | 12                      | ... |
| 4/1/2018   | No             |                         | ... |

A context menu is open over the second row (4/1/2018, Yes, 12), showing a 'Delete event' option with a trash icon. At the bottom of the table, there is a 'Rows per page' dropdown set to 15, and pagination information '1-3 of 3' with navigation arrows.

*delete event*

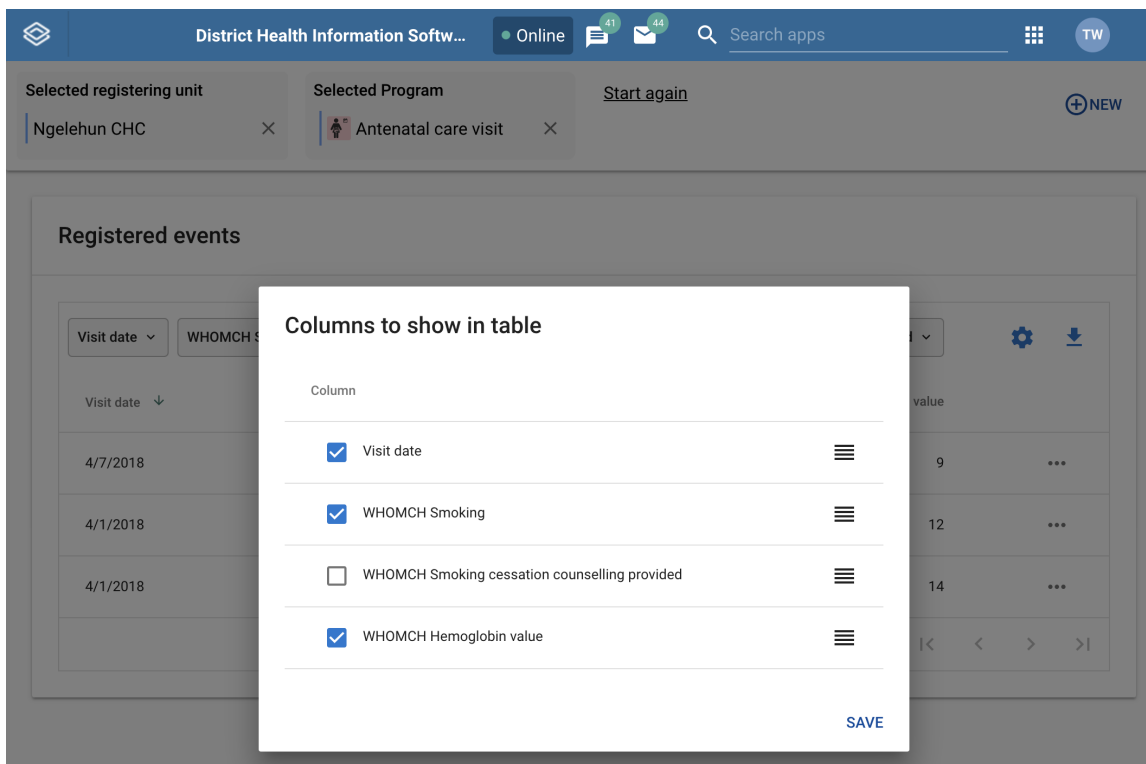
## Modify an event list layout

You can select which columns to show or hide in an event list. This can be useful for example when you have a long list of data elements assigned to a program stage.

1. Open the **Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click the **gear** icon on the top right of the event list.
5. Select the columns you want to display and click **Save**.



### *modify event list*

Note: You can reorganize the order of the data elements by dragging and dropping them in the list.

### Filter an event list

1. Open the **Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

Along the top of the event list are buttons with the same names as the column headers in the list.

4. Use the buttons on the top of the list to filter based on a report date or a specific data element.

The screenshot shows the District Health Information Software interface. At the top, there is a navigation bar with the text "District Health Information Softw...", "Online", and a search bar. Below the navigation bar, there are two tabs: "Selected registering unit" (Ngelehun CHC) and "Selected Program" (Antenatal care visit). A "Start again" button and a "NEW" button are also visible. The main content area is titled "Registered events" and contains a table with columns: "Visit date", "WHOMCH Smoking", "WHOMCH Hemoglobin value", and "WHOMCH Smoking cessation counselling provided". A filter dialog is open over the "WHOMCH Hemoglobin value" column, showing a range from "Min" to "Max" with "UPDATE" and "CLOSE" buttons. The table data is as follows:

| Visit date | WHOMCH Smoking | WHOMCH Hemoglobin value | WHOMCH Smoking cessation counselling provided |
|------------|----------------|-------------------------|---|
| 4/7/2018   | No             | 9                       |   |
| 4/1/2018   | Yes            | 12                      |   |
| 4/1/2018   | No             | 14                      |   |

At the bottom of the table, there is a "Rows per page" dropdown set to 15, and a pagination indicator showing "1-3 of 3".

### *filter event*

Note: Data elements will have slightly different way that they are filtered. A **Number** data element will for instance show a range to filter on while a **Text** data element will ask you to enter a search query to filter on.

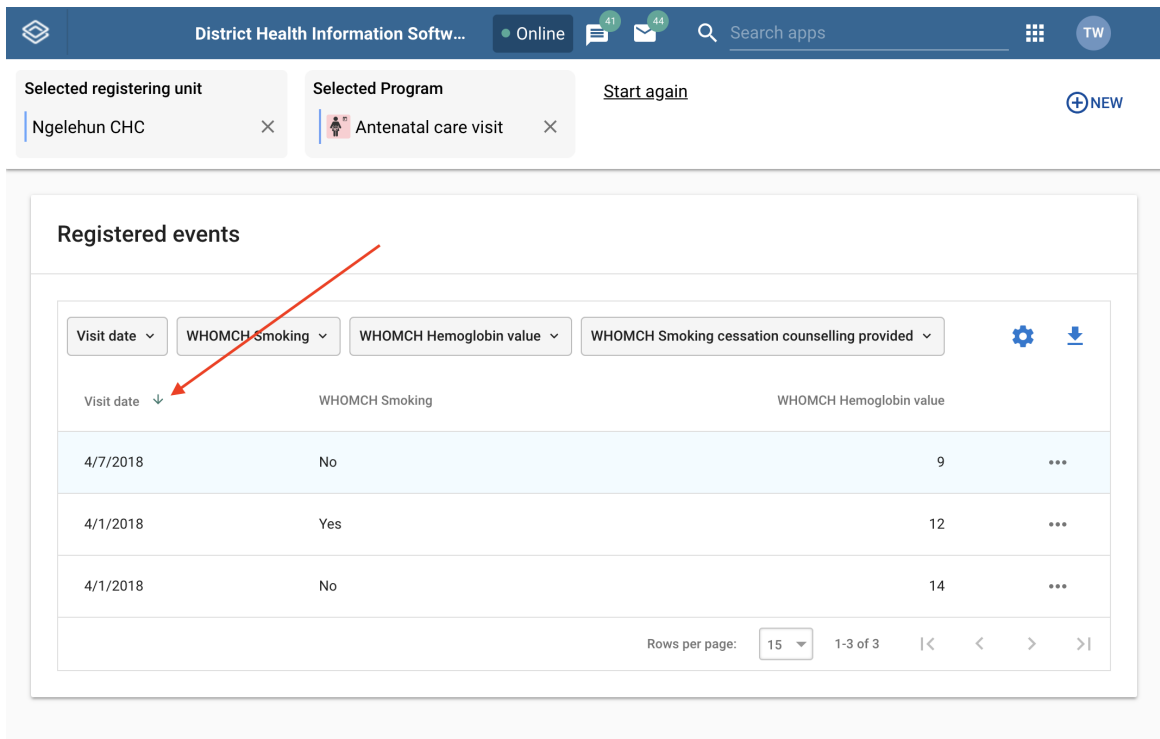
## Sort an event list

1. Open the **Capture** app.
2. Select an organisation unit.
3. Select a program. All events registered to the selected program show up in a list.
4. Click one of the column headers to sort the list on that data element in ascending order.

A small upward arrow is displayed next to the column to show that the list is sorted in ascending order.

5. Click the column header again to sort the list on that data element in descending order.

A small downward arrow is displayed next to the column to show that the list is sorted in descending order.



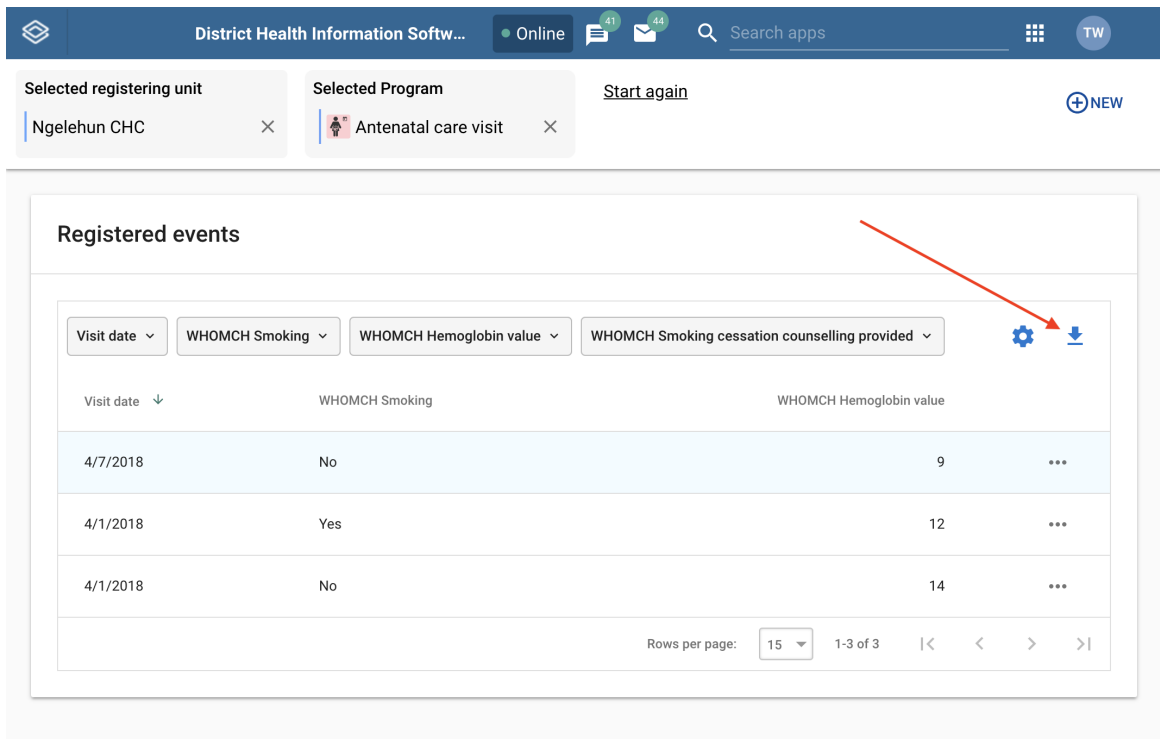
The screenshot shows the District Health Information Software interface. At the top, there is a navigation bar with the text "District Health Information Softw...", "Online", and notification icons for 41 and 44 messages. Below the navigation bar, there are two tabs: "Selected registering unit" with "Ngelehun CHC" and "Selected Program" with "Antenatal care visit". A "Start again" link and a "NEW" button are also visible. The main content area is titled "Registered events" and contains a table with columns for "Visit date", "WHOMCH Smoking", and "WHOMCH Hemoglobin value". A red arrow points to the "Visit date" column header. The table has three rows of data. At the bottom right of the table, there is a "Rows per page" dropdown set to "15" and a "1-3 of 3" indicator.

| Visit date | WHOMCH Smoking | WHOMCH Hemoglobin value |     |
|------------|----------------|-------------------------|-----|
| 4/7/2018   | No             | 9                       | ... |
| 4/1/2018   | Yes            | 12                      | ... |
| 4/1/2018   | No             | 14                      | ... |

*sort event*

## Download an event list

1. Open the **Capture** app.
2. Select an organisation unit.
3. Select a program. All events registered to the selected program show up in a list.
4. Click the **downward arrow** icon on the top right of the event list.
5. Select the format you want to download.



*download event list*

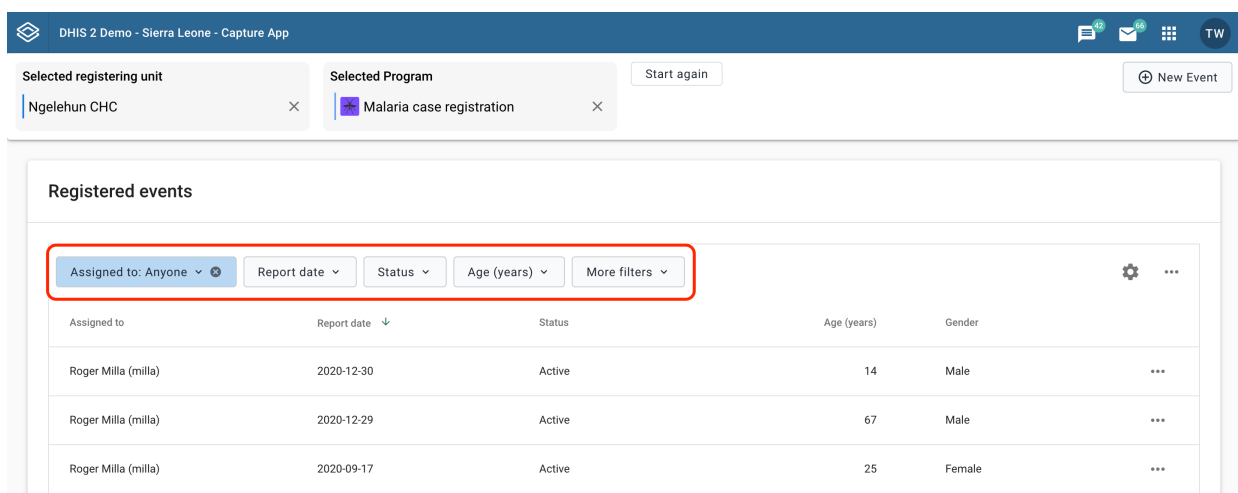
Note: You can download an event list in JSON, XML or CSV formats.

### Predefined list views

You can set up your own views and save them for later use. The views can also be shared with others. A view consists of filters, column order and event sort order.

### Saving a new view

1. Select an organisation unit and a program.
2. Set filters using the filter buttons above the event list (described in detail [here](#)).



1. Set the column order by clicking the cog icon and then, in the popover, specify the layout according to your preference (how to modify the layout is described in detail [here](#)).



Selected registering unit: Ngelehun CHC

Selected Program: Malaria case registration

Registered events

Assigned to: Anyone | Report date | Status | Age (years) | More filters

| Assigned to         | Report date | Status | Age (years) | Gender |     |
|---------------------|-------------|--------|-------------|--------|-----|
| Roger Milla (milla) | 2020-12-30  | Active | 14          | Male   | ... |
| Roger Milla (milla) | 2020-12-29  | Active | 67          | Male   | ... |
| Roger Milla (milla) | 2020-09-17  | Active | 25          | Female | ... |

- Sort the events by clicking on one of the column headers (described in detail [here](#)).

Selected registering unit: Ngelehun CHC

Selected Program: Malaria case registration

Registered events

Assigned to: Anyone | Report date | Status | Age (years) | More filters

| Assigned to         | Report date | Status | Age (years) | Gender |     |
|---------------------|-------------|--------|-------------|--------|-----|
| Roger Milla (milla) | 2020-12-30  | Active | 14          | Male   | ... |
| Roger Milla (milla) | 2020-12-29  | Active | 67          | Male   | ... |
| Roger Milla (milla) | 2020-09-17  | Active | 25          | Female | ... |

- Open the more menu (three dots icon) to the right and then select "Save current view..."

Selected registering unit: Ngelehun CHC

Selected Program: Malaria case registration

Registered events

Assigned to: Anyone | Report date | Status | Age (years) | More filters

| Assigned to         | Report date | Status | Age (years) | Gender |     |
|---------------------|-------------|--------|-------------|--------|-----|
| Roger Milla (milla) | 2020-12-30  | Active | 14          | Male   | ... |
| Roger Milla (milla) | 2020-12-29  | Active | 67          | Male   | ... |
| Roger Milla (milla) | 2020-09-17  | Active | 25          | Female | ... |

Download data...  
Save current view...

- Fill in a name for the view and click save.

## Save As view

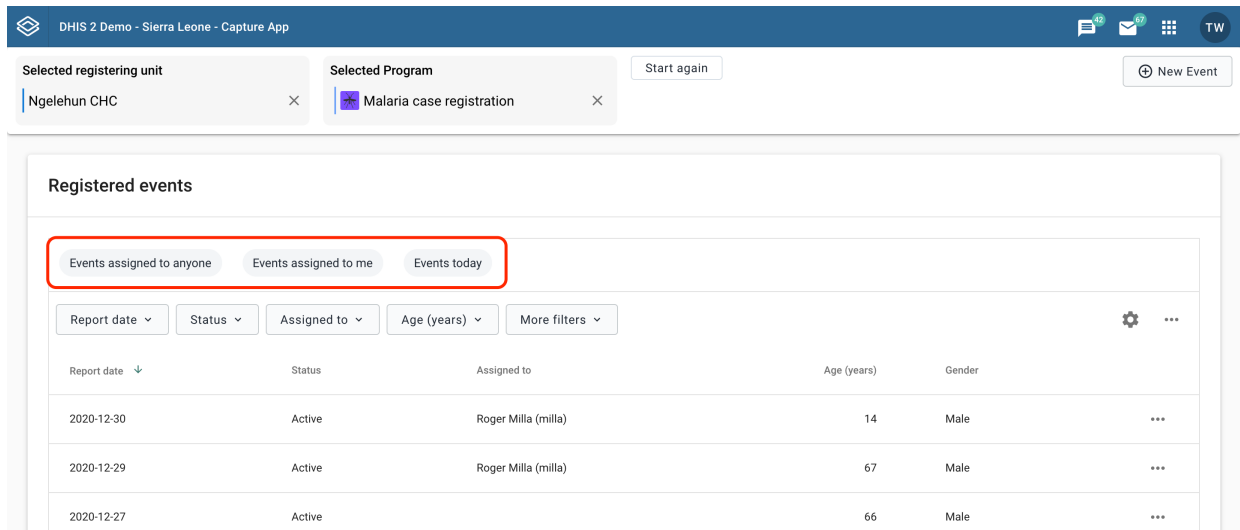
View name \*

Cancel

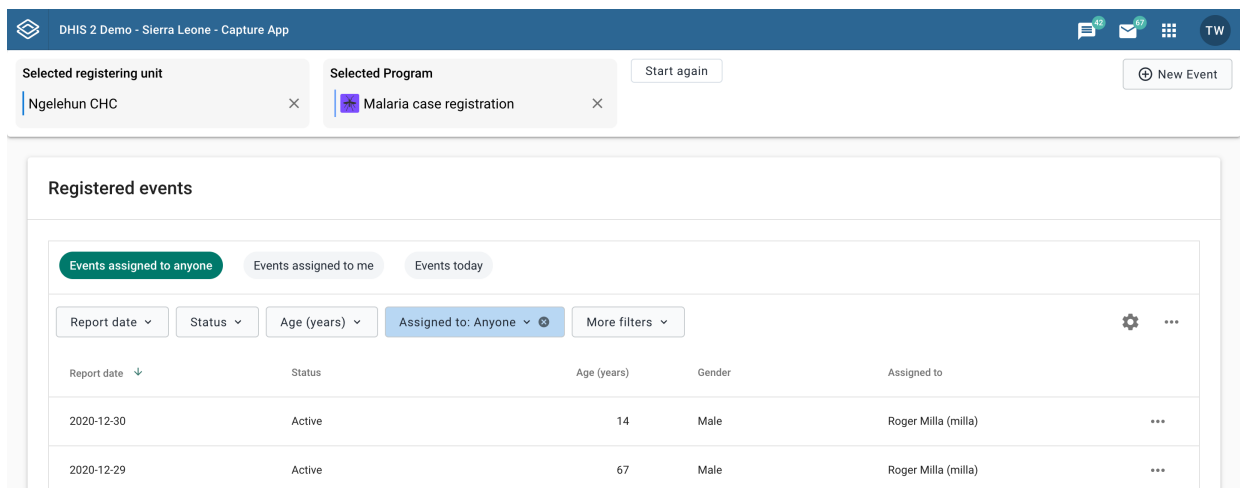
Save

## Loading a view

1. Select an organisation unit and a program with a predefined view.
2. The views should be available above the event list itself. Click on a view to load it.



1. An example of a loaded view.



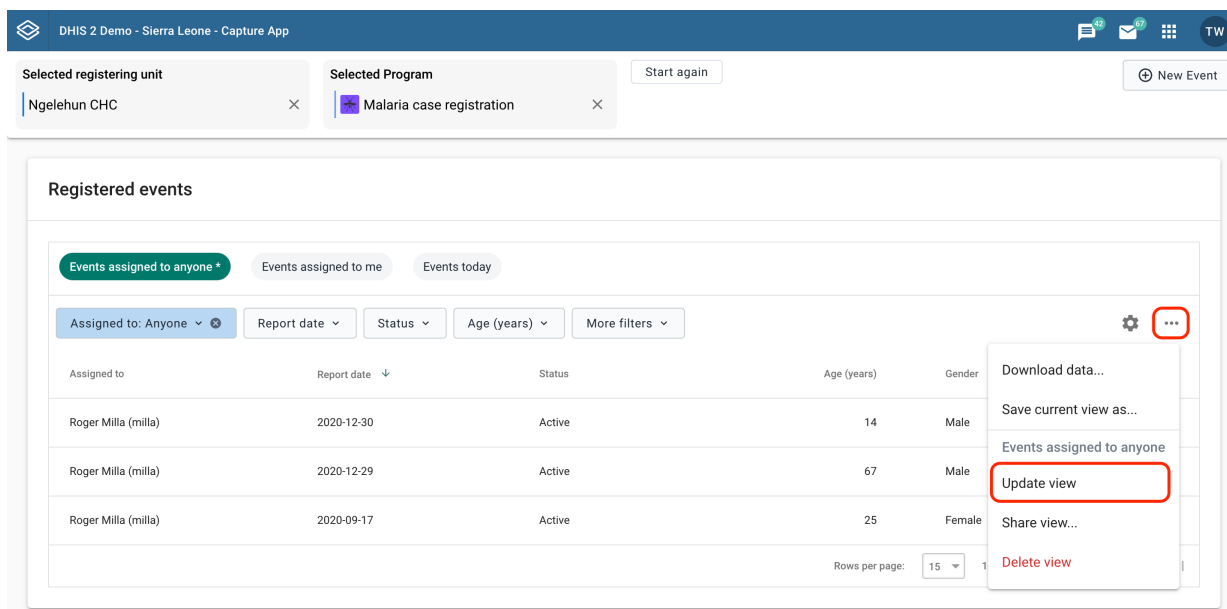
## Updating a view

1. Load the view you would like to update (see [loading a view](#)).
2. Make your changes to filters, column order and/or event sort order.

### Note

An asterisk(\*) is appended to the view name when the view has unsaved changes.

1. Open the more menu (three dots icon) to the right and then select "Update view".

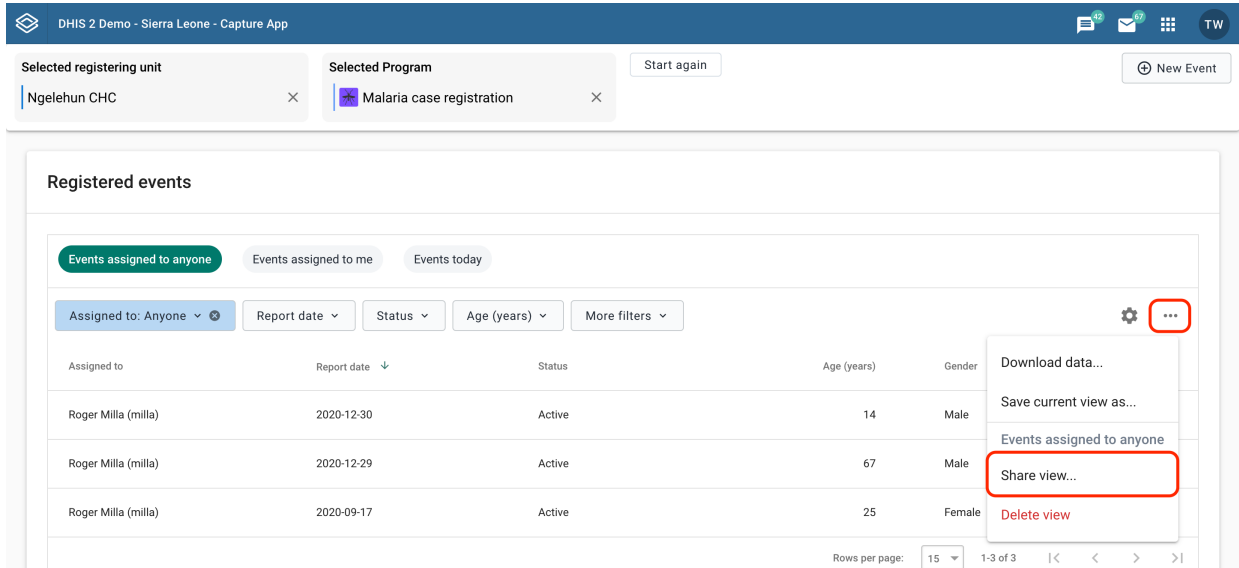


The screenshot shows the DHIS 2 Demo - Sierra Leone - Capture App interface. At the top, there is a header with the app name and user initials 'TW'. Below the header, there are tabs for 'Selected registering unit' (Ngelehun CHC) and 'Selected Program' (Malaria case registration). A 'Start again' button and a 'New Event' button are also visible. The main content area is titled 'Registered events' and contains a table with columns: Assigned to, Report date, Status, Age (years), and Gender. The table has three rows of data for Roger Milla (milla). A dropdown menu is open on the right side of the table, showing options: Download data..., Save current view as..., Events assigned to anyone, Update view (highlighted with a red box), Share view..., and Delete view. The 'Update view' option is the one to be selected according to the instructions.

| Assigned to         | Report date | Status | Age (years) | Gender |
|---------------------|-------------|--------|-------------|--------|
| Roger Milla (milla) | 2020-12-30  | Active | 14          | Male   |
| Roger Milla (milla) | 2020-12-29  | Active | 67          | Male   |
| Roger Milla (milla) | 2020-09-17  | Active | 25          | Female |

## Sharing a view

1. Load the view you would like to share (see [loading a view](#)).
2. Open the more menu (three dot icon) to the right and then select "Share view..."

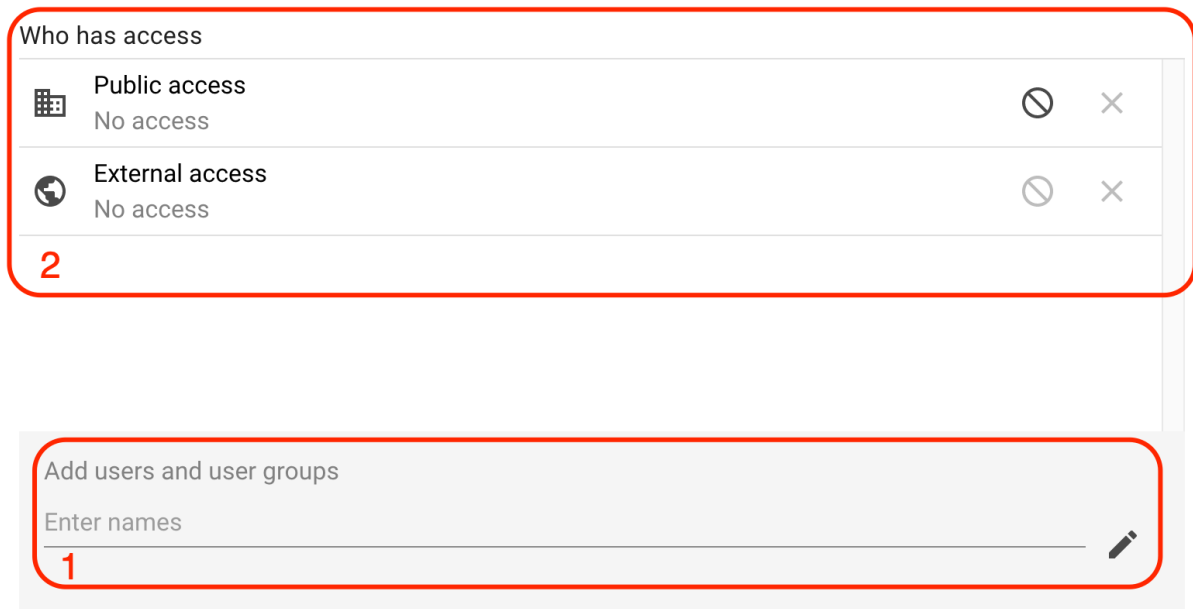


1. Make your changes. You would typically add users/groups (1) and/or change the access rights of users/groups added earlier (2).

### Sharing settings

Events assigned to anyone

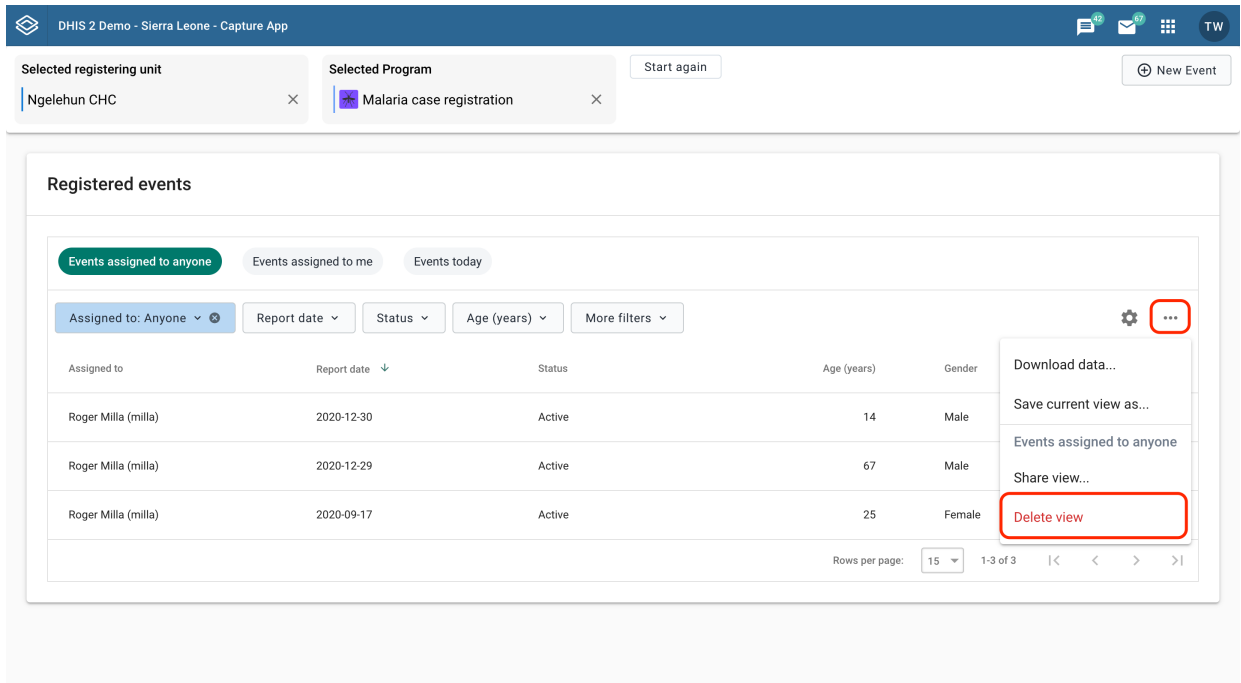
Created by: Tom Wakiki



CLOSE

### Deleting a view

1. Load the view you would like to delete (see [loading a view](#)).
2. Open the more menu (three dots icon) to the right and then select "Delete view".

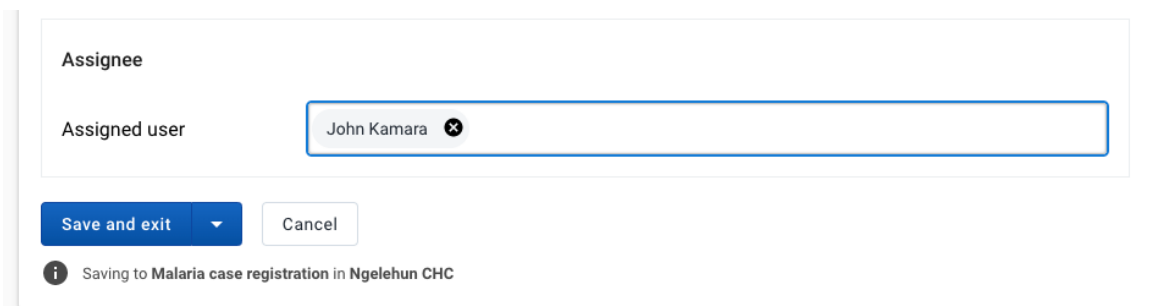
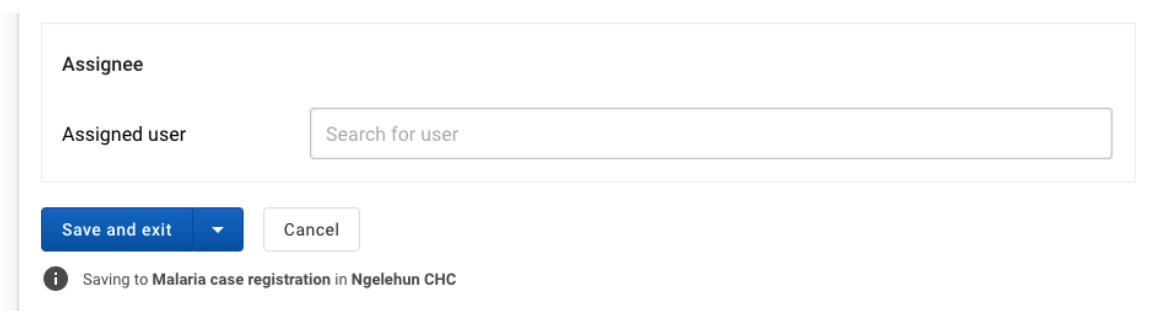


## User assignment

Events can be assigned to users. This feature must be enabled per program.

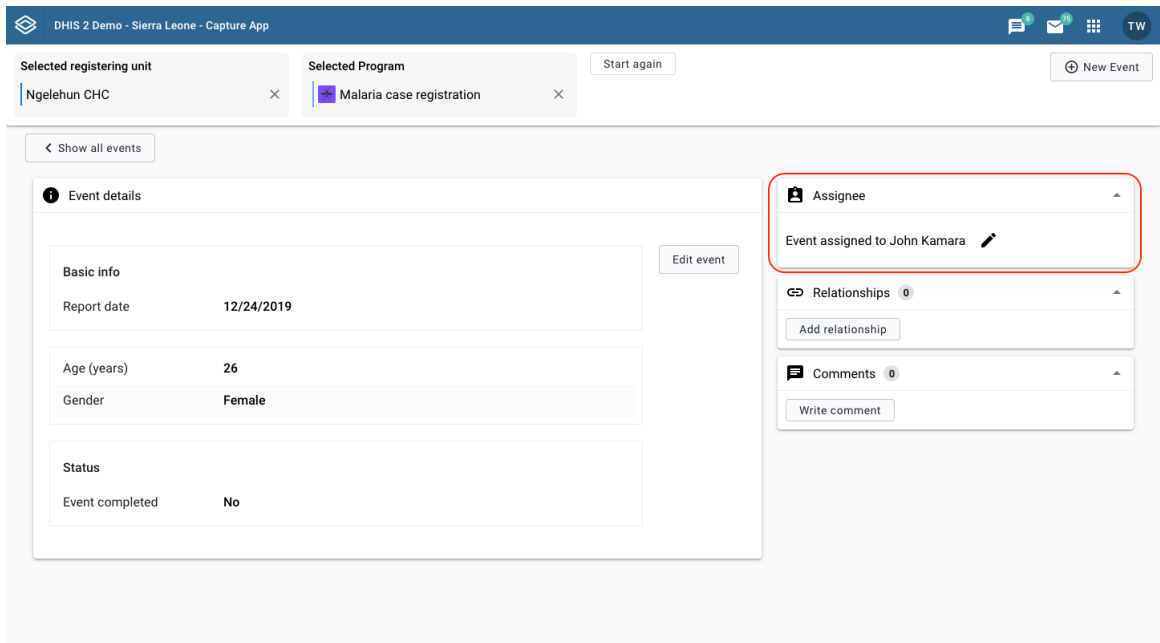
### Assigning new events

1. Select an organisation unit and a program with user assignment enabled.
2. Click **New Event** in the upper right corner.
3. You will find the assignee section near the bottom of the data entry page. Search for and select the user you would like to assign the event to. The assignee will be preserved when you save the event.

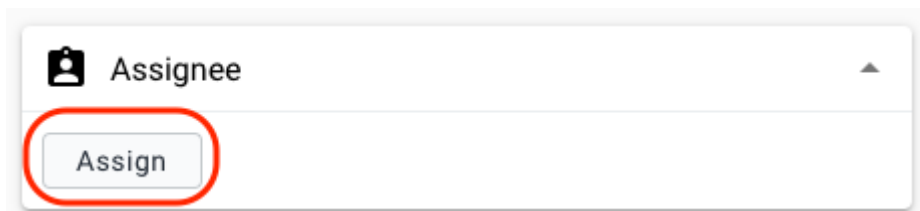
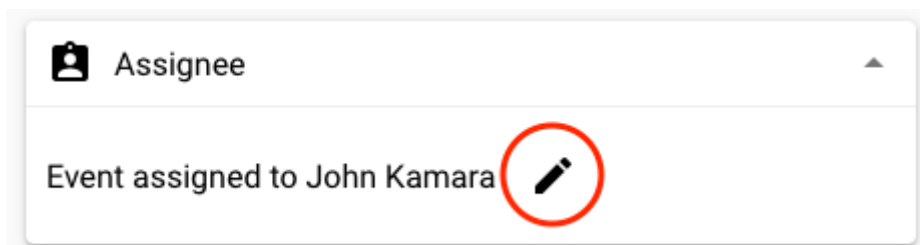


## Change assignee

1. Select an organisation unit and a program with user assignment enabled.
2. Click an event in the list
3. In the right column you will find the assignee section.



4. Click the edit button, or the **Assign** button if the event is not currently assigned to anyone.



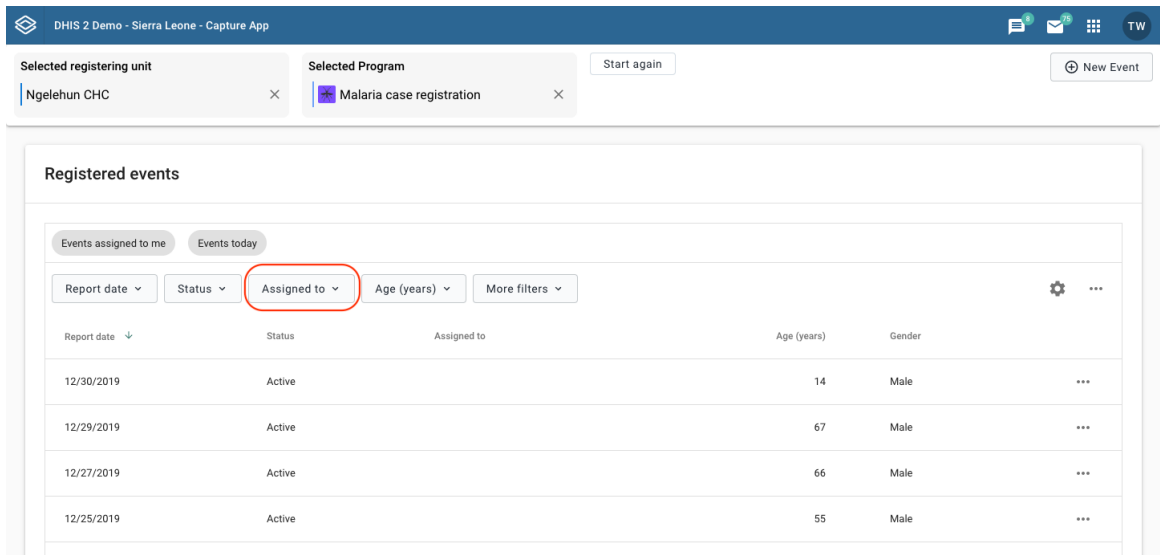
5. Search for and select the user you would like to reassign the event to. The assignment is saved immediately.

### Assignee in the event list

In the event list you will be able to view the assignee per event. Moreover, you can sort and filter the list by the assignee.

## Filter by assignee

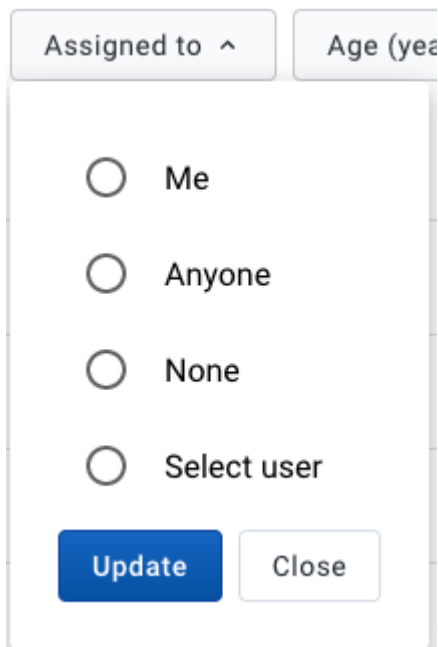
1. Click the **Assigned to** filter.



The screenshot shows the DHIS 2 Demo - Sierra Leone - Capture App interface. At the top, there are tabs for 'Selected registering unit' (Ngelehun CHC) and 'Selected Program' (Malaria case registration). Below these, there are filter buttons for 'Report date', 'Status', 'Assigned to', 'Age (years)', and 'More filters'. The 'Assigned to' filter is highlighted with a red circle. Below the filters, there is a table of registered events with columns for Report date, Status, Assigned to, Age (years), and Gender.

| Report date | Status | Assigned to | Age (years) | Gender |
|-------------|--------|-------------|-------------|--------|
| 12/30/2019  | Active |             | 14          | Male   |
| 12/29/2019  | Active |             | 67          | Male   |
| 12/27/2019  | Active |             | 66          | Male   |
| 12/25/2019  | Active |             | 55          | Male   |

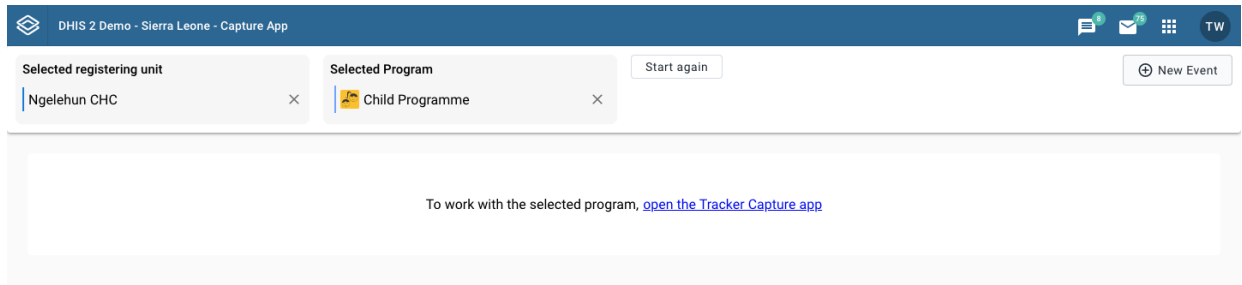
2. Select your preferred assignee filter and then click update.



The screenshot shows the 'Assigned to' filter dropdown menu. The options are: Me, Anyone, None, and Select user. There are radio buttons next to each option. At the bottom of the menu, there are two buttons: 'Update' (blue) and 'Close' (white).

## Tracker programs

The Capture app doesn't support tracker programs yet, but the tracker programs are still listed. If you select a tracker program, the app will lead you to the Tracker Capture app as shown below.





## Using the Event Capture app

### About the Event Capture app

The screenshot displays the DHIS2 Event Capture app interface. On the left is a sidebar with a tree view of organisation units. The main area is titled "Event capture" and contains a form for registering an event. The form has "Registering unit" set to "Njandama MCHP" and "Program" set to "Inpatient morbidity and mortality". There are "Register event" and "Print list" buttons. Below the form is a table of "Registered events (Total: 94)". The table has columns for Incident date, Age (Years), Mode of Discharge, Diagnosis (ICD-10), and Comment. The table shows 10 rows of data. At the bottom, there are pagination controls: "No. of pages: 10", "No. of rows per page: 10", and "Jump to page: 1".

| Incident date | Age (Years) | Mode of Discharge | Diagnosis (ICD-10)  | Comment |
|---------------|-------------|-------------------|---|---------|
| 2015-10-22    | 35          | Discharged        | F601 Schizoid personality disorder  |         |
| 2015-10-14    | 53          | Discharged        | A380 Pharyngeal diphtheria  |         |
| 2015-07-14    | 52          | Died              | X293 Contact with unspecified venomous animal or plant, sports and athletics area |         |
| 2015-07-05    | 7           | Died              | Q28 Other congenital malformations of circulatory system                          |         |
| 2015-06-17    | 40          | Absconded         | B068 Rubella with other complications   |         |
| 2015-05-25    | 59          | Absconded         | D159 Intrathoracic organ, unspecified   |         |
| 2015-05-16    | 64          | Died              | V831 Passenger of special industrial vehicle injured in traffic accident          |         |
| 2015-01-17    | 3           | Absconded         | Q683 Congenital bowing of femur   |         |
| 2014-12-15    | 25          | Died              | P374 Other congenital malaria   |         |
| 2014-07-25    | 29          | Transferred       | J988 Other specified respiratory disorders  |         |

In the **Event Capture** app you register events that occurred at a particular time and place. An event can happen at any given point in time. This stands in contrast to routine data, which can be captured for predefined, regular intervals. Events are sometimes called cases or records. In DHIS2, events are linked to a program. The **Event Capture** app lets you select the organisation unit and program and specify a date when a event happened, before entering information for the event.

The **Event Capture** app works online and offline. If the Internet connectivity drops, you can continue to capture events. The events will be stored locally in your web browser (client). When connectivity has returned, the system will ask you to upload the locally stored data. The system then sends the data to the server where the data is stored.

#### Note

If you close the web browser while in offline mode, it is not possible to reopen a new web browser window and continue the working session. However the data will still be saved locally and can be uploaded to the server the next time the machine is online and the you have logged into the server.

- You only see programs associated with the organisation unit you've selected and programs you've access to view through your user role.
- Both skip-logic and validation error/warning messages are supported during registration.
- When you close an organisation unit, you can't register or edit events to this organisation unit in the **Event Capture** app. You can still view and filter the event list and view the details of an event.
- On-the-fly indicator expression evaluation is supported. If a program has indicators defined for it and the moment all values related to the indicator expression are filled, the system will calculate indicator and display the result.

Event capture

|                  |                                   |
|------------------|-----------------------------------|
| Registering unit | Ngelehun CHC                      |
| Program          | Inpatient morbidity and mortality |
| Section          | Patient details                   |

Register event Print form

New Event

|                |            |
|----------------|------------|
| Incident date* | yyyy-MM-dd |
| Latitude       |            |
| Longitude      |            |

Patient details

| Data element | Value                          |
|--------------|--------------------------------|
| Gender       | Select or search from the list |
| Age (Years)  | 105                            |
| Height in cm | 150                            |
| Weight in kg | 46                             |

Comments

Add your comment here

Save and add new Save and go back Cancel

| Indicators |       |
|------------|-------|
| BMI        | 20.44 |

Validation Warnings

Are you sure you have the correct age?

- **Sorting:** this can be done by clicking the sorting icon of each column header. A red sorting icon implies the current sorting column. However, the sorting functionality works only within the page displayed. Currently, it is not possible to do sorting from serverside.
- **Filtering:** this is done by clicking the small search icon shown to the right of each column header. Clicking them provides an input field to type a filtering criteria. The system starts applying the filter the moment a user starts to type. During filtering it is possible to define start and end dates for date type data elements and lower and upper limits for number types. Server side filtering is not-support at the moment.

## Register an event

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

You'll only see programs associated with the selected organisation unit and programs you've access to through your user role.

4. Click **Register event**.
5. Select a date.
6. Fill in the required information.

If the program's program stage is configured to capture GPS coordinate, you can enter the coordinates in two ways:

- Enter values directly in corresponding fields.
- Choose a location in a map. The map option also displays polygons and points that are defined for organisation units.

7. Click **Save and add new** or **Save and go back**.

Note: Some data elements in an event might be mandatory (marked with a red star next to the data element label). What this means is that all

mandatory data elements must be filled in before the user is allowed to save the event. The exception to this is if the user has the authority called "**Ignore validation of required fields in Tracker and Event Capture**". If the user has this authority, the mandatory data elements will not be required to be filled in before saving and the red star will not be displayed next to the data element label. Note that super user that have the "**ALL**" authority automatically have this authority.

## Edit an event

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click the event you want to modify and select **Edit**.
5. Modify the event details and click **Update**.

## Edit events in grid

The **Edit in grid** function allows you to edit a selected event within the table but only those columns (data elements) visible in the grid. If you need more columns, use **Show/hide columns** to specify which columns should be displayed in the list.

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click the event you want to modify and select **Edit in grid**.
5. Modify the event details.
6. Click on another event to close the edit mode.

## Share events in edit mode

You can share an event in edit mode via its web address.

1. Open the **Event Capture** app.
2. Open the event you want to share in edit mode.
3. Copy the URL.

Make sure that the URL contains "event" and "ou" (organisation unit) parameters.

4. Paste the URL in the sharing method of your choice, for example an e-mail or a message within DHIS2.

If you're not logged in to DHIS2 when you click the link, you'll be asked to do so and then taken to the dashboard.

---

## View an event audit history

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click an event and select **Audit history**.

## Delete an event

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click an event and select **Remove**.
5. Click **Remove** to confirm the deletion.

## Modify an event list's layout

You can select which columns to show or hide in an event list. This can be useful for example when you have a long list of data elements assigned to a program stage. Once you've modified the layout, it's saved on your user profile. You can have different layouts for different programs.

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click the **Show/hide columns** icon.
5. Select the columns you want to display and click **Close**.

## Print an event list

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

All events registered to the selected program show up in a list.

4. Click **Print list**.

## Download an event list

1. Open the **Event Capture** app.
2. Select an organisation unit.
3. Select a program.

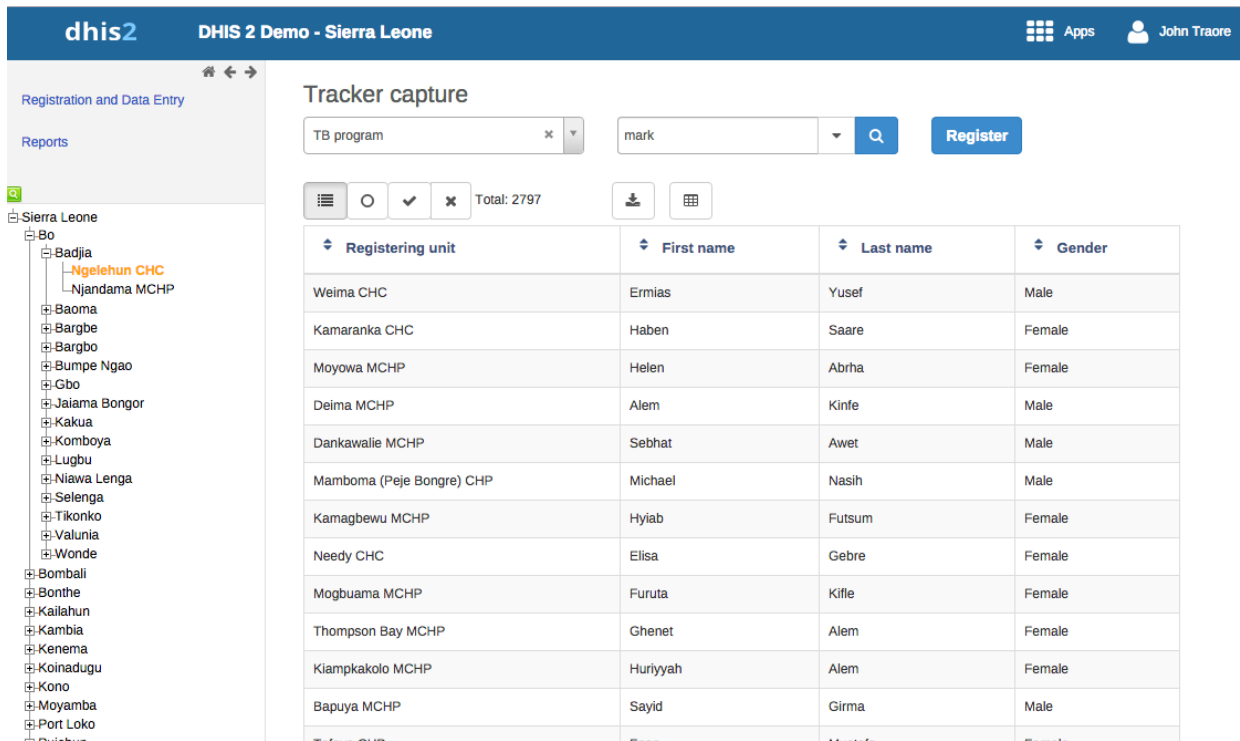
All events registered to the selected program show up in a list.

4. Click the **Downlad** icon and select a format.

You can download an event list in XML, JSON or CSV formats.

## Using the Tracker Capture app

### About the Tracker Capture app



| Registering unit          | First name | Last name | Gender |
|---------------------------|------------|-----------|--------|
| Weima CHC                 | Ermias     | Yusef     | Male   |
| Kamaranka CHC             | Haben      | Saare     | Female |
| Moyowa MCHP               | Helen      | Abriha    | Female |
| Deima MCHP                | Alem       | Kinfe     | Male   |
| Dankawalie MCHP           | Sebhat     | Awet      | Male   |
| Mamboma (Peje Bongre) CHP | Michael    | Nasih     | Male   |
| Kamagbewu MCHP            | Hyiab      | Futsum    | Female |
| Needy CHC                 | Elisa      | Gebre     | Female |
| Mogbuama MCHP             | Furuta     | Kifle     | Female |
| Thompson Bay MCHP         | Ghenet     | Alem      | Female |
| Kiampkakolo MCHP          | Huriyyah   | Alem      | Female |
| Bapuya MCHP               | Sayid      | Girma     | Male   |

The **Tracker Capture** app is an advanced version of the **Event Capture** app.

- **Event Capture:** handles single events *without* registration
- **Tracker Capture:** handles multiple events (including single event) *with* registration.
- You capture event data for a registered tracked entity instance (TEI).
- You only see programs associated with the organisation unit you've selected and programs you've access to view through your user role.
- The options you see in the search and register functions depend on the program you've selected. The program attributes control these options. The attributes also decide the columns names in the TEI list.

If you don't select a program, the system picks default attributes.

- Both skip-logic and validation error/warning messages are supported during registration.
- When you close an organisation unit, you can't register or edit events to this organisation unit in the **Tracker Capture** app. You can still search for TEIs and filter the search results. You can also view the dashboard of a particular TEI.

## About tracked entity instance (TEI) dashboards

The screenshot displays the DHIS2 Tracker Capture app interface for a TEI dashboard. The top navigation bar shows 'dhis2' and 'DHIS 2 Demo - Sierra Leone'. The breadcrumb trail indicates the location: 'Back' > 'MNCH / PNC (Adult Woman)'. The dashboard is organized into several sections:

- Enrollment:** Shows the enrolling organit as 'Ngelehun CHC', the date of enrollment as '2014-08-31', and the LMP Date as '2014-08-31'. There are buttons for 'Complete', 'Terminate', and a warning icon.
- Indicators:** A yellow box indicates 'No indicator to show'.
- Data Entry:** A table with columns for 'ANC 1st visit', 'ANC Visit (2-4+)', 'Delivery', and 'PNC Visit'. Each column contains a record for 'Ngelehun CHC' with a date and a 'Click for more' link.
- Report:** Shows the report name as 'MNCH / PNC (Adult Woman)'.
- Notes:** A text area with the placeholder 'Add new note here'.
- Profile | Edit:** A form with fields for 'First name\*' (Sarah), 'Last name\*' (Thompson), 'Email' (sarah@gmail.com), 'Date of birth' (2001-01-01), 'Address' (Main street 1), 'Weight in kg' (56), 'Height in cm' (167), and 'Service provider' (dU2P0v8JDco).
- Active programs:** A yellow box indicates 'No active program other than selected'.
- Relationships | Add child | Add:** A table with columns for 'Relationship', 'National identifier', 'First name', and 'Last name'. It shows a 'Child' relationship with 'Alan' as the first name and 'Thompson' as the last name.

You manage a TEI from the TEI's dashboard in the **Tracker Capture** app.

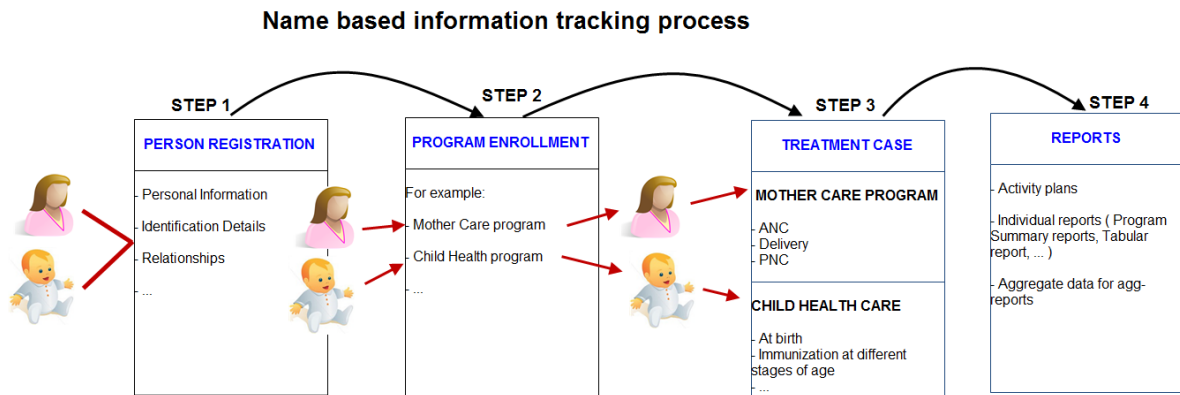
- The dashboard consist of widgets. Drag and drop the widgets to place them in the order and in the position you want.
- Click the pin icon to stick the right column of widgets to a fix position. This is useful especially during data entry.

If you have many data elements or big form to fill in, stick the right widget column. Then all the widgets you've placed in the right column remain visible while you scroll in the data entry part.

- Any indicator defined for the program you've selected will have its value calculated and displayed in the **Indicators** widget.
- Navigation:
  - **Back:** takes you back to the search and registration page
  - Previous and next buttons: takes you to the previous or next TEI dashboard in the TEI search results list
  - **Other programs** field: if the TEI is enrolled in other programs, they're listed here. Click a program to change the program for which you enter data for the selected TEI. When you change programs, the content in the widgets change too.

## Workflow

Working process of Mother and child health program



1. Create new or find existing TEI.

You can search on defined attributes, for example name or address.

2. Enroll TEI in a program.
3. Based on the services of the program by the time, the app creates an activity plan for the TEI.
4. The TEI is provided with various services depending on the program. All services are recorded.
5. Use information about the individual cases to create reports.

## Linking to the Tracker Capture App

### Link to a specific program on the "home screen"

You can share a program selection on the "home screen."

1. Open the **Tracker Capture** app.
2. Select the program you want to link to.
3. Copy the URL.
  - Make sure that the URL contains the "program" parameter.
4. Paste the URL in the sharing method of your choice, for example an e-mail or a message within DHIS2.

Note: If the program does not exist in the selected organisation unit (that is stored in the local cache) the system will instead select the first available program for that organisation unit. If the local cache is empty/clean and the root organisation unit of the current user does not have the specified program, the system will also here select the first available program for the root organisation unit.

### Linking to TEI dashboard

You can share a TEI dashboard via its web address.

1. Open the **Tracker Capture** app.



- Open the dashboard you want to share.
- 
- Copy the URL.

Make sure that the URL contains "tei", "program" and "ou" (organisation unit) parameters.

- Paste the URL in the sharing method of your choice, for example an e-mail or a message within DHIS2.

If you're not logged in to DHIS2 when you click the link, you'll be asked to do so and then taken to the dashboard.

## Create a TEI and enroll it in a program

You can create a TEI and enroll that TEI to a program in one operation:

- Open the **Tracker Capture** app.
- In the organisation unit tree in the left hand pane, select an organisation unit.
- Select a program.
- Click **Register**.
- Fill in the required information.

Both tracked entity type and program can be configured to use a feature type. This makes it possible to capture geometry for either the TEI or the enrollment. Supported feature type is Point and Polygon. Please see **How to use geometry**.

- If the selected program is configured to display first stage during registration, all mandatory fields in the stage will have to be filled in. At the end of the stage you will also be asked if you want to complete the stage that you have entered data for. If you select **Yes**, the stage will have the status completed once saved. If you select **No**, the stage will have the status active.
- If searching for program is configured, a background search will be performed on searchable fields to help you prevent registering duplicates. If there is any matching TEIs, a blue box will be displayed on the right side of the form with the possibility to view these matching TEIs.

WHO RMNCH Tracker x v
Lists Search Register

### Enrollment

Enrolling organisation unit

Date of first visit

### Profile

Unique ID \*

First name \*

Last name \*

Address

Postal code

City

Mobile number

Email address

Birth date \*

Civil status

Continue
Print form
Cancel

Possible duplicates found. x

View 48 candidates

If there is any matching TEIs, click **Continue** to review possible duplicates before registering a new one.

If there is no matching TEIs, click **Save and continue** or **Save and add new**

- **Save and continue:** completes the registration and opens the registered TEI's dashboard
- **Save and add new:** completes the registration but stays on the same page. Use this option when you want to register and enroll one TEI after another without enter data.

Note: All mandatory attributes have to be filled in to be able to save. Mandatory attributes are marked with a red star next to the attribute label. If the user has the authority called "**Ignore validation of required fields in Tracker and Event Capture**" you will not be required to fill in the mandatory attributes and will not see the red star next to the attribute label. Note that super user that have the "**ALL**" authority automatically have this authority.

## Open an existing TEI dashboard

There are multiple ways to find a TEI: Using the "Lists" which is predefined lists in the current selection, or "Search" for global lookup.

### Lists

Lists is used to find and display TEIs in the selected organisation unit and program.

1. Open Tracked Capture app
2. In the organisation unit tree in the left hand pane, select an organisation unit
3. Select a program
4. Click the "Lists" button if not already selected

If not configured, a set of predefined lists will be available:

1. Any TEI with any enrollment status
2. TEIs with an active enrollment of the current program
3. TEIs with a completed enrollment of the current program
4. TEIs with a cancelled enrollment of the current program

The screenshot shows the DHIS2 interface for a 'Child Programme' in Sierra Leone. On the left, a navigation pane shows a tree view of organization units under 'Sierra Leone', with 'Bo' selected. The main content area displays a list of TEIs for the 'Child Programme'. The list has columns for 'First name' and 'Last name'. The 'Lists' button is highlighted in blue. Below the list, there are icons for download, print, and grid view.

| First name | Last name |
|------------|-----------|
| Filona     | Ryder     |
| Gertrude   | Fjordsen  |
| Frank      | Fjordsen  |
| Maria      | Wright    |
| Joe        | Riley     |
| Anthony    | Banks     |
| Alan       | West      |
| Heather    | Greene    |
| Andrea     | Burton    |
| Donald     | Johnson   |
| Frances    | Rodriguez |

You can select which columns to show or hide in the lists for each program. This will be saved in your user settings.

1. Click the **grid** icon button
2. Check the columns you want to include
3. Click **Save**

There is also an option to create a custom working list with own filters. This can be used to create custom lists on the fly.

Lists can also be downloaded or printed.

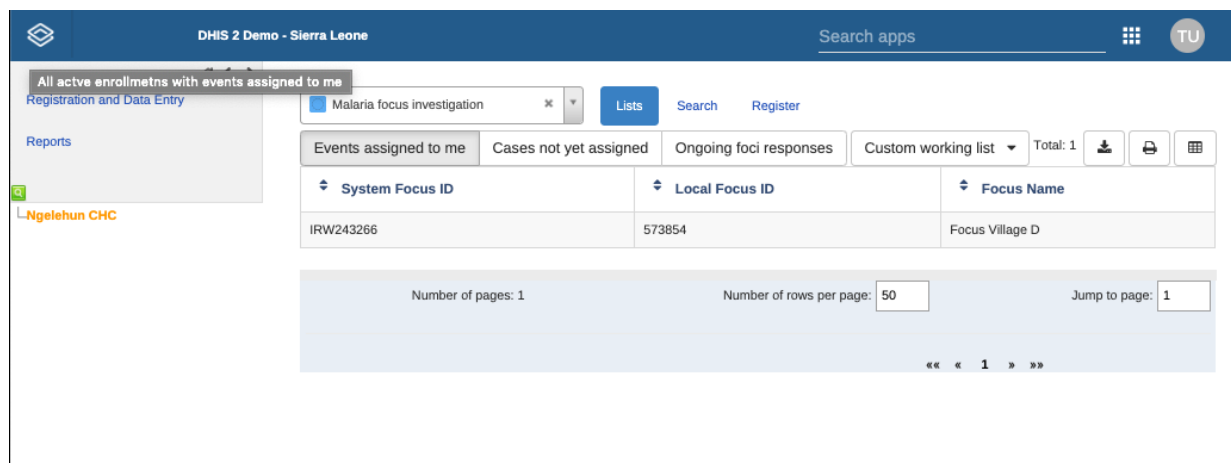


### Custom predefined lists

If the program has any custom tracked entity filters associated with it, these will take the place of the four predefined lists mentioned above. The predefined lists will when well configured be an effective way to find or work with the data relevant for the user in that program.

Working lists can be defined with a wide variety of options, here are some examples:

- Display all TEIs with at least one event in a given program stage that
- has a due date on the current date.
- Display all TEIs that has at least one event that is assigned to the
- logged in user.
- Display all TEIs that is active, but is not assigned to any user.



### *Predefined working lists in tracker capture*

See the API documentation for a full list of functionality supported for these predefined tracked entity instance filters.

## Search

Search is used to search for TEIs in the organisation units the user has search access to. This can be used if you want to find a TEI, but you don't know which organisation unit or program the TEI was enrolled in. There are two ways of doing this: With and without a program context. Searchable fields need to be configured. For configuring searching with program context, this is done individually for each program in the program maintenance app. For configuring searching without a program context, this is done individually for each tracked entity type in the tracked entity type maintenance app.

### Searching without a program context:

1. Open **Tracker Capture app**
2. Click the **Search** button
3. Searchable fields will be displayed in groups. Unique attributes are only individually searchable. Non-unique attributes can be combined.
4. Fill in search criteria and click the **search** icon button.

### Searching with a program context:

1. Open **Tracker Capture app**
2. Select an organisation unit which has the program you wish to search in
3. Select the program
4. Click the **Search** button
5. Searchable fields will be displayed in groups. Unique attributes are only individually searchable. Non-unique attributes can be combined.
6. Fill in search criteria and click the **search** icon button

---

✕ ▼ Lists Search Register

### Search for person

**Provider ID**

---

**First name**

**Last name**

**More options** ▼

Fill in at least 1 attribute to search

After the search has been done, you will be presented with the search result. What's displayed depends on the outcome of the search.

For unique attribute search:

- If no matching TEI found, you will get the possibility to open the registration form.
- If the TEI was found in the selected organisation unit, the TEI dashboard will automatically open.
- If the TEI was found in outside the selected organisation unit, you will get the possibility to open the TEI.

For non-unique attributes search:

- If no matching TEI's found, you will get the possibility to open the registration form.
- If matching TEI's found, you can either click on any TEI in the result list, or open the registration form.
- If a too large number of matches was found, you will be prompted to refine your search criteria

Person search results

| Registering unit | Registration date | Inactive | First name | Last name |                              |
|------------------|-------------------|----------|------------|-----------|------------------------------|
| Vaama MCHP       | 2015-08-07        |          | Mark       | Robinson  | Possible duplicate<br>Unflag |
| Sandialu MCHP    | 2015-08-06        |          | Mark       | Robinson  | Flag possible duplicate      |

Number of pages: 1      Number of rows per page: 50      Jump to page: 1

« «    »    » »

If none of the matches above is the person you are searching for, choose 'Go to registration'.

Back    **Go to registration**

The search results have functionality for flagging tracked entity instances as possible duplicates, see next chapter.

When choosing to open the registration form, the search values will automatically be filled into the registration form.

### Flagging tracked entity instance as potential duplicate

When searching for tracked entity instances in the tracker capture app, the user will sometimes suspect that one or more of the search hits are duplicates of other tracked entity instances. The user has the option of clicking on the **flag possible duplicate** link in the rightmost column of the search result grid.

Tracked entity instances flagged in this way will be marked as "possible duplicate" in the DHIS2 database. The flag indicates that the tracked entity instance is/has a duplicate. The presence of such a flag is visible to the user in two places. One is the result list itself (in this example Mark Robinson is already flagged as a potential duplicate):

### Person search results

| Registering unit | Registration date | Inactive | First name | Last name |                              |
|------------------|-------------------|----------|------------|-----------|------------------------------|
| Vaama MCHP       | 2015-08-07        |          | Mark       | Robinson  | Possible duplicate<br>Unflag |
| Sandialu MCHP    | 2015-08-06        |          | Mark       | Robinson  | Flag possible duplicate      |

Number of pages: 1      Number of rows per page: 50      Jump to page: 1

« « » »

If none of the matches above is the person you are searching for, choose 'Go to registration'.      [Back](#)      [Go to registration](#)

*Tracker capture search results*

The other place is within the tracked entity instance dashboard:

The screenshot shows the DHIS 2 Demo - Sierra Leone interface. At the top, there is a search bar with 'Child Programme' entered. Below the search bar, a yellow banner displays the message: 'Possible duplicate: This person is, or has, a possible duplicate and has been flagged for review.' The main content area is divided into three panels: 'Enrollment', 'Feedback', and 'Profile Edit'. The 'Enrollment' panel shows details for a 'Selected program' (Owned by: Vaama MCHP) with fields for 'Enrolling organisation unit' (Vaama MCHP), 'Enrollment point' (Latitude, Longitude), 'Date of enrollment' (2020-03-21), and 'Date of birth' (2020-03-21). Below these fields are buttons for 'Complete', 'Deactivate', and 'Delete'. The 'Other programs' section shows 'No active enrollments exist'. The 'Feedback' panel shows 'No feedback exist'. The 'Profile Edit' panel shows the 'Profile' section with 'First name' (Mark) and 'Last name' (Robinson).



---

*Tracked entity instance flagged as duplicate*

In addition to informing users about the tracked entity instance potentially being a duplicate, the flag will be used by the underlying system for finding and merging duplicates in coming versions of DHIS2.

**Breaking the glass**

If the program is configured with access level **protected**, and the user searches and finds tracked entity instances that is owned by organisation unit that the user does not have data capture authority for, the user is presented with the option of breaking the glass. The user will give a reason for breaking the glass, then gain temporary ownership of the tracked entity instance.

**Enroll an existing TEI in a program**

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. Select a program.
4. In the **Enrollment** widget, click **Add new**.
5. Fill in the required information and click **Enroll**.

**Enter event data for a TEI****Widgets for data entry**

In a TEI dashboard, you enter event data in the **Timeline Data entry** or **Tabular data entry** widgets.

*Data entry widgets in the Tracker Capture app*

| Widget name                       | Description  |
|-----------------------------------|--|
| <p><b>Timeline Data entry</b></p> | <p>For data entry using either default or custom forms.</p> <p>Depending on program definition, in particular program stages, events will be displayed in a timely fashion. Clicking on any of them displays the corresponding data entry. If a stage needs new event, a plus icon is displayed for new event creation. To proceed with data entry, it is mandatory to have event date. Once an event date is specified it is not possible to change due date. The assumption is that by specifying event date, the event has already taken place. If the event hasn't occurred yet, it is possible to change due date - this is effectively doing nothing but rescheduling. The buttons at the bottom help to change the status of a selected event.</p> <p>Another key feature from this widget is addition of multiple notes for an event. Normally data recording is through data elements, however there are cases where it is necessary to record additional information or comments. This is where the notes section comes handy. However it is not possible to delete a note. The idea is notes are more like log books. Both skip-logic and validation error/warning messages are supported during data entry.</p> <p>Also included in the Timeline Data entry is the option to compare your data entry to previous entries. This can be enabled by clicking the "Switch to compare form" button (Two sheets of paper) in the top right corner of the Timeline Data entry widget.</p> |
| <p><b>Tabular data entry</b></p>  | <p>For tabular-style data entry.</p> <p>The widget displays the list of program stages as left-hand side labels. Events will be listed in table for repeatable program stage, and allows for in-line edits of event data values.</p>   |

## Creating an event

You can create an event for a TEI by:

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Timeline Data entry** or **Tabular data entry** widget, click the **+**-button.
4. Select a **Programstage** and set a **Report date**.

Program stages can be configured to use a feature type. This makes it possible to capture geometry for an event. Supported feature type is Point and Polygon. Please see **How to use geometry**.

5. Click **Save**.

---

## Schedule an event

You can schedule an event for a future date by:

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Timeline Data entry** or **Tabular data entry** widget, click the **Calendar** icon.
4. Select a **Programstage** and set a **Schedule date**.
5. Click **Save**.

## Refer an event

Sometimes it might be necessary to refer a patient to a different **Organisation unit**. To refer a TEI:

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Timeline Data entry** or **Tabular data entry** widget, click the **Arrow** icon.
4. Select a **Programstage**, **Organisation unit** and set a **\*\*Report date\*\***.
5. Click either **One-time referral** which will only refer TEI for one single event or **Move permanently** which will move TEI ownership to the selected **Organisation Unit**. Further access to the TEI will be based on the ownership organisation unit.

## Mandatory data elements in events

Some data elements in an event might be mandatory (marked with a red star next to the data element label). What this means is that all mandatory data elements must be filled in before the user is allowed to complete the event. The exception to this is if the user has the authority called **"Ignore validation of required fields in Tracker and Event Capture"**. If the user has this authority, the mandatory data elements will not be required to be filled in before saving and the red star will not be displayed next to the data element label. Note that super user that have the **"ALL"** authority automatically have this authority.

## How to use geometry

Tracked entity type, program and program stage can be configured to use a feature type. This makes it possible to capture geometry for a TEI, program or event. Supported feature types are Point and Polygon.

### Capture coordinate

**Option 1:** Fill in the latitude and longitude into the field.

**Option 2:**

1. Click on the **map icon**
2. Find the location you want by either searching or locating it on the map
3. Right-click on the location you want, and choose **Set coordinate**
4. Click **Capture** at the bottom

### Capture Polygon

1. Click on the **map icon**
-

2. Find the location you want by either searching or locating it on the map
3. At the top left of the map, click the **polygon icon**
4. Draw a polygon on the map. To finish, connect the last point with the first point
5. Click **Capture** at the bottom



Polygons can also be deleted

1. Click the **map icon**
2. Click the **trash can icon** at the left side of the map, and select **Clear all**

### How to assign a user to an event

In the Maintenance App a program stage can be configured to allow user assignment. If user assignment is enabled, you will be able to assign a user to an event.

1. Click the **Assigned user** field.
2. Scroll or search for a user.
3. Click the user.

### Manage a TEI's enrollments

The Enrollment widget gives access to information and functionality for the enrollment in the selected program.

Enrollment
⌵ ⌘

**Selected program**  
Owned by: Ngelehun CHC

Enrolling organisation unit:

Enrollment point:

Date of enrollment:

Date of birth:

**Other programs**

TB program

---

*Enrollments widget***TEI ownership**

The current ownership of all enrollments in the selected program is displayed in the "Owned by" part of the enrollment widget. The ownership will always start out as the organisation unit that first enrolled the TEI into the given program.

Ownership can be different for a TEI's different programs, for example one clinic can follow up a patient in HIV, while another clinic follows up the same patient in MCH.

To update the ownership for a TEI/program combination, the user has to utilize the referral functionality and select the "Move permanently" option while referring.

A user that has capture access to the organisation unit that is the current owner of the TEI/Program will have write access to all enrollments for that TEI/Program combination. A user that has search access to the organisation unit that is the current owner will have access to search and find the TEI/Program combination.

**Deactivate a TEI's enrollment**

If you deactivate a TEI dashboard, the TEI becomes 'read-only'. You can't enter data, enroll the TEI or edit the TEI's profile.

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Enrollment** widget, click **Deactivate**.
4. Click **Yes** to confirm.

**Activate a TEI's enrollment**

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Enrollment** widget, click **Activate**.
4. Click **Yes** to confirm.

**Mark TEI's enrollment as complete**

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Enrollment** widget, click **Complete**.
4. Click **Yes** to confirm.

**Reopen completed enrollment**

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Enrollment** widget, click **Reopen**.
4. Click **Yes** to confirm.

---

### Display TEI's enrollment history

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Profile** widget, click the **Audit history** icon.

### Create a TEI enrollment note

An enrollment note is useful to record information about for example why an enrollment was cancelled.

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Notes** widget, type your note and click **Add**.

### Send a message to a TEI

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Messaging** widget and select **SMS** or **E-mail**.
4. Enter the required contact information.

If the TEI's profile contains an e-mail address or a phone number, these fields are filled in automatically.

5. Type a message.
6. Click **Send**.

### Mark a TEI for follow-up

You can use mark a TEI's enrollment for follow-up and then use this status as a filter when you create **Upcoming events** and **Overdue events** reports. This can be useful for example to monitor high-risk cases during a pregnancy program.

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Enrollment** widget, click the **Mark for follow-up** icon.

### Edit a TEI's profile

You edit a TEI's profile or tracked entity attributes in the **Profile** widget.

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Profile** widget, click **Edit**.
4. Modify the profile and click **Save**.

---

## Add a relationship to a TEI

You can create a relationship from one TEI to another, for example linking a mother and a child together or a husband and a wife. Depending on how the relationship type is configured, the relative can inherit attributes.

Assume there are two programs: Antenatal care for the mother and Immunization for the child. If first name, last name and address attributes are required for both programs, it is possible to configure last name and address attributes as inheritable. Then during child registration, there is no need to enter these inheritable attributes. You can add them automatically based on the mother's value. If you want to have a different value for the child, you can override the automatically generated value.

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. In the **Relationships** widget, and click **Add**.
4. Select a relationship type.
5. Search for the relative and select it. The search follows the same pattern as when searching for tracked entity instances from the tracker front page. Searches are by default covering the users search scope.
6. Select the tracked entity instance that matches the search criteria in the popup.
7. Click **Save**.

Note: If the relationship is a bi-directional relationship, the relationship will be displayed in the TEI that the relationship was created in and in the TEI that the relationship was linked to. Also, if the relationship is bi-directional, each end of the relationship will have a unique name that will be displayed in the relationship widget under the "Relationship" column.

## Share a TEI dashboard

You can share a TEI dashboard via its web address.

1. Open the **Tracker Capture** app.
2. Open the dashboard you want to share.
3. Copy the URL.

Make sure that the URL contains "tei", "program" and "ou" (organisation unit) parameters.

4. Paste the URL in the sharing method of your choice, for example an e-mail or a message within DHIS2.

If you're not logged in to DHIS2 when you click the link, you'll be asked to do so and then taken to the dashboard.

## Deactivate a TEI

If you deactivate a TEI, the TEI becomes 'read-only'. Data associated with the TEI is not deleted.

1. Open the **Tracker Capture** app.

- Open an existing TEI dashboard.
- 
- 



In the top right corner, click the

button > **Deactivate**.

- Click **Yes** to confirm.

### Activate a TEI

- Open the **Tracker Capture** app.
- Open an existing TEI dashboard.
- 



In the upper top corner, click the

button > **Activate**.

- Click **Yes** to confirm.

### Delete a TEI

#### Warning

When you delete a TEI, you delete all data associated with the TEI.

- Open the **Tracker Capture** app.
- Open an existing TEI dashboard.
- 



In the top right corner, click the

button > **Delete**.

- Click **Yes** to confirm.

### Configure the TEI dashboard

#### Show or hide widgets

- Open the **Tracker Capture** app.
- Open an existing TEI dashboard.
- Click the **Settings** icon, and select **Show/hide widgets**.
- Select the widgets you want to show or hide.
- Click **Close**.



## Save the dashboard's layout as default

You can save the dashboard's layout as default for a program.

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. Click the **Settings** icon, and select **Save dashboard layout as default**.

## Lock dashboard's layout

If you are the **administrator** you have the option of locking the layout of the dashboard for all users.

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. Organize the widgets to the desired layout and save it as default (see section above).
4. Click the **Settings** icon, and select **Lock layout for all users**.

Users will still be able to reorganize the widgets temporarily, but the layout will be reset to the admin's saved layout after page refresh. The remove widget buttons will be hidden when the dashboard layout is locked.

## Top bar

The top bar can be a helpful tool to see important data in a quick and easy way. To start using the top bar:

1. Open the **Tracker Capture** app.
2. Open an existing TEI dashboard.
3. Click the **Settings** icon, and select **Top bar settings**.
4. Click **Activate top bar** and click the data you would like to display in the top bar.

The screenshot shows the Tracker Capture app interface. At the top, there is a 'Back' button and a top bar containing two data points: 'Weight in kg : 70' and 'Height in cm : 186'. Below the top bar, there is a dropdown menu showing 'MNCH / PNC (Adult Woman)'. The main content area is divided into several widgets:
 

- Enrollment**: A widget with a title 'Selected program' and a sub-section 'Other programs'. It contains three input fields: 'Enrolling organisation unit' (Ngelehun CHC), 'Date of enrollment' (2018-02-26), and 'LMP Date' (2018-02-26). Below these fields are three buttons: 'Complete' (blue), 'Deactivate' (orange), and 'Delete' (red). A yellow box below the 'Other programs' section states 'No active enrollments exist'.
- Feedback**: A widget with a title 'Feedback' and a sub-section 'No feedback exist'.
- Profile**: A widget with a title 'Profile' and a sub-section 'Profile'. It contains a text input field for 'First name' with the value 'Test'.

 The interface also includes various navigation and settings icons throughout.

## Change table display mode for Timeline Data Entry widget

The **Timeline Data Entry** widget has 5 different table display modes that can be selected. The different options are:

- **Default form** - Shows all data elements vertically.

- **Compare form previous** - Shows the previous (repeatable) program stage next to the current selected program stage.
- **Compare form all** - Shows all previous (repeatable) program stages next to the current selected program stage.
- **Grid form** - Shows the data elements horizontally.
- **POP-over form** - The same as **Grid form**, but when clicked the data elements are displayed in a pop-up.

To change the current display mode, click the second icon in the widgets top bar (see image below):

The screenshot shows a 'Timeline Data Entry' window with a sequence of four visits:

- 2018-01-01 Ngelehun CHC First antenatal care visit (Completed)
- 2018-01-10 Ngelehun CHC Antenatal care visit (Completed)
- 2018-03-01 Ngelehun CHC Antenatal care visit (Open)
- 2018-03-01 Ngelehun CHC Antenatal care visit (Open)

Below the timeline, there are input fields for 'Date of visit' (2018-03-01), 'Appointment date' (yyyy-MM-dd), 'Gestational age at visit' (64), and 'Antihypertensive drug given according to national guidelines' (Yes/No).

A red arrow points to the second icon in the top right widget bar, which is used to change the display mode.

Once an option is selected the selection is stored for that specific program stage. This means that you can have different table modes for the different program stages in a program.

#### Notes:

1. The **Compare form** options will function best if you have multiple repeatable events (of the same program stage) present.
2. The **Grid form** and **POP-over form** options are not selectable if the program stage has more than 10 data elements.
3. The icon in the widgets bar will change depending on the option you have selected.

## Create reports

1. Open the **Tracker Capture** app.
2. Click **Reports**.
3. Select a report type.

#### Report types in the Tracker Capture app

| Report type     | Description   |
|-----------------|---|
| Program summary | A summary report for a particular program, organisation unit and time frame. The report consists of a list of TEIs and their records organised based on program stages. |

| Report type        | Description  |
|--------------------|--|
| Program statistics | A statistics report for a particular program. The report provides for example an overview of drop-outs or completion rates in a given time frame at a particular organisation unit.  |
| Upcoming events    | A tabular report showing tracked entity instances and their upcoming events for a selected program and time. You can sort the columns and search the values. Show/hide operations are possible on the columns. You can also export the table to Microsoft Excel. |
| Overdue events     | A list of events for a selected program. The report displays a list of TEIs and their events that are not completed on time. You can sort the columns and search the values You can also export the table to Microsoft Excel.                                    |

Registration and Data Entry

Reports

- Sierra Leone
  - Bo
    - Badja
      - Ngelehun CHC**
      - Njandama MCHP
    - Baoma
    - Bargbe
    - Bargbo
    - Bumpe Ngao
    - Gbo
    - Jalama Bongor
    - Kakua
    - Komboya
    - Lugbu
    - Niawa Lenga
    - Selenga
    - Tikonko
    - Valunia
    - Wonde
  - Bombali
  - Bonthe
  - Kailahun
  - Kambia
  - Kenema
  - Koinadugu
  - Kono
  - Moyamba
  - Port Loko
  - Pujehun
  - Tonkolili
  - Western Area

### Program Summary Report

Organisation unit:

Organisation unit scope:
   
 Selected
   
 Immediate children
   
 All children

Program:

ANC 1st visit    ANC Visit (2-4+)    Delivery    PNC Visit

| Person  | Event date | Organisation unit | mnch ANC Visit | mnch Weight (g) | mnch Blood Pressure | mnch HB | mnch Tetatus |
|---|------------|-------------------|----------------|-----------------|---------------------|---------|--------------|
| First name: Evelyn<br>Last name: Jackson        | 2015-01-01 | Ngelehun CHC      |                |                 |                     |         |              |
|   | 2015-03-10 | Ngelehun CHC      | 4              |                 |                     |         |              |
|   | 2015-04-08 | Ngelehun CHC      |                |                 |                     |         |              |
|   | 2015-04-15 | Ngelehun CHC      | 3              |                 |                     |         |              |
| First name: Woman2<br>Last name: Woman2         | 2015-03-25 | Ngelehun CHC      |                | 10              | 40                  |         |              |
| First name: Baby name<br>Last name: Father name | 2015-03-17 | Ngelehun CHC      |                |                 |                     |         |              |
|   | 2015-04-16 | Ngelehun CHC      |                |                 |                     |         |              |

The summary report displays a list of TEIs and their records for "MNCH/PNC (Adult Woman)" program. The records are organized in the form of tabs where each tab is a program stage. The columns in the table are data elements which are configured to be displayed in reports under program stage definition.

## Data approval

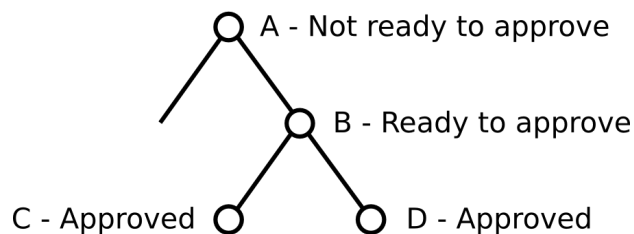
DHIS2 has an optional feature that allows authorized users to approve data that has been entered. It allows data to be reviewed and approved at selected levels in the organisation unit hierarchy, so the approval follows the structure of the hierarchy from lower levels to higher levels.

Data is approved for a combination of (a) period, (b) organisation unit and © workflow. Data may be approved for the organisation unit for which it is entered, as well as for higher-level organisation units to which the data is aggregated. As part of system settings, you can choose the organisation unit level(s) at which data is approved. It can be approved at higher levels only after it has been approved for all that organisation unit's descendants at lower levels for the same workflow and period. When you approve a workflow, it approves data for any data sets that have been assigned to that workflow.

After a period, organisation unit and workflow combination has been approved, data sets associated with that workflow will be locked for that period and organisation unit, and any further data entry or modification will be prohibited unless it is first un-approved.

For example, the following diagram illustrates that data has already been approved for organisation units C and D, for a given period and workflow. It may now be approved for organisation unit B for the same period and workflow. But it is not ready to be approved for organisation unit A. Before it can be approved for organisation unit A, it must be approved for B, and for any other children of organisation unit A, for that period and workflow.

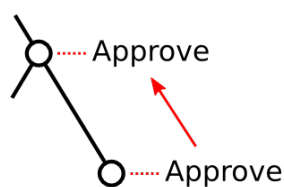
### Organisation units



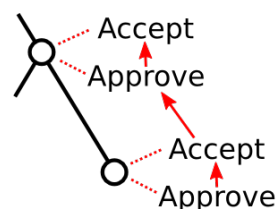
*Approving at organisation units*

## Approving and accepting

DHIS2 supports two different types of approval processes: either a one-step process where the data is approved at each level, or a two-step process where data is first approved and then accepted at each level. This is illustrated in the following diagram:



*1 step per approval level:*  
- Approve



*2 steps per approval level:*  
- Approve  
- Accept

*Approving and accepting*

---

In the one-step process, data is approved at one level, and then approved at the next higher level. Until it is approved at the next higher level, it may be unapproved at the first level. (For example, if the data was approved my mistake, this allows the approver to undo their mistake.) Once the data is approved at the next higher level, it may not be unapproved at the lower level unless it is first unapproved at the higher level.

In the two-step process, data is approved at one level, and then the approval is accepted at the same level. This acceptance is done by a user who is authorized to approve data at the next higher level. Once the data is accepted, it may not be changed or unapproved unless it is first *unaccepted*.

The two-step process is not required by DHIS2. It is an optional step for a user reviewing data at the next higher level. It has the benefit of locking the acceptance from the level below, so reviewer does not have to worry that the data could be changing from below while it is being reviewed. It can also be used by the higher-level user to keep track of which lower-level data has already been reviewed.

Two-step process can be activated by checking **Acceptance required before approval** in SystemSettings app under General section.

### Authorities for approving data

To approve data, you must be assigned a role containing one of these authorities:

- **Approve data** - You may approve data for the organisation unit(s) to which you are assigned. Note that this authority does not allow you to approve data for lower-levels below the organisation unit(s) to which you are assigned. This is useful to separate the users authorized to approve at one level from the users authorized to approve at levels below.
- **Approve data at lower levels** - Allows you to approve data for all lower levels below the organisation units assigned to you. This is useful if, for example, you are a district-level user whose role includes approving the data for all the facilities within that district, but not for the district itself. If you are assigned this as well as the *Approve data* authority, you may approve data at the level of the organisation unit(s) to which you have been assigned, and for any level below.
- **Accept data at lower levels** - Allows you to accept data for the level just below the organisation unit(s) assigned to you. This authority can be given to the same users as approve data. Or it may be given to different users, if you want to have some users who accept data from the level below, and a different set of users who approve data to go up to the next level above.

### Configuring data approval

In the *Maintenance app* section under *Data approval level* you can specify the levels at which you want to approve data in the system. Click the Add new button on this page and select the organisation unit level at which you want approvals. It will be added to the list of approval settings. You may configure the system for approving data at every organisation unit level, or only at selected organisation unit levels.

Note that when you add a new approval level, you may optionally choose a Category option group set. This feature is discussed later in this chapter.

Also in maintenance under *Data approval workflow*, you can define the workflows that will be used for approving data. Each workflow can be associated with one or more approval levels. Any two workflows may operate at all the same approval levels as each other, some of the same and some different levels, or completely different levels.

If you want data for a data set to be approved according to a workflow, then assign the workflow to the data set when you add or edit the data set. If you do not want data for a data set to be subject to approval, then do not assign any workflow to that data set. For data sets that you want to approve at the same time as each other, assign them to the same workflow. For data sets that you want to approve independently, assign each data set to its own workflow.

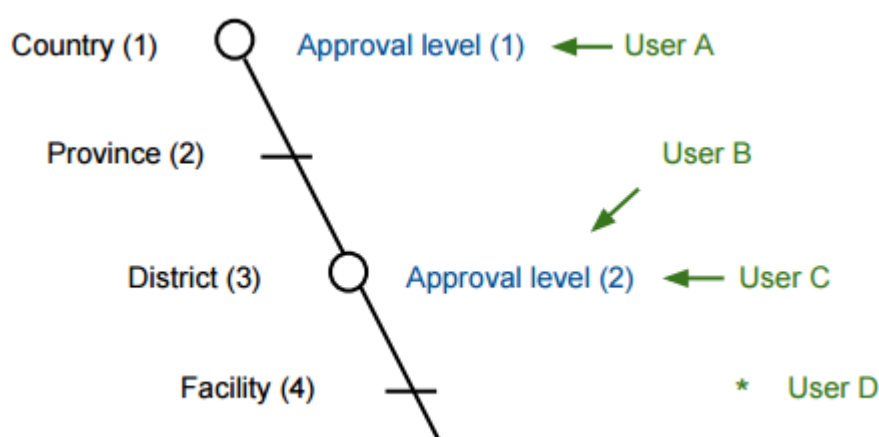
Under *System Settings -> Analytics*, you can control what unapproved data (if any) will appear in analytics. See the "Analytics settings" section of this user guide. Note that users who are assigned to organisation units where data is ready for approval can always view this data in analytics, as can users assigned to higher-level organisation units if they have the *Approve data at lower levels* authority or the *View unapproved data* authority.

## Data visibility

If the option *Hide unapproved data in analytics* is enabled, data will be hidden from viewing by users associated with higher levels. When determining whether a data record should be hidden for a specific user, the system associates a user with a specific approval level and compares it to the level to which the data record has been approved up to. A user is associated with the approval level which matches the level of the organisation unit(s) she is linked to, or if no approval level exists at that level, the next approval level linked to an organisation unit level below herself. A user will be allowed to see data which has been approved up to the level immediately below her associated approval level. The rationale behind this is that a user must be able to view the data that has been approved below so that she can eventually view and approve it herself.

Note that if the user has been granted the *View unapproved data* or the *ALL* authority she will be able to view data irrespective of the approval status.

*Lets consider the following example:* There are four organisation unit levels, with approval levels associated with level 2 and 4. *User A* at country level (1) gets associated with approval level 1 since the approval level exists at the same level as the organisation unit level. *User B* gets associated with approval level 2 since there is no approval level directly linked to her organisation unit level and approval level 2 is the immediate level below. *User C* gets associated with approval level 2. *User D* is below all approval levels which implies that she can see all data entered at or below her organisation unit level.



*Hiding of unapproved data*

Using this example, lets consider some scenarios:

- Data is entered at facility level: Only *User D* can see the data, as the data has not yet been approved at all.

- 
- Data is approved by *User D* at facility level: Data becomes visible to *User C* and *User B*, as
    - the data is now approved at their level.
  - Data is approved by *User C* at district level: Data becomes visible to *User A*, as data is now approved at the level immediately below herself.

## Approving data

To approve data, go to *Reports* and choose *Data Approval*. When this report shows data that is configured for approval, it shows the approval status of the data in the report. The approval status will be one of the following:

- **Waiting for lower level org units to approve** - This data is not yet ready to be approved, because it first needs to be approved for all the child organisation units to this organisation unit, for the same workflow and period.
- **Ready for approval** - This data may now be approved by an authorized user.
- **Approved** - This data has already been approved.
- **Approved and accepted** - This data has already been approved, and also accepted.

If the data you are viewing is in an approval state that can be acted upon, and if you have sufficient authority, one or more of the following actions will be available to you on the *Data Approval* form:

- **Approve** - Approve data that has not yet been approved, or that was formerly approved and has been unapproved.
- **Unapprove** - Return to an unapproved state data that has been approved or accepted.
- **Accept** - Accept data that has been approved.
- **Unaccept** - Return to an unaccepted (but still approved) state data that has been accepted.

In order to unapprove data for a given organisation unit, you must have the authority to approve data for that organisation unit or to approve data for a higher-level organisation unit to which that data is aggregated. The reason for this is as follows: If you are reviewing data for approval at a higher organisation unit level, you should consider whether the data at lower organisation units are reasonable. If all lower-level data looks good, you can approve the data at the higher level. If some lower-level data looks suspect, you can unapprove the data at the lower level. This allows the data to be reviewed again at the lower level, corrected if necessary, and re-approved up through the organisation unit levels according to the hierarchy.

## Approving by category option group set

When defining an approval level, you specify the organisation unit level at which data will be approved. You may also optionally specify a category option group set. This is useful if you are using category option groups to define additional dimensions of your data, and you want approvals to be based on these dimensions. The following examples illustrate how this can be done within a single category option group set, and by using multiple category option group sets.

### Approving by one category option group set

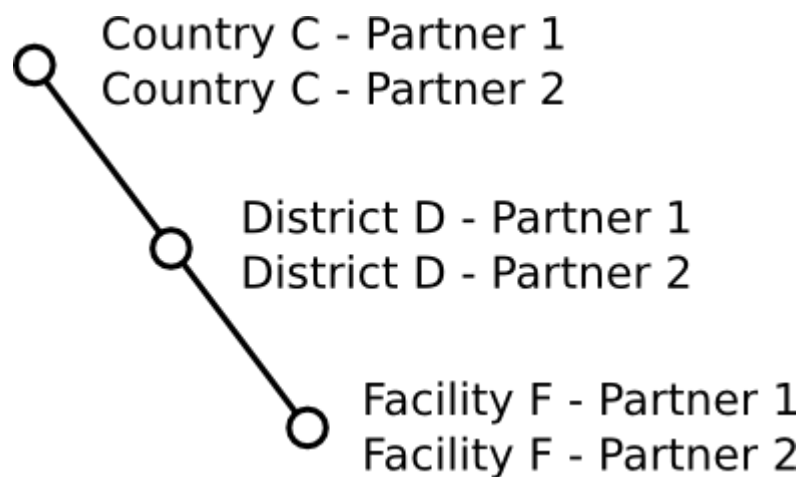
For example, suppose you define a category option group set to represent NGOs who serve as healthcare partners at one or more organisation units. Each category option group within this set represents a different partner. The category option group for *Partner 1* may group together category options (such as funding account codes) that are used by that partner as a dimension of

the data. So data entered by Partner 1 is attributed to a category option in Partner 1's category option group. Whereas data entered by partner 2 is attributed to a category option in Partner 2's category option group:

#### Example Category Option Groups

| Category option group set | Category option group | Category options       |
|---------------------------|-----------------------|------------------------|
| Partner                   | Partner 1             | Account 1A, Account 1B |
| Partner                   | Partner 2             | Account 2A, Account 2B |

Each partner could enter data for their accounts independently of the other, for the same or different workflows, at the same or different facilities. So for example, data can be entered and/or aggregated at the following levels for each partner, independently of each other:



Example category option groups

#### Tip

You can use the sharing feature on category options and category option groups to insure that a user can enter data (and/or see data) only for certain category options and groups. If you don't want users to see data that is aggregated beyond of their assigned category options and/or category option groups, you can assign *Selected dimension restrictions for data analysis*, when adding or updating a user.

You can optionally define approval levels for partner data within any or all of these organisation unit levels. For example, you could define any or all of the following approval levels:

#### Example Category Option Group Set approval levels

| Approval level | Organisation unit level | Category option group set |
|----------------|-------------------------|---------------------------|
| 1              | Country                 | Partner                   |
| 2              | District                | Partner                   |
| 3              | Facility                | Partner                   |



## Approving by multiple category option group sets

You can also define approval levels for different category option group sets. To continue the example, suppose that you have various agencies that manage the funding to the different partners. For example, Agency A funds accounts 1A and 2A, while Agency B funds accounts 1B and 2B. You could set up category option groups for Agency A, and Agency B, and make them both part of a category option group set called Agency. So you would have:

### Example Multiple Category Option Group Sets

| Category option group set | Category option group | Category options       |
|---------------------------|-----------------------|------------------------|
| Partner                   | Partner 1             | Account 1A, Account 1B |
| Partner                   | Partner 2             | Account 2A, Account 2B |
| Agency                    | Agency A              | Account 1A, Account 2A |
| Agency                    | Agency B              | Account 1B, Account 2B |

Now suppose that at the country level, you want each partner to approve the data entered by that partner. Once this approval is done, you want each agency to then approve the data from accounts that are managed by that agency. Finally, you want to approve data at the country level across all agencies. You could do this by defining the following approval levels:

### Example Multiple Category Option Group Set approval levels

| Approval level | Organisation unit level | Category option group set |
|----------------|-------------------------|---------------------------|
| 1              | Country                 |                           |
| 2              | Country                 | Agency                    |
| 3              | Country                 | Partner                   |

Note that multiple approval levels can be defined for the same organisation unit level. In our example, Partner 1 would approve country-wide data at approval level 3 from category options Account 1A and Account 1B. Next, Agency A would approve country-wide data at approval level 2 from category options Account 1A (after approval by Partner 1) and Account 2A (after approval by Partner 2.) Finally, after approval from all agencies, country-wide data can be approved at approval level 1 across all category options. Note that approval level 1 does not specify a category option group set, meaning that it is for approving data across all category options.

This example is meant to be illustrative only. You may define as many category option groups as you need, and as many approval levels as you need at the same organisation unit level for different category option group sets.

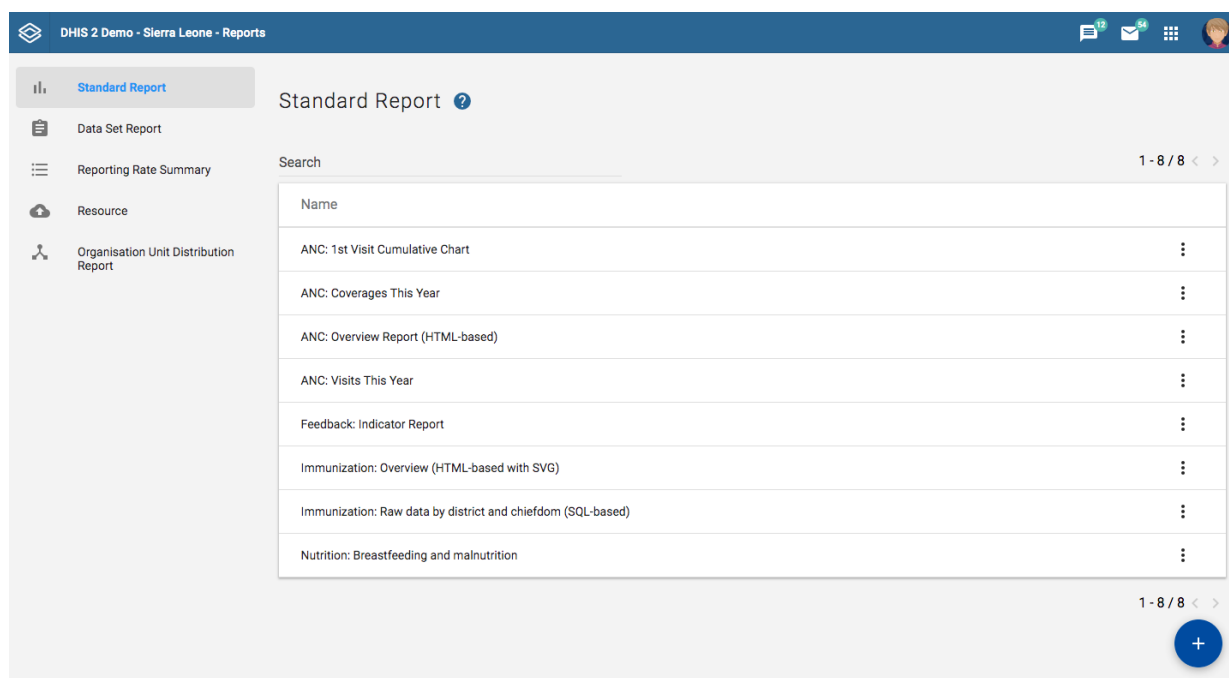
If you have multiple approval levels for different category option group sets at the same organisation unit level, you may change the approval ordering in the *Settings* section, under *System Approval Settings*. Just click on the approval level you wish to move, and select *Move up* or *Move down*. If you have an approval level with no category option groups set, it must be the highest approval level for that organisation unit level.

## Reporting functionality in the reports app

The reports app allows for canned, standard reports, data set reports, resources and org unit distribution reports.

### Using standard reports

You access the available reports by navigating to Apps->Reports (Beta). In the report menu in the left bar, click Standard Report. A list of all pre-defined reports will appear in the main window.



You run/view a report by clicking on the triple-dot icon of the report and then selecting "Create" from the contextual menu. If there are any pre-defined parameters, you will see a report parameter window where you must fill in the values needed for orgunit and/or reporting month, depending on what has been defined in the underlying report table(s). Click on "Generate Report" when you are ready. The report will either appear directly in your browser or be available as a PDF file for download, depending on your browser settings for handling PDF files. You can save the file and keep it locally on your computer for later use.

### Using dataset reports

Dataset reports are printer friendly views of the data entry screen filled with either raw or aggregated data. These are only available for data sets that have custom data entry forms and not for default or section forms.

You can access data set reports from Apps->Reports (Beta).

A Criteria window will appear where you fill in the details for your report:

**Dataset:** The data set you want to display.

**Report period:** The actual period you want data for. This can be aggregated as well as raw periods. This means that you can ask for a quarterly or annual report even though the data set is collected monthly. A data set's period type (collection frequency) is defined in data set maintenance. First select the period type (Monthly, Quarterly, Yearly etc.) in the drop down next to Prev and Next buttons, and then select one of the available periods from the dropdown list below. Use Prev and Next to jump one year back or forward.

---

**Use data for selected unit only:** Use this option if you want a report for an orgunit that has children, but only want the data collected directly for this unit and not the data collected by its children. If you want a typical aggregated report for an orgunit you do not want to tick this option.

**Report Organisation unit:** Here you select the orgunit you want the report for. This can be at any level in the hierarchy as the data will be aggregated up to this level automatically (if you do not tick the option above).

When you are done filling in the report criteria you click on "Generate". The report will appear as HTML in a printer-friendly format. Use the print and save as functions in the browser to print or save (as HTML) the report. You can also export the data set report in Excel and PDF formats.

### Using reporting rate summary

Access the reporting rate summary from the Apps->Reports (Beta) menu. Reporting rate summaries will show how many datasets (forms) that have been submitted by organisation unit and period.

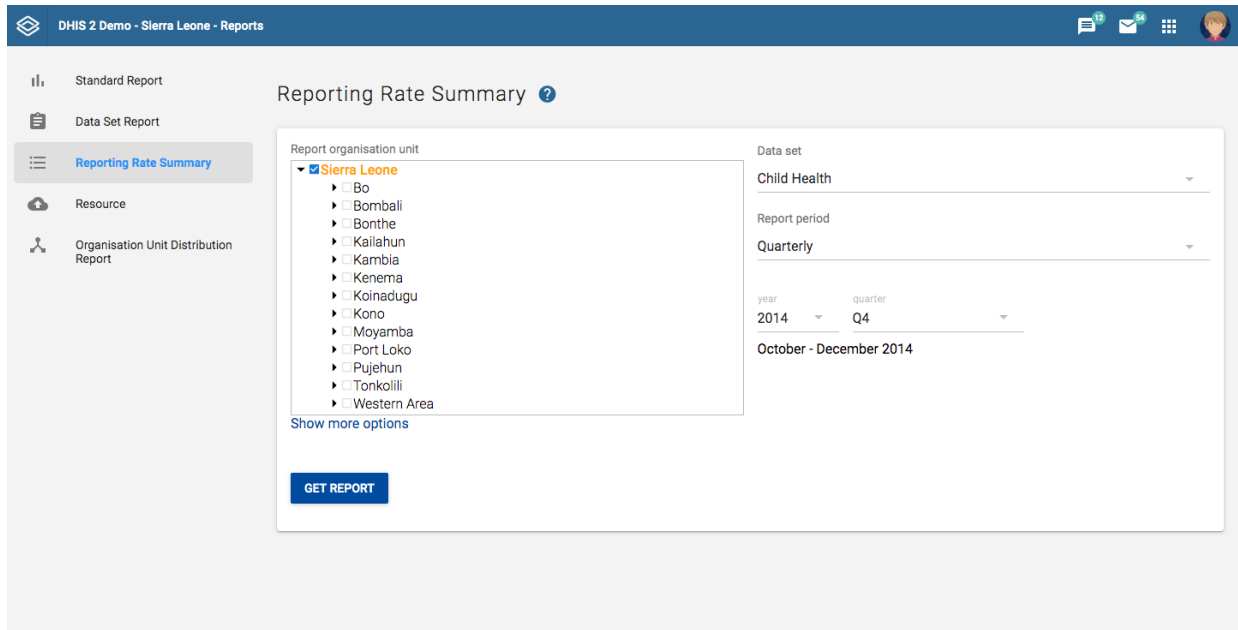
The reporting rate calculation is based on complete data set registrations. A complete data set registration refers to a user marking a data entry form as complete, typically by clicking the complete button in the data entry screen, hereby indicating to the system that she considers the form to be complete. This is i.e. a subjective approach to calculating completeness.

The reporting rate summary will for each row show a range of measures:

- **Actual reports:** Indicates the number of data entry complete registrations for the relevant data set.
- **Expected reports:** Indicates how many data entry complete registrations are expected. This number is based on the number of organisation units the relevant data set has been assigned to (enabled for data entry).
- **Reporting rate:** The percentage of reports registered as complete based on the number expected.
- **Reports on time:** Same as actual reports, only reports registered as complete within the maximum number of days after the end of the reporting period. This number of days after reporting period can be defined per data set in the data set management.
- **Reporting rate on time:** Same as percentage, only reports registered as complete on time used as numerator.

To run the report you can follow these steps:

- Select an orgunit from the tree.
- Select a data set.
- Select a period type and a period from the list of available periods for that period type.
- The report will then be rendered. Change any of the parameters above and click "Get report" again see the corresponding results.



## Using resources

The resource tool allows you to upload both files from your local computer to the DHIS server and to add links to other resources on the Internet through URLs. If cloud storage is configured for your system, resources will be saved there.

To create a new resource:

1. Open the **Reports (Beta)** app and click **Resource**.
2. Click **Add new**.
3. Enter a **Name**.
4. Select a **Type: Upload file** or **External URL**.
5. Click **Save**.

## Using organisation unit distribution reports

You can access the Orgunit Distribution reports from the left side menu in the Apps->Reports (Beta).

Orgunit distribution reports are reports that show how the orgunits are distributed on various properties like type and ownership, and by geographical areas.

The result can be presented in a table-based report or in a chart.

### Running a report:

To run a report first select an orgunit in the upper left side orgunit tree. The report will be based on orgunits located under the selected orgunit. The select the orgunit group set that you want to use, typically these are Type, Ownership, Rural/Urban, but can be any user-defined orgunit group set. The you can click on either Get Report to get the table-based presentation or Get chart to get the same result in a chart. You can also download the table-based report as Excel or CSV.

The screenshot displays the 'Organisation Unit Distribution Report' interface in the DHIS 2 Reports app. The top navigation bar shows 'DHIS 2 Demo - Sierra Leone - Reports' and includes notification icons for messages and alerts, along with a user profile icon. The left sidebar contains a menu with the following items: 'Standard Report', 'Data Set Report', 'Reporting Rate Summary', 'Resource', and 'Organisation Unit Distribution Report' (which is highlighted). The main content area features the title 'Organisation Unit Distribution Report' with a help icon. Below the title is a 'Report organisation unit' section containing a tree view of the Sierra Leone administrative structure. The 'Sierra Leone' root is expanded, showing a list of districts: Bo (selected), Bombali, Bonthe, Kailahun, Kambia, Kenema, Koinadugu, Kono, Moyamba, Port Loko, Pujehun, Tonkolili, and Western Area. To the right of the tree is a 'Group Set' dropdown menu currently set to 'Facility Ownership'. At the bottom of the main content area are two buttons: 'GET REPORT' and 'GET CHART'.

## Using the Data Visualizer app




## Creating and editing visualizations


When you open the data-visualizer app from the dhis2 menu, you are presented with a blank slate and you can start creating your visualization right away.


The screenshot displays the DHIS 2 Demo - Sierra Leone - Data Visualizer interface. The top navigation bar includes 'Update', 'File', 'Options', and 'Download'. The left sidebar is divided into three sections: 'MAIN DIMENSIONS' (Data, Period, Organisation Unit), 'OTHER DIMENSIONS' (Assigned Categories), and 'YOUR DIMENSIONS' (Area, Commodities, Diagnosis, Donor, EPI/nutrition age, Facility Ownership, Facility Type, Funding Agency, Gender, HIV age, Implementing Partner, Location Fixed/Outreach, Location Rural/Urban, Main data element groups, Morbidity Age, Morbidity/Mortality, PMTCT, Pregnant/Non-pregnant, Project, Referrals Age, Rural and Urban, Target vs Result, Tracker-based data). The main area features a 'Getting started' section with three bullet points: 'All dimensions that you can use to build visualizations are shown in the left sidebar', 'Add dimensions to the layout above', and 'Click a dimension to add or remove items'. Below this is a 'Your most viewed charts and tables' section listing several visualization types: 'Immunization: Fully immunized by districts and last 12 m stacked', 'ANC: ANC IPT 1 Coverage last 12 months districts', 'IDSR: Disease Week 1-12 Sierra Leone', 'ANC: 1 and 3 coverage Yearly', 'ANC: ANC by area last 12 months', and 'HIV: 4. Care data indicators at district'.


## Select visualization type


Select the desired visualization type from the selector in the upper left corner:


 **DHIS 2 Demo - Sierra Leone - Data Visualizer**


 **Column** ▼ [Update](#) [File](#) [Options](#) [Download](#)


 **Column**


 **Stacked column**


 **Bar**


 **Stacked bar**


 **Line**


 **Area**


 **Pie**


 **Radar**


 **Gauge**

 **Year over year (line)**

 **Year over year (column)**

 **123**  
**Single value**

 **Pivot table**

 **Open as Map**

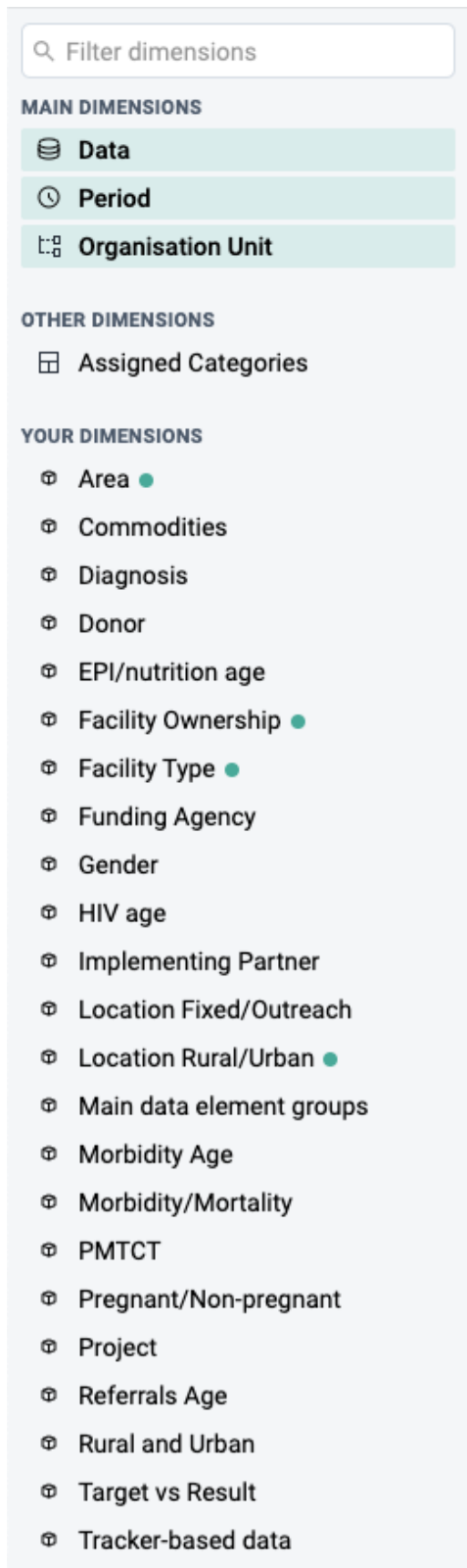


| Visualization type | Description   |
|--------------------|---|
| Column             | <p>Displays information as vertical rectangular columns with lengths proportional to the values they represent.</p> <p>Example: comparing performance of different districts.</p> <p>Layout restrictions: exactly 1 dimension as series, exactly 1 dimension as category.</p> |
| Stacked column     | <p>Displays information as vertical rectangular columns, where bars representing multiple categories are stacked on top of each other.</p> <p>Example: displaying trends or sums of related data elements.</p> <p>Layout restrictions: same as <i>Column</i>.</p>             |
| Bar                | <p>Same as <i>Column</i>, only with horizontal bars.</p>  |
| Stacked bar        | <p>Same as <i>Stacked column</i>, only with horizontal bars.</p>  |
| Line               | <p>Displays information as a series of points connected by straight lines. Also referred to as time series.</p> <p>Example: visualizing trends in indicator data over intervals of time.</p> <p>Layout restrictions: same as <i>Column</i>.</p>                               |
| Area               | <p>Is based on a line (above), with the space between the axis and the line filled with colors and the lines stacked on top of each other.</p> <p>Example: comparing the trends of related indicators.</p> <p>Layout restrictions: same as <i>Column</i>.</p>                 |
| Pie                | <p>Circle divided into sectors (or slices).</p> <p>Example: visualizing the proportion of data for individual data elements compared to the total sum of all data elements.</p> <p>Layout restrictions: exactly 1 dimension as series, has no category.</p>                   |
| Radar              | <p>Displays data on axes starting from the same point. Also known as spider chart.</p> <p>Layout restrictions: same as <i>Column</i>.</p>   |
| Gauge              | <p>Semi-circle which displays a single value, typically out of 100% (start and end values are configurable).</p> <p>Layout restrictions: exactly 1 dimension with exactly 1 item as series, <i>d ata</i> dimension is locked to series.</p>                                   |

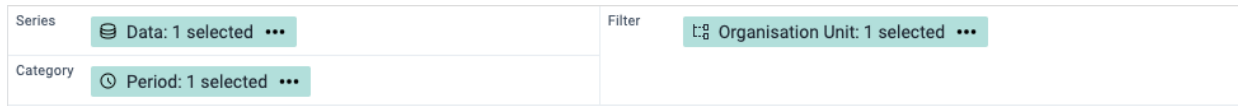
| Visualization type      | Description   |
|-------------------------|---|
| Year over year (line)   | Useful when you want to compare one year of data to other years of data. Based on calendar years.<br><br>Layout restrictions: <i>period</i> dimension is disabled.                                |
| Year over year (column) | Same as <i>Year over year (line)</i> , only with columns.   |
| Single value            | Displays a single value in a dashboard friendly way.<br><br>Layout restrictions: same as <i>Gauge</i> .   |
| Pivot table             | Summarizes the data of a more extensive table and might include sums, averages, or other statistics, which the pivot table groups together in a meaningful way.<br><br>Layout restrictions: none. |

### Select dimensions

From the dimensions menu on the left you can select the dimensions you want to show in your visualization, including data, period, organisation units and dynamic dimensions. These can be added by clicking on a dimension, by dragging and dropping a dimension to the layout area or by hovering over a dimension and using on its context menu (three dots).



Just like in the dimensions menu, in the layout area you can also change the selections by clicking on a dimension, dragging and dropping a dimension or by using a dimension's context menu (three dots).



- **Series:** A series is a set of continuous, related elements (for example periods or data elements) that you want to visualize in order to emphasize trends or relations in its data. Also known as Columns for Pivot table visualizations.
- **Categories:** A category is a set of elements (for example indicators or organisation units) for which you want to compare its data. Also known as Rows for Pivot table visualizations.
- **Filter:** The filter selection will filter the data displayed in the visualization. Note that if you use the data dimension as filter, you can only specify a single indicator or data set as filter item, whereas with other dimension types you can select any number of items.

### Select dimension items

A dimension refers to the elements that describe the data values in the system. There are three main dimensions in the system:

- **Data:** Includes data elements, indicators and datasets (reporting rates), describing the phenomena or event of the data.
- **Periods:** Describes when the event took place.
- **Organisation units:** Describes where the event took place.

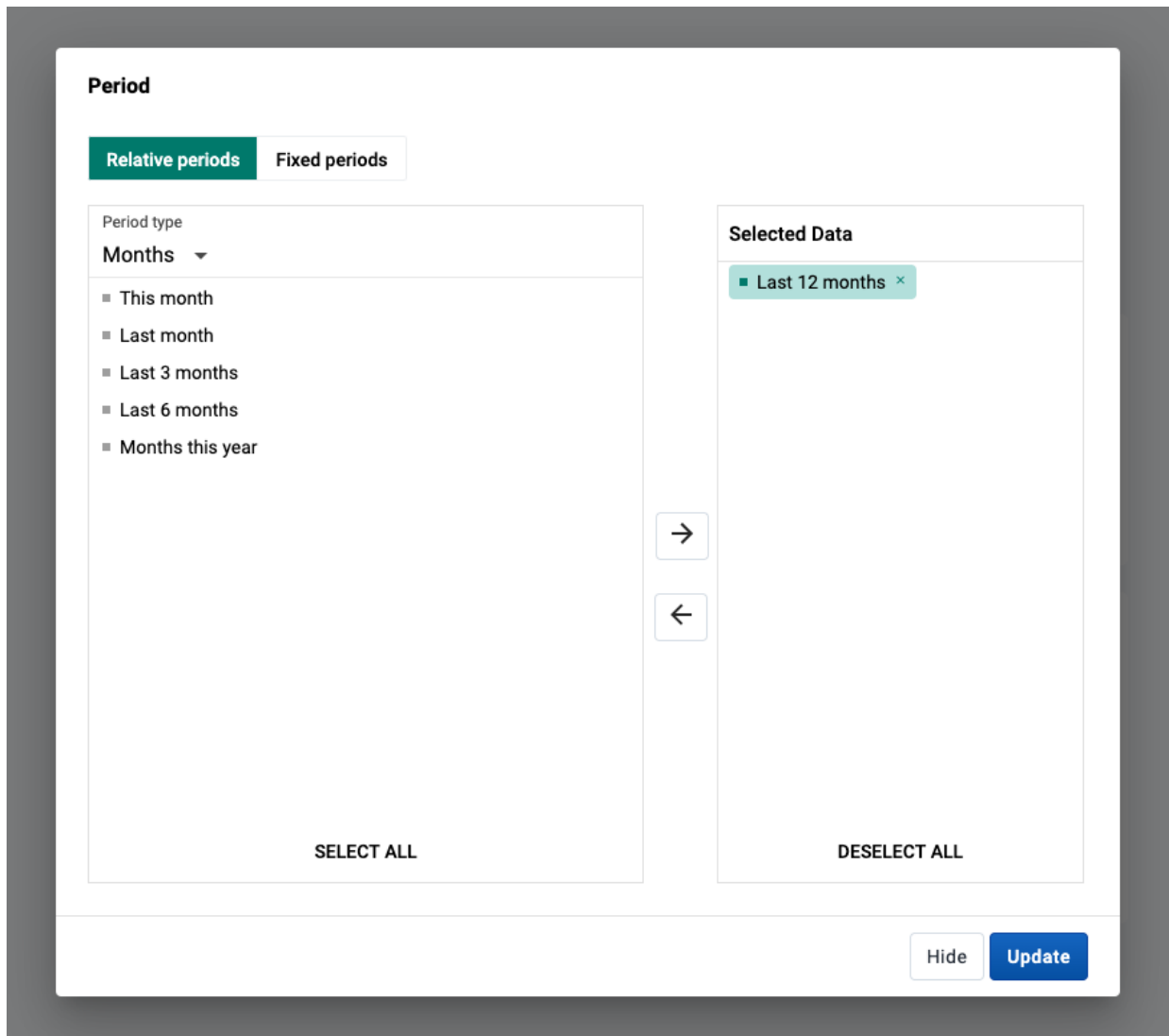
Data Visualizer is highly flexible in terms of allowing you to use these dimensions as series, categories and filter.

To select items for a dimension, open the dimension modal window by clicking on a dimension. This window will also be opened automatically when adding a dimension without selected items to the layout. Select which items to add to the visualization by double-clicking an item or by selecting an item with a single click and using the arrows in the middle. The order of appearance will be the same as the order in which they are selected. Selected items can be reordered by dragging and dropping them in the Selected section.

The screenshot shows the 'Data' selection interface in the Sierra Leone Data Visualizer app. The interface is titled 'Sierra Leone' at the top. It features a 'Data' section with a 'Data Type' dropdown set to 'Indicators'. Below this is a 'Select indicator group' dropdown set to '[ All groups ]'. A search bar is present with the text 'Search'. A list of indicators is displayed, including 'ANC 1 Coverage', 'ANC 1-3 Dropout Rate', 'ANC 2 Coverage', 'ANC 3 Coverage', 'ANC => 4 Coverage', 'ANC IPT 1 Coverage', 'ANC IPT 2 Coverage', 'ANC LLITN coverage', 'ANC TT2 coverage', 'ANC visits per clinical professional', and 'ANC visits total'. A 'SELECT ALL' button is located at the bottom of the list. To the right of the list are two arrow buttons: a right-pointing arrow and a left-pointing arrow. Further right is a 'Selected Data' panel, which is currently empty. At the bottom of this panel is a 'Deselect ALL' button. At the bottom right of the entire interface are two buttons: 'Hide' and 'Update'.

### Select periods

When selecting a Period you have to option to choose between fixed periods and relative periods. These can also be combined. Overlapping periods are filtered so that they only appear once. For relative periods the names are relative to the current date, e.g. if the current month is March and **Last month** is selected, the month of February is shown in the visualization.



### Select organisation units

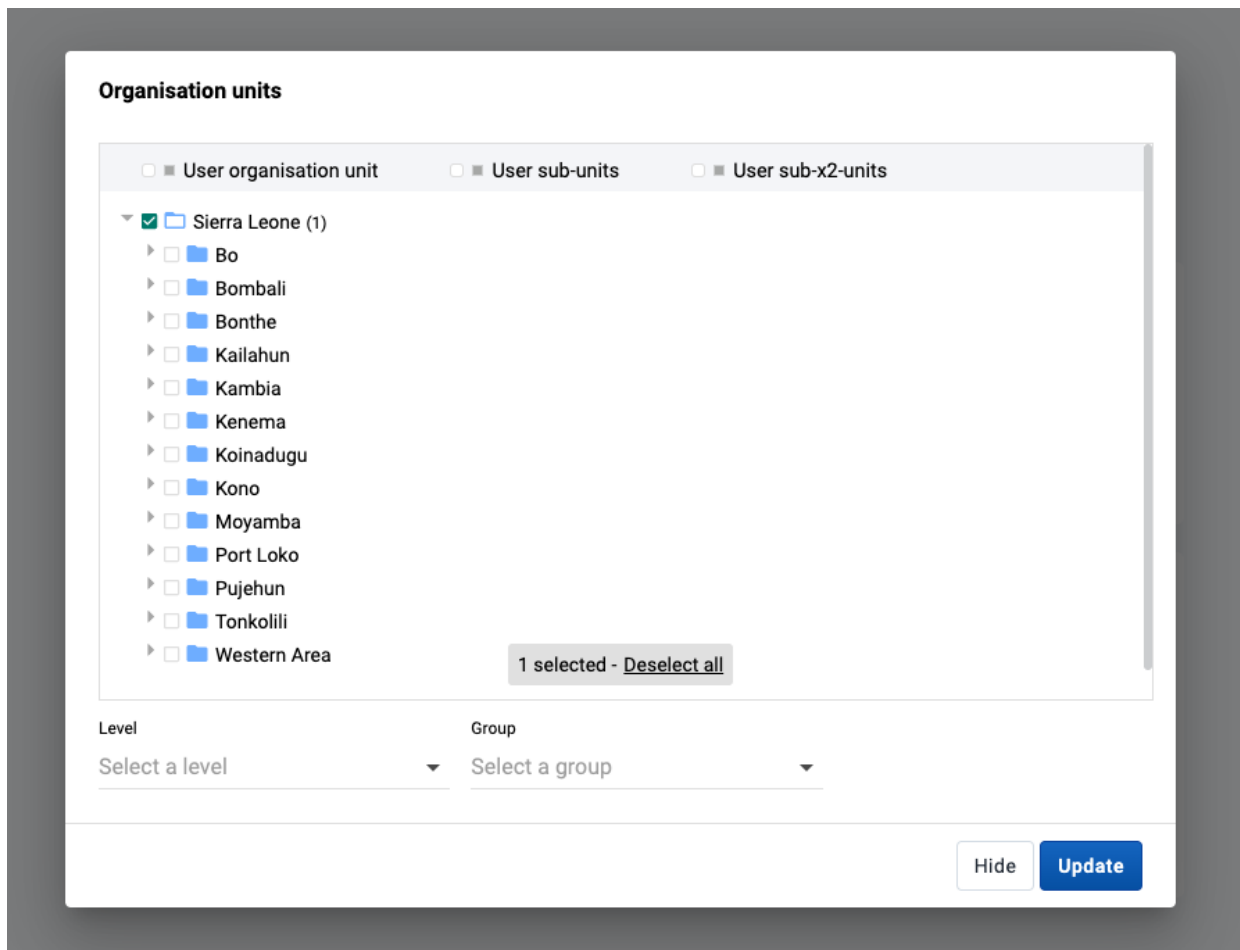
The organisation units dialog is flexible, offering essentially three ways of selecting organisation units:

- Explicit selection: Use the **tree** to explicitly select the organisation units you want to appear in the visualization. If you right-click on an organisation unit you can easily choose to select all org units below it.
- Levels and groups: The **Level** and **Group** dropdowns are a convenient way to select all units in one or more org unit groups or at specific levels. Example: select *Chiefdom* (level 3) to get all org units at that level.

Please note that as soon as at least one level or group has been selected the org unit tree now acts as the boundary for the levels/groups. Example: if you select *Chiefdom* (level 3) and *Kailahun* org unit (at level 2) in the tree you get all chiefdom units inside Kailahun district.

- The user's organisation units:
  - User organisation unit: This is a way to dynamically select the org units that the logged in user is associated to.
  - User sub-units: Selects the sub-units of the user organisation unit.

User sub-x2-units: Selects the units two levels below the user organisation unit.



## Change the display of your visualization

The display of a visualization can be changed by enabling/disabling and configuring several options. Each visualization type can have a different set of available options. The options are organised in tabs in the **Options dialog** and in sections within each tab.

1. Click **Options** to open the **Options dialog**.
2. Navigate the tabs in the dialog to see the available options.
3. Configure the desired options as required.
4. Click **Update** to apply the changes to the visualization.

### List of available options

| Option           | Description  |
|------------------|--|
| Data tab         |  |
| Aggregation type | Defines how the data elements or indicators will be aggregated within the visualization. Some of the aggregation types are <i>By data element</i> , <i>Count</i> , <i>Min</i> and <i>Max</i> . |

| Option                        | Description  |
|-------------------------------|--|
| Base line                     | Displays a horizontal line at the given domain value. Useful for example when you want to visualize how your performance has evolved since the beginning of a process.   |
| Column sub-totals             | Displays sub-totals in a Pivot table for each dimension.<br>If you only select one dimension, sub-totals will be hidden for those columns. This is because the values will be equal to the sub-totals.   |
| Column totals                 | Displays total values in a Pivot table for each column, as well as a total for all values in the table.  |
| Cumulative values             | Displays cumulative values in Column, Stacked column, Bar, Stacked bar, Line and Area visualizations   |
| Custom sort order             | Controls the sort order of the values.   |
| Dimension labels              | Shows the dimension names as part of a Pivot table.  |
| Hide empty categories         | Hides the category items with no data from the visualization. <i>Before first</i> : hides missing values only before the first value <i>After last</i> : hides missing values only after the last value <i>Before first and after last</i> : hides missing values only before the first value and after the last value <i>All</i> : hides all missing values This is useful for example when you create Column and Bar visualizations. |
| Hide empty columns            | Hides empty columns from a Pivot table. This is useful when you look at large tables where a large portion of the dimension items don't have data in order to keep the table more readable.  |
| Hide empty rows               | Hides empty rows from a Pivot table. This is useful when you look at large tables where a large portion of the dimension items don't have data in order to keep the table more readable.   |
| Number type                   | Sets the type of value you want to display in a Pivot table: Value, Percentage of row or Percentage of column.<br>The options Percentage of row and Percentage of column mean that you'll display values as percentages of row total or percentage of column total instead of the aggregated value. This is useful when you want to see the contribution of data elements, categories or organisation units to the total value.        |
| Only include completed events | Includes only completed events in the aggregation process. This is useful for example to exclude partial events in indicator calculations.   |
| Row sub-totals                | Displays sub-totals in a Pivot table for each dimension.<br>If you only select one dimension, sub-totals will be hidden for those rows. This is because the values will be equal to the sub-totals.  |



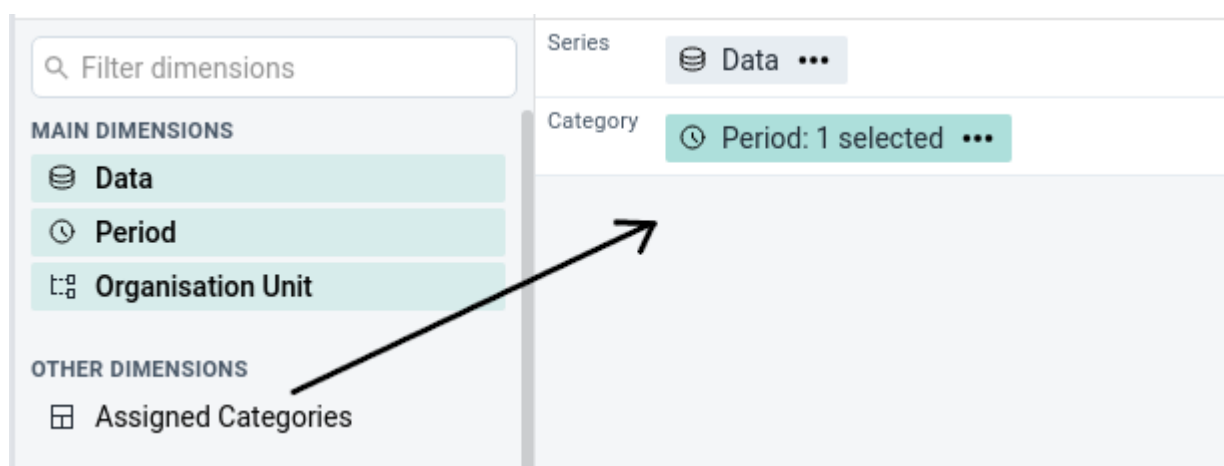
| Option                        | Description   |
|-------------------------------|---|
| Row totals                    | Displays total values in a Pivot table for each row, as well as a total for all values in the table.  |
| Skip rounding                 | Skips the rounding of data values, offering the full precision of data values. Can be useful for finance data where the full dollar amount is required.   |
| Stacked values add up to 100% | Displays 100 % stacked values in Stacked column and Stacked bar visualizations.   |
| Target line                   | Displays a horizontal line at the given domain value. Useful for example when you want to compare your performance to the current target.   |
| Trend line                    | Displays the trend line that visualizes how your data evolves over time. For example if performance is improving or deteriorating. Useful when periods are selected as category.  |
| Value labels                  | Shows the values above the series in the visualization.   |
| Axes tab                      |   |
| Axis range                    | Defines the maximum and minimum value that will be visible on the range axis.   |
| Axis title                    | Type a title here to display a label next to the x or y axis. Useful when you want to give context information to the visualization, for example about the unit of measure.   |
| Decimals                      | Defines the number of decimals that will be used for range axis values.   |
| Steps                         | Defines the number of ticks that will be visible on the range axis.   |
| Legend tab                    |   |
| Display legend                | <p>Applies a legend to the values. This means that you can apply a color to the values. You configure legends in the <i>Maintenance app</i>.</p> <p>The <i>Legend type</i> section allows to control which color is applied. Select <i>Use pre-defined legend per data item</i> to color a data point individually according to each data element or indicator. Select <i>Select a single legend for entire visualization</i> to use a single legend, chosen in a drop-down list of available legends.</p> <p>The <i>Legend style</i> section allows to control where the color is applied, the text or background based on the selected legend. You can use this option for scorecards to identify high and low values at a glance. Not applicable for <i>Single Value</i> visualizations.</p> |
| Style tab                     |   |

| Option                              | Description   |
|-------------------------------------|---|
| Digit group separator               | Controls which character to use to separate groups of digits or "thousands". You can set it to <i>Comma</i> , <i>Space</i> or <i>None</i> .   |
| Display density                     | Controls the size of the cells in a Pivot table. You can set it to <i>Comfortable</i> , <i>Normal</i> or <i>Compact</i> . <i>Compact</i> is useful when you want to fit large tables into the browser screen.   |
| Display organisation unit hierarchy | Shows the name of all ancestors for organisation units, for example " <i>Sierra Leone / Bombali / Tamabaka / Sanya CHP</i> " for " <i>Sanya CHP</i> ". The organisation units are then sorted alphabetically which will order the organisation units according to the hierarchy. When you download a pivot table with organisation units as rows and you've selected <i>Display organisation unit hierarchy</i> , each organisation unit level is rendered as a separate column. This is useful for example when you create Excel pivot tables on a local computer. |
| Font size                           | Controls the size of a Pivot table text font. You can set it to <i>Large</i> , <i>Normal</i> or <i>Small</i> .  |
| Chart/Table title                   | Controls the title that appears above the visualization. <i>Auto generated</i> uses the default title generated from the visualization's dimensions/filters. <i>None</i> removes the title. The <i>Custom</i> option allows you to type a custom title.   |
| Chart/Table subtitle                | Controls the subtitle that appears above the visualization. <i>Auto generated</i> uses the default subtitle generated from the visualization's dimensions/filters. <i>None</i> removes the subtitle. The <i>Custom</i> option allows you to type a custom subtitle.   |
| Legend key                          | Toggles the legend on and off leaving more room for the visualization itself.   |
| No space between bars/ columns      | Removes the space between the columns or bars in the visualization. Useful for displaying the visualization as an EPI curve.  |
| Value labels                        | Shows the values above the series in the visualization.   |
| Chart/Table title                   | Controls the title that appears above the visualization. <i>Auto generated</i> uses the default title generated from the visualization's dimensions/filters. <i>None</i> removes the title. The <i>Custom</i> option allows you to type a custom title.   |
| Limit values tab                    |   |
| Limit minimum/ maximum values       | Allows for the data to be filtered on the server side. You can instruct the system to return only records where the aggregated data value is equal, greater than, greater or equal, less than or less or equal to certain values. If both parts of the filter are used, it's possible to filter out a range of data records.  |
| Parameters tab                      |   |

| Option                   | Description  |
|--------------------------|--|
| Custom sort order        | Controls the sort order of the values.   |
| Include cumulative       | Includes a column with cumulative values to a Pivot table.   |
| Include regression       | Includes a column with regression values to a Pivot table.   |
| Organisation unit        | Controls whether to ask user to enter an organisation unit when creating a standard report in Reports app.       |
| Parent organisation unit | Controls whether to ask user to enter a parent organisation unit when creating a standard report in Reports app. |
| Reporting period         | Controls whether to ask user to enter a report period when creating a standard report in Reports app.            |
| Top limit                | Controls the maximum number of rows to include in a Pivot table.   |

## Adding Assigned Categories

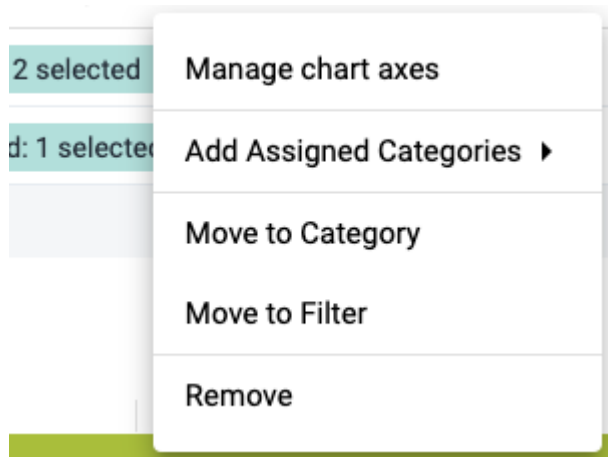
Assigned Categories is a composite dimension that represents associated category option combinations to the selected data element's category combination. This can be added by dragging the **Assigned Categories** dimension from the left side dimensions menu and into the visualization layout:



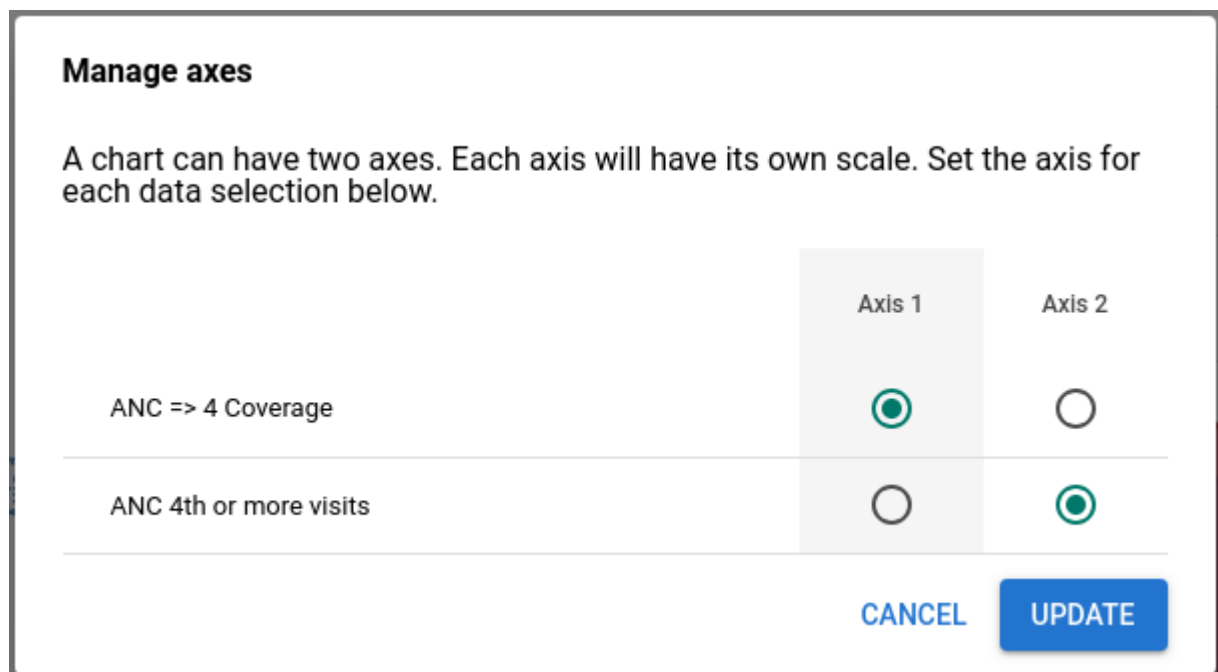
Another way of adding assigned categories is by accessing the **Add Assigned Categories** option from the Data dimension's context menu (not available for Gauge, Year over year or Single value).

## Adding more axes

When combining data with different measurement scales you will get a more meaningful visualization by having more than a single axis. For Column, Bar and Line you can do so by clicking **Manage chart axes** in the Data dimension's context menu. If the option is disabled, make sure that the Data dimension is on the Series axis and that at least two items have been added.



In the axis management dialog you can assign data items to the two axes.



## Manage saved visualizations

Saving your visualizations makes it easy to find them later. You can also choose to share them with other users or display them on a dashboard.

### Open a visualization

1. Click **File > Open**.
2. Enter the name of a visualization in the search field, or click the **<** and **>** arrows to navigate between different pages. The result can also be filtered by type and owner by using the corresponding menus in the top right corner.

Click the name of the one you want to open.

3.

The screenshot shows a modal window titled 'Save' with a search bar and filters. Below the search bar is a table of saved visualizations. The table has four columns: Name, Type, Created, and Last updated. The visualization 'ANC: 1st and 3rd trends Monthly' is highlighted in grey. At the bottom right of the modal, there is a 'CLOSE' button.

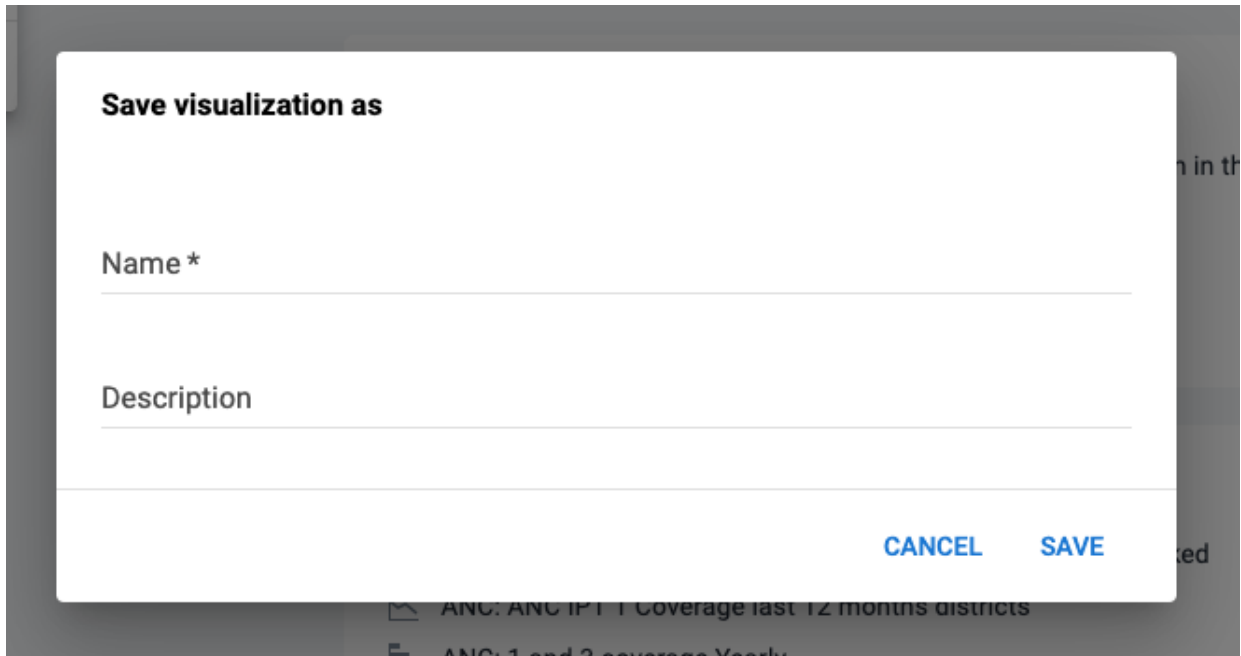
| Name ↑   | Type | Created    | Last updated |
|--|------|------------|--------------|
| ANC: 1-3 dropout rate Yearly                             |      | 2012-11-05 | 2017-10-09   |
| ANC: 1-3 trend lines last 12 months                      |      | 2014-04-16 | 2015-07-15   |
| ANC: 1-4 visits by districts this year (stacked)         |      | 2015-03-26 | 2015-07-15   |
| ANC: 1-4 visits last 12 months                           |      | 2014-07-18 | 2015-07-15   |
| ANC: 1 and 3 coverage Yearly                             |      | 2016-10-11 | 2016-10-11   |
| ANC: 1st and 3rd trends Monthly                          |      | 2012-11-05 | 2015-07-15   |
| ANC: 1st and 3rd visit coverage by orgunit last year     |      | 2014-04-03 | 2018-05-18   |
| ANC: 1st to 3rd visit drop-out rate by orgunit last year |      | 2014-04-03 | 2015-07-15   |
| ANC: 4th visit coverage by orgunit last year             |      | 2014-04-03 | 2017-05-16   |
| ANC: 4+ visits by Facility this year                     |      | 2012-11-05 | 2017-10-09   |

1-10 of 269

CLOSE

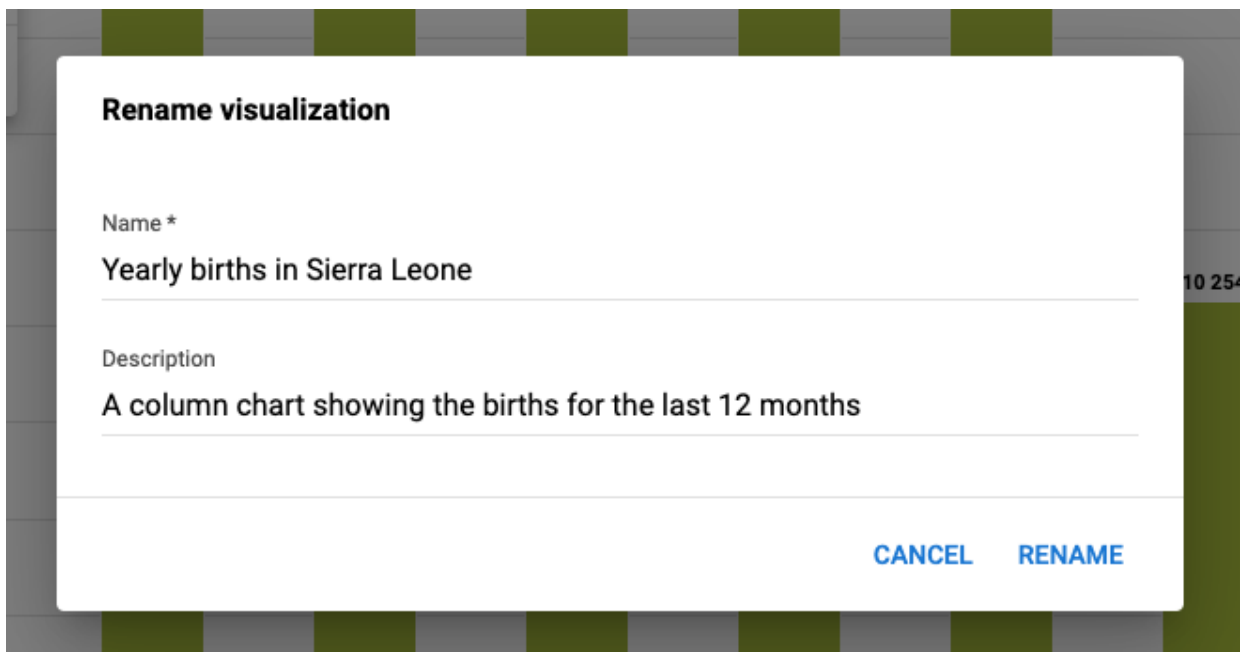
### Save a visualization

1. a) Click **File** > **Save**.
2. Enter a **Name** and a **Description** for your visualization.
3. Click **Save**.



### Rename a visualization

1. Click **File > Rename**.
2. Enter the new name and/or description.
3. Click **Rename**.



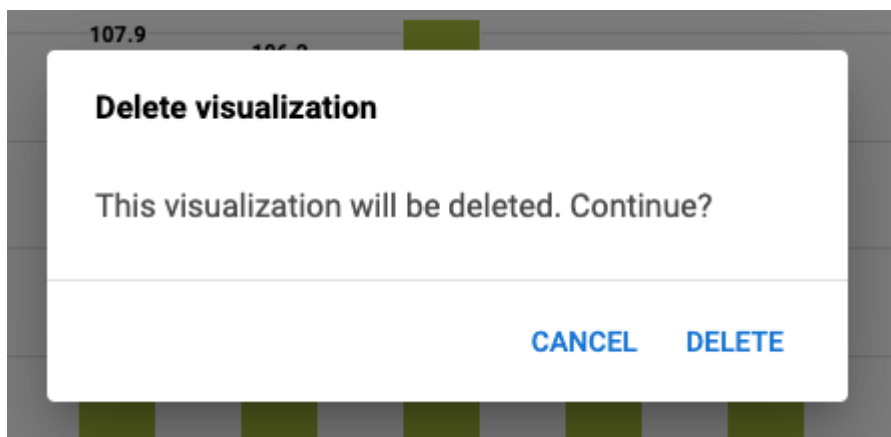
### Delete a visualization

1. Click **File > Delete**.
2. Click **Delete**.

---

### Get the link to the visualization

1. Click **File > Get Link**.
2. The URL can be copied via the browser's context menu that opens when right clicking on the link.



### Visualization interpretations

When viewing a saved visualization, you can expand the interpretations on the right side by clicking on the Interpretations button in the upper right corner. The visualization description will also be shown. The description supports rich text format.


New interpretations can be added by typing in the text field in the bottom right corner. Other users can be mentioned with @username. Start by typing @ plus the first letters of the username or real name and a list of matching users will be displayed. Mentioned users will receive an internal DHIS2 message with the interpretation or comment. Interpretations can also be seen in the **Dashboard** app.

It is possible to format the text with **bold**, *italic* by using the Markdown style markers \* and \_ for **bold** and *italic* respectively (keyboard shortcuts are also available: Ctrl/Cmd + B and Ctrl/Cmd + I). A limited set of emojis is supported and can be used by typing one of the following character combinations: :) :- ) :( :- ( :+1 :-1. URLs are automatically detected and converted into a clickable link.


To view the visualization according to the date of a particular interpretation, click on the interpretation or its View button. This will regenerate the visualization with the relevant date, which is indicated next to the visualization title. Clicking on Back to all interpretations will regenerate the visualization with the current date.

To subscribe to the saved visualization, click the bell icon in the upper right corner. You will then receive internal messages whenever another user likes/creates/updates an interpretation in this saved visualization.


> Interpretations

**Visualization details** 




---


*No description* 

**Owner:** Tom Wakiki  
**Created:** Nov 5, 2012  
**Last updated:** Oct 9, 2017  
**Views:** 9  
**Sharing:** Public: Read

**Interpretations** 

---

 **Robert Malai**  
We can see that the drop-out rate in Kenema is very low while Port Loko and Tonkolili have high vales. This might be because the service provision in Kenema is a lot better. We should also investigate potential missing values which drive up the dropout rates.  
Apr 14, 2019 · 1 reply  
 

 Write an interpretation

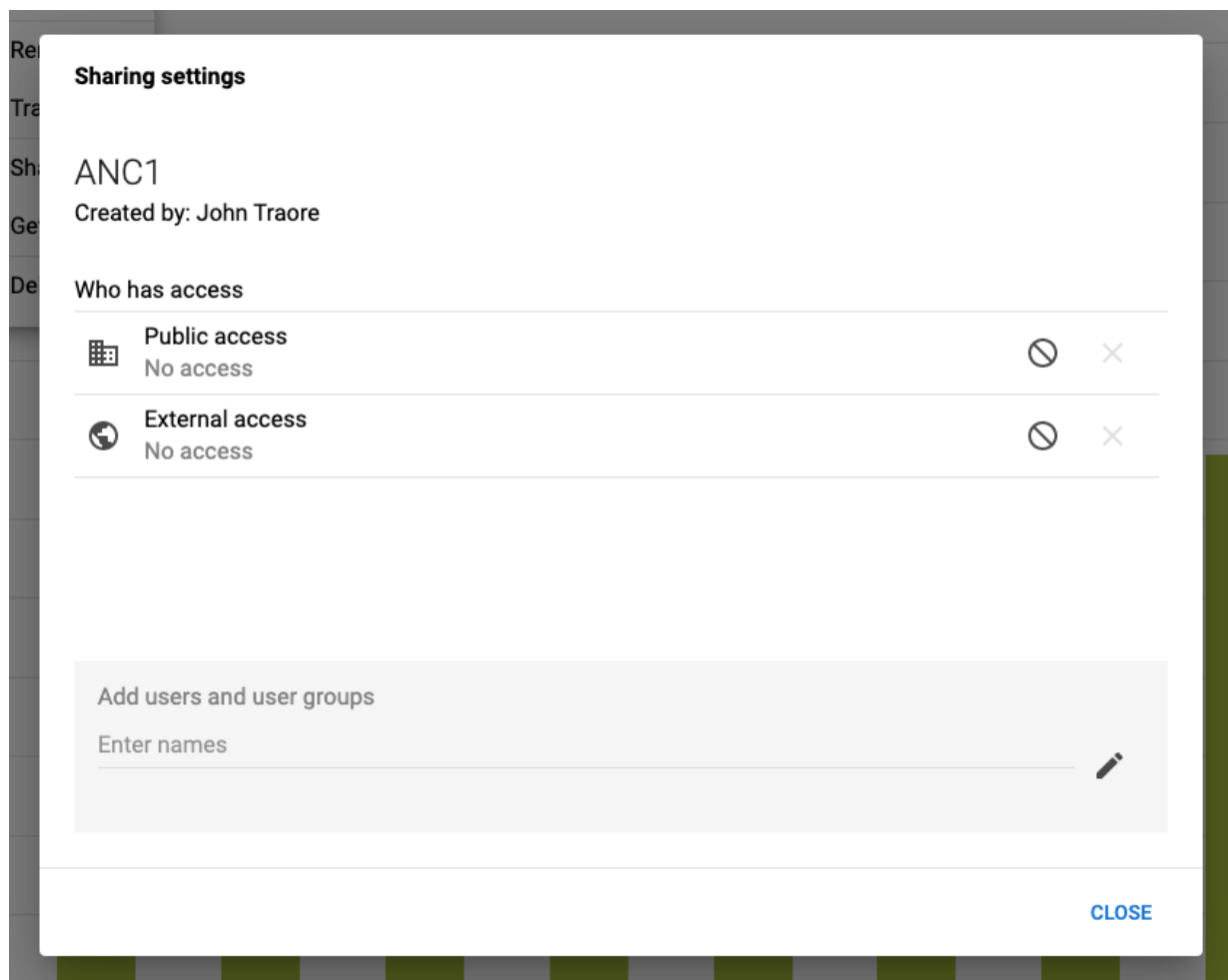
## Share a visualization

Sharing settings can be accessed by clicking **File > Share**. Change sharing settings for the user groups you want to modify, the available settings are:

- **Can edit and view:** Can view and edit the visualization.
- **Can view only:** Can only view the visualization.
- **No access:** Won't have access to the visualization. This setting is only applicable to **Public access** and **External access**.

New users can be added by searching for them by name under **Add users** and **user groups**.





## Download

Visualizations can be downloaded using the **Download** menu. All visualization types support Graphics and Plain data source downloads, except for the Pivot table type, which can be downloaded as Table layout and Plain data source.

### Graphics download

Downloads an image (.png) or a PDF (.pdf) file to your computer.

### Table layout download

Downloads a Excel (.xls), CSV (.csv) or HTML (.html) file to your computer.

### Plain data source download

You can download the data source of a visualization in JSON, XML, Excel, CSV, JXRML or Raw data SQL formats with different identification schemes (ID, Code, and Name). The data document uses identifiers of the dimension items and opens in a new browser window to display the URL of the request to the Web API in the address bar. This is useful for developers of apps and other client modules based on the DHIS2 Web API or for those who require a plan data source, for instance for import into statistical packages.

#### *Available formats*

| Format              | Action                                  | Description  |
|---------------------|---|--|
| JSON                | Click <b>JSON</b>                       | Downloads JSON format based on the <b>ID</b> , <b>Code</b> or <b>Name</b> property.  |
| XML                 | Click <b>XML</b>                        | Downloads XML format based on the <b>ID</b> , <b>Code</b> or <b>Name</b> property.   |
| Microsoft Excel     | Click <b>Microsoft Excel</b>            | Downloads Microsoft Excel format based on the <b>ID</b> , <b>Code</b> or <b>Name</b> property.   |
| CSV                 | Click <b>CSV</b>                        | Downloads CSV format based on the <b>ID</b> , <b>Code</b> or <b>Name</b> property.   |
| XML data value set  | Click <b>Advanced &gt; XML</b>          | Downloads the raw data values as XML, as opposed to data which has been aggregated along various dimensions.   |
| JSON data value set | Click <b>Advanced &gt; JSON</b>         | Downloads the raw data values as JSON, as opposed to data which has been aggregated along various dimensions.  |
| JRXML               | Click <b>Advanced &gt; JRXML</b>        | Produces a template of a Jasper Report which can be further customized based on your exact needs and used as the basis for a standard report in DHIS 2.        |
| Raw data SQL        | Click <b>Advanced &gt; Raw data SQL</b> | Provides the actual SQL statement used to generate the data visualization. You can use it as a data source in a Jasper report, or as the basis for a SQL view. |

### See visualization as map

To see how a visualization would look on map, select the **Open as Map Visualization** type after you're finished building your visualization.

Column ▼ Update File Options Download

ter

AI

Column Stacked column Bar Stacked bar

Line Area Pie Radar

Gauge Year over year (line) Year over year (column) Single value

Pivot table

Open as Map

## Analyze data in pivot tables

### About the Pivot Table app

With the **Pivot Table** app, you can create pivot tables based on all available data dimensions in DHIS2. A pivot table is a dynamic tool for data analysis which lets you summarize and arrange data according to its dimensions. Examples of data dimensions in DHIS2 are:

- data dimension itself (for example data elements, indicators and events)
- periods (representing the time period for the data)
- organisation hierarchy (representing the geographical location of the data)

From these dimensions you can freely select *dimension items* to include in the pivot table. You can create additional dimensions in DHIS2 with the group set functionality. This allows for different aggregation pathways, such as aggregation by "Partner" or facility type.

A pivot table can arrange data dimensions on *columns*, *rows*, and as *filters*. When you place a data dimension on columns, the pivot table will display one column per dimension item. If you place multiple data dimensions on columns, the pivot table displays one column for all combinations of the items in the selected dimensions. When you place a data dimension on rows, the pivot table displays one row per dimension item in a similar fashion. The dimensions you select as filters will not be included in the pivot table, but will aggregate and filter the table data based on the selected filter items.

#### Tip

- You must select at least one dimension on columns or rows.
- You must include at least one period.
- Data element group sets and reporting rates can't appear in the same pivot table.
- A pivot table can't contain more than the maximum number of analytic records which have been specified in the system settings. The maximum number of records could also be constrained by the maximum RAM which is available to your browser. You will be prompted with a warning if your requested table exceeds a particular size. From this prompt, you can either cancel the request or continue building the table. Consider making smaller tables instead of one table which displays all of your data elements and indicators together.
- The **Pivot Table** app supports drill-down and up for periods and organisation unit. This means that you can for example drill down from yearly periods to quarters, months and weeks inside a pivot table. You can also drill down from the global organisation unit to countries, provinces and facilities.

### Create a pivot table

1. Open the **Pivot Table** app.
2. In the menu to the left, select the dimension items you want to analyse, for example data elements or indicators.
3. Click **Layout** and arrange the data dimensions as columns, rows and filters.

You can keep the default selection if you want.

#### 4. Click **Update**.

In this example, indicators are listed as columns and periods as rows.

| Data                     |                       | Update   Layout   Options   Favorites   Download   Share |                 |                       |                     |                  |                    |           |
|--------------------------|-----------------------|--|-----------------|-----------------------|---------------------|------------------|--------------------|-----------|
| Data elements            |                       | Periods / Data   | BCG doses given | Fully Immunized child | Measles doses given | OPV3 doses given | Penta3 doses given | Total     |
| Immunization             |                       | October 2014   | 16 691          | 14 065                | 15 763              | 14 006           | 14 106             | 74 631    |
| Available                |                       | November 2014  | 17 400          | 14 812                | 16 679              | 15 866           | 16 034             | 80 791    |
| Selected                 |                       | December 2014  | 13 634          | 11 743                | 11 798              | 10 292           | 10 812             | 58 279    |
| OPV0 doses given         | BCG doses given       | January 2015   | 20 031          | 14 579                | 16 379              | 14 446           | 14 646             | 80 081    |
| OPV1 doses given         | Fully Immunized child | February 2015  | 20 483          | 15 732                | 18 208              | 15 992           | 16 245             | 86 660    |
| OPV2 doses given         | Measles doses given   | March 2015   | 19 396          | 16 200                | 17 563              | 15 304           | 15 600             | 84 063    |
| Penta1 doses given       | OPV3 doses given      | April 2015   | 20 410          | 15 526                | 17 422              | 15 335           | 15 790             | 84 483    |
| Penta2 doses given       | Penta3 doses given    | May 2015   | 22 402          | 17 765                | 19 386              | 16 711           | 17 191             | 93 455    |
| Yellow Fever doses given |                       | June 2015  | 23 243          | 15 762                | 17 875              | 16 143           | 16 601             | 89 624    |
|                          |                       | July 2015  | 21 589          | 15 705                | 17 063              | 16 741           | 16 622             | 87 720    |
|                          |                       | August 2015  | 20 485          | 17 499                | 19 144              | 18 024           | 18 247             | 93 399    |
|                          |                       | September 2015   | 21 130          | 17 841                | 19 645              | 17 924           | 18 108             | 94 648    |
|                          |                       | Total  | 236 894         | 187 229               | 206 925             | 186 784          | 190 002            | 1 007 834 |

### Select dimension items

The left menu lists sections for all available data dimensions. From each section you can select any number of dimension items. As an example, you can open the section for data elements and select any number of data elements from the available list. You can select an item by marking it and clicking on the arrow in the section header or simply double-clicking on the item. Before you can use a data dimension in your pivot table you must at least select one dimension item. If you arrange a dimension as columns or rows but do not select any dimension items, the dimension is ignored.

You must choose at least one data dimension type to create a pivot table. The available types are described in this table:

#### Data dimension types

| Data dimension type | Definition   | Examples   |
|---------------------|--|--|
| Indicators          | An indicator is a calculated formula based on data elements. | Coverage of immunization across a specific district. |
| Data elements       | Represents the phenomenon for which data has been captured.  | Number of malaria cases; number of BCG doses given.  |

| Data dimension type | Definition   | Examples   |
|---------------------|--|--|
| Data sets           | <p>A collection of data elements grouped for data collection. You can select :</p> <ul style="list-style-type: none"> <li>• <b>Reporting rates:</b> the percentage of actual reports compared to the expected number of reports</li> <li>• <b>Reporting rates on time:</b> the reporting rates based on timely form submissions. A timely submission must happen within a number of days after the reporting period.</li> <li>• <b>Actual reports:</b> the actual number of reports</li> <li>• <b>Actual reports on time:</b> the actual number of reports based on timely form submissions. A timely submission must happen within a number of days after the reporting period.</li> <li>• <b>Expected reports:</b> the number of expected reports based on organisation units where the data set and the reporting frequency has been assigned.</li> </ul> | Reporting rates for immunization and morbidity forms.          |
| Event data items    | A data element that is part of a program representing events that have been captured.  | Average weight and height for children in a nutrition program. |
| Program indicators  | A calculated formula based on data elements in a program representing events.  | Average BMI score for children in a nutrition program.         |

You can combine these dimensions to display for example aggregate data with reporting rates, or event data items together with program indicators, all in the same pivot tables. For the "data element" data dimension, you are also able to select "Totals" and "Details", which will allow you to view different category combination options together on the same pivot table.

For the period dimension you can choose between using fixed periods or relative periods. An example of a fixed period is "January 2012". To select fixed periods start by selecting a period type from the period type list. You can then select periods from the list of available periods.

Relative periods are periods relative to the current date. Examples of relative periods are "Last month", "Last 12 months", "Last 5 years". Relative periods can be selected by ticking the checkboxes next to each period. The main advantage of using relative periods is that when you save a pivot table favorite, it will stay updated with the latest data as time goes by without the need for constantly updating it.

For the organisation unit dimension you can select any number of organisation units from the hierarchy. To select all organisation units below a specific parent organisation unit, right click and click "Select all children". To manually select multiple organisation units, click and hold the **Ctrl** key while clicking on organisation units. You can tick "User org unit", "User sub-units" or "User sub-x2-units" in order to dynamically insert the organisation unit or units associated with your user account. This is useful when you save a pivot table favorite and want to share it with other users, as the organisation units linked with the other user's account will be used when viewing the favorite.

**Periods**

Monthly ▼ Prev year Next year

| Available     | Selected       |
|---------------|----------------|
| November 2015 | July 2015      |
| October 2015  | June 2015      |
| May 2015      | August 2015    |
| April 2015    | September 2015 |
| March 2015    |                |
| February 2015 |                |
| January 2015  |                |

|   |  |   |
|---|--|---|
| <b>Weeks</b><br><input type="checkbox"/> This week<br><input type="checkbox"/> Last week<br><input type="checkbox"/> Last 4 weeks<br><input type="checkbox"/> Last 12 weeks<br><input type="checkbox"/> Last 52 weeks | <b>Months</b><br><input type="checkbox"/> This month<br><input type="checkbox"/> Last month<br><input type="checkbox"/> Last 3 months<br><input type="checkbox"/> Last 6 months<br><input type="checkbox"/> Last 12 months | <b>Bi-months</b><br><input type="checkbox"/> This bi-month<br><input type="checkbox"/> Last bi-month<br><input type="checkbox"/> Last 6 bi-months                         |
| <b>Quarters</b><br><input type="checkbox"/> This quarter<br><input type="checkbox"/> Last quarter<br><input type="checkbox"/> Last 4 quarters   | <b>Six-months</b><br><input type="checkbox"/> This six-month<br><input type="checkbox"/> Last six-month<br><input type="checkbox"/> Last 2 six-months  | <b>Financial years</b><br><input type="checkbox"/> This financial year<br><input type="checkbox"/> Last financial year<br><input type="checkbox"/> Last 5 financial years |
| <b>Years</b><br><input type="checkbox"/> This year<br><input type="checkbox"/> Last year<br><input type="checkbox"/> Last 5 years   |  |   |

Dynamic dimensions can consist of organisation unit group sets, data element group sets, or category option group sets which have been configured with the type of "Disaggregation". Once the group sets have been configured, they will be come available in the pivot tables, and can be used as additional analysis dimensions, for instance to analyse aggregate data by Type of organisation unit or Implementing partner. Dynamic dimensions work the same as fixed dimensions.

**Tip**

Some dynamic dimensions may contain many items. This can cause issues with certain browsers due to the length of the URL when many dimension members are selected. A special "All" check box is available for dynamic dimensions, which allows you to include all available dimensions implicitly in your pivot table, without specifying each and every dimension member.

### Modify pivot table layout

After selecting data dimensions it is time to arrange your pivot table. Click "Layout" in the top menu to open the layout screen. In this screen you can position your data dimensions as table columns, rows or filters by clicking and dragging the dimensions from the dimensions list to the respective column, row and filter lists. You can set any number of dimensions in any of the lists. For instance, you can click on "Organisation units" and drag it to the row list in order to position the organisation unit dimension as table rows. Note that indicators, data elements and data set reporting rates are part of the common "Data" dimension and will be displayed together in the pivot table. For instance, after selecting indicators and data elements in the left menu, you can drag "Organisation Unit" from the available dimensions list to the row dimension list in order to arrange them as rows in the pivot table.

The screenshot shows a dialog box titled "Table layout" with a close button (X) in the top right corner. The dialog is divided into three main sections: "Excluded dimensions", "Report filter", and "Column dimensions".

| Excluded dimensions   | Report filter                 | Column dimensions |
|---|-------------------------------|-------------------|
| Assigned categories<br>Facility Ownership<br>Funding Agency<br>Gender |                               | Data              |
|   | Row dimensions                |                   |
|   | Periods<br>Organisation units |                   |

At the bottom right of the dialog, there are two buttons: "Hide" and "Update".

After you have set up your pivot table you can click "Update" to render your pivot table, or click "Hide" to hide the layout screen without any changes taking effect. Since we in our example have



selected both the period and organisation unit dimension as rows, the pivot table will generate all combinations of the items in these dimensions and produce a table like this:

| Periods        | Organisation units / Data | BCG doses given | Fully Immunized child | Measles doses given | OPV3 doses given | Penta3 doses given | Total  |
|----------------|---------------------------|-----------------|-----------------------|---------------------|------------------|--------------------|--------|
| June 2015      | Bo                        | 2 405           | 1 427                 | 1 512               | 1 535            | 1 544              | 8 423  |
|                | Bombali                   | 1 585           | 1 168                 | 1 228               | 1 183            | 1 200              | 6 364  |
|                | Bonthe                    | 779             | 472                   | 515                 | 541              | 534                | 2 841  |
|                |                           | 4 769           | 3 067                 | 3 255               | 3 259            | 3 278              | 17 628 |
| July 2015      | Bo                        | 2 255           | 1 351                 | 1 382               | 1 559            | 1 492              | 8 039  |
|                | Bombali                   | 1 438           | 1 219                 | 1 252               | 1 300            | 1 303              | 6 512  |
|                | Bonthe                    | 650             | 597                   | 623                 | 593              | 560                | 3 023  |
|                |                           | 4 343           | 3 167                 | 3 257               | 3 452            | 3 355              | 17 574 |
| August 2015    | Bo                        | 2 283           | 2 092                 | 2 148               | 2 127            | 2 073              | 10 723 |
|                | Bombali                   | 1 613           | 1 255                 | 1 332               | 1 318            | 1 318              | 6 836  |
|                | Bonthe                    | 792             | 621                   | 650                 | 641              | 667                | 3 371  |
|                |                           | 4 688           | 3 968                 | 4 130               | 4 086            | 4 058              | 20 930 |
| September 2015 | Bo                        | 2 392           | 1 508                 | 2 067               | 1 732            | 1 737              | 9 436  |
|                | Bombali                   | 1 526           | 1 344                 | 1 432               | 1 337            | 1 403              | 7 042  |
|                | Bonthe                    | 615             | 792                   | 684                 | 622              | 651                | 3 364  |
|                |                           | 4 533           | 3 644                 | 4 183               | 3 691            | 3 791              | 19 842 |
| <b>Total</b>   |                           | 18 333          | 13 846                | 14 825              | 14 488           | 14 482             | 75 974 |

### Change the display of your pivot table

1. Open the **Pivot Table** app.
2. Create a new pivot table or open a favorite.
3. Click **Options**.
4. Set the options as required.

#### *Pivot table options*

| Option   | Description   |
|--|---|
| <b>Data</b><br><br><b>Show column totals</b><br><br><b>Show row totals</b> | Displays total values in the table for each row and column, as well as a total for all values in the table.   |
| <b>Show column sub-totals</b><br><br><b>Show row sub-totals</b>            | Displays subtotals in the table for each dimension.<br><br>If you only select one dimension, subtotals will be hidden for those columns or rows. This is because the values will be equal to the subtotals. |
| <b>Show dimension labels</b>   | Shows the dimension names as part of the pivot tables.  |

| Option | Description               |  |
|--------|---------------------------|--|
|        | <b>Hide empty rows</b>    | Hides empty rows from the table. This is useful when you look at large tables where a big part of the dimension items don't have data in order to keep the table more readable.  |
|        | <b>Hide empty columns</b> | Hides empty columns from the table. This is useful when you look at large tables where a big part of the dimension items don't have data in order to keep the table more readable.   |
|        | <b>Skip rounding</b>      | Skips the rounding of data values, offering the full precision of data values. Can be useful for finance data where the full dollar amount is required.  |
|        | <b>Aggregation type</b>   | The default aggregation operator can be over-ridden here, by selecting a different aggregation operator. Some of the aggregation types are <b>Count</b> , <b>Min</b> and <b>Max</b> .  |
|        | <b>Number type</b>        | Sets the type of value you want to display in the pivot table: <b>Value</b> , <b>Percentage of row</b> or <b>Percentage of column</b> .<br><br>The options <b>Percentage of row</b> and <b>Percentage of column</b> mean that you'll display values as percentages of row total or percentage of column total instead of the aggregated value. This is useful when you want to see the contribution of data elements, categories or organisation units to the total value. |
|        | <b>Measure criteria</b>   | Allows for the data to be filtered on the server side.<br><br>You can instruct the system to return only records where the aggregated data value is equal, greater than, greater or equal, less than or less or equal to certain values.<br><br>If both parts of the filter are used, it's possible to filter out a range of data records.   |

| Option                    | Description                          |  |
|---------------------------|--------------------------------------|--|
| <b>Events</b>             | <b>Include only completed events</b> | Includes only completed events in the aggregation process. This is useful for example to exclude partial events in indicator calculations.   |
| <b>Organisation units</b> | <b>Show hierarchy</b>                | <p>Shows the name of all ancestors for organisation units, for example "Sierra Leone / Bombali / Tamabaka / Sanya CHP" for Sanya CHP.</p> <p>The organisation units are then sorted alphabetically which will order the organisation units according to the hierarchy.</p> <p>When you download a pivot table with organisation units as rows and you've selected <b>Show hierarchy</b>, each organisation unit level is rendered as a separate column. This is useful for example when you create Excel pivot tables on a local computer.</p> |
| <b>Legend</b>             | <b>Apply legend</b>                  | <p>Applies a legend to the values. This mean that you can apply a colour to the values.</p> <p>Select <b>By data item</b> to color the table cells individually according to each data element or indicator.</p> <p>You configure legends in the <b>Maintenance</b> app.</p>   |
|                           | <b>Style</b>                         | <p>Colors the text or background of cells in pivot tables based on the selected legend.</p> <p>You can use this option for scorecards to identify high and low values at a glance.</p>   |
| <b>Style</b>              | <b>Display density</b>               | <p>Controls the size of the cells in the table. You can set it to <b>Comfortable</b>, <b>Normal</b> or <b>Compact</b>.</p> <p><b>Compact</b> is useful when you want to fit large tables into the browser screen.</p>  |

| Option  | Description   |  |
|---|---|--|
|   | <b>Font size</b>  | Controls the size of the table text font. You can set it to <b>Large</b> , <b>Normal</b> or <b>Small</b> .                           |
|   | <b>Digit group separator</b>  | Controls which character to separate groups of digits or "thousands". You can set it to <b>Comma</b> , <b>Space</b> or <b>None</b> . |
| <b>General</b>                                | <b>Table title</b>  | Type a title here to display it above the table.   |
| <b>Parameters (for standard reports only)</b> | <div style="border: 1px solid #add8e6; padding: 10px;"> <p><b>Note</b></p> <p>You create standard reports in the <b>Reports</b> app.</p> <p>In the <b>Pivot Table</b> app you set which parameters the system should prompt the user for.</p> </div> |  |
|   | <b>Reporting period</b>   | Controls whether to ask user to enter a report period.   |
|   | <b>Organisation unit</b>  | Controls whether to ask user to enter an organisation unit.  |
|   | <b>Parent organisation unit</b>   | Controls whether to ask user to enter a parent organisation unit.  |
|   | <b>Include regression</b>   | Includes a column with regression values to the pivot table.   |
|   | <b>Include cumulative</b>   | Includes a column with cumulative values to the pivot table.   |
|   | <b>Sort order</b>   | Controls the sort order of the values.   |
|   | <b>Top limit</b>  | Controls the maximum number of rows to include in the pivot table.   |

5. Click **Update**.

---

## Manage favorites

Saving your charts or pivot tables as favorites makes it easy to find them later. You can also choose to share them with other users as an interpretation or display them on the dashboard.

You view the details and interpretations of your favorites in the **Pivot Table**, **Data Visualizer**, **Event Visualizer**, **Event Reports** apps. Use the **Favorites** menu to manage your favorites.

### Open a favorite

1. Click **Favorites > Open**.
2. Enter the name of a favorite in the search field, or click **Prev** and **Next** to display favorites.
3. Click the name of the favorite you want to open.

### Save a favorite

1. Click **Favorites > Save as**.
2. Enter a **Name** and a **Description** for your favorite. The description field supports a rich text format, see the interpretations section for more details.
3. Click **Save**.

### Rename a favorite

1. Click **Favorites > Rename**.
2. Enter the new name for your favorite.
3. Click **Update**.

### Write an interpretation for a favorite

An interpretation is a link to a resource with a description of the data at a given period. This information is visible in the **Dashboard** app. To create an interpretation, you first need to create a favorite. If you've shared your favorite with other people, the interpretation you write is visible to those people.

1. Click **Favorites > Write interpretation**.
2. In the text field, type a comment, question or interpretation. You can also mention other users with '@username'. Start by typing '@' plus the first letters of the username or real name and a mentioning bar will display the available users. Mentioned users will receive an internal DHIS2 message with the interpretation or comment. You can see the interpretation in the **Dashboard** app.

It is possible to format the text with **bold**, *italic* by using the Markdown style markers \* and \_ for **bold** and *italic* respectively. Keyboard shortcuts are also available: Ctrl/Command + B and Ctrl/Command + I. A limited set of smilies is supported and can be used by typing one of the following character combinations: :) :-) :( :-(: :+1 :-1. URLs are automatically detected and converted into a clickable link.

3. Search for a user group that you want to share your favorite with, then click the + icon.
4. Change sharing settings for the user groups you want to modify.
  - **Can edit and view**: Everyone can view and edit the object.
  - **Can view only**: Everyone can view the object.

- 
- **None:** The public won't have access to the object. This setting is only applicable to
  - **Public access.**

5. Click **Share**.

### Subscribe to a favorite

When you are subscribed to a favorite, you receive internal messages whenever another user likes/creates/updates an interpretation or creates/update an interpretation comment of this favorite.

1. Open a favorite.
2. Click >>> in the top right of the workspace.
3. Click on the upper-right bell icon to subscribe to this favorite.

### Create a link to a favorite

1. Click **Favorites > Get link**.
2. Select one of the following:
  - **Open in this app:** You get a URL for the favorite which you can share with other users by email or chat.
  - **Open in web api:** You get a URL of the API resource. By default this is an HTML resource, but you can change the file extension to ".json" or ".csv".

### Delete a favorite

1. Click **Favorites > Delete**.
2. Click **OK**.

### View interpretations based on relative periods

To view interpretations for relative periods, such as a year ago:

1. Open a favorite with interpretations.
2. Click >>> in the top right of the workspace.
3. Click an interpretation. Your chart displays the data and the date based on when the interpretation was created. To view other interpretations, click them.

### Download data from a pivot table

#### Download table layout data format

To download the data in the current pivot table:

1. Click **Download**.
2. Under **Table layout**, click the format you want to download: Microsoft Excel, CSV or HTML.

The data table will have one column per dimension and contain names of the dimension items.

**Tip**

When you download a pivot table with organisation units as rows and you've selected **Show hierarchy** in **Table options**, each organisation unit level is rendered as a separate column. This is useful for example when you create Excel pivot tables on a local computer.

#### Tip

You can create a pivot table in Microsoft Excel from the downloaded Excel file.

### Download plain data source format

You can download data in the current pivot table in JSON, XML, Excel, and CSV as plain data formats with different identification schemes (ID, Code, and Name). The data document uses identifiers of the dimension items and opens in a new browser window to display the URL of the request to the Web API in the address bar. This is useful for developers of apps and other client modules based on the DHIS2 Web API or for those who require a plan data source, for instance for import into statistical packages.

To download plain data source formats:

1. Click **Download**.
2. Under **Plain data source**, click the format you want to download.

#### Available formats

| Format          | Action                       | Description  |
|-----------------|------------------------------|--|
| JSON            | Click <b>JSON</b>            | Downloads JSON format based on ID property.<br><br>You can also download JSON format based on <b>Code</b> or <b>Name</b> property.           |
| XML             | Click <b>XML</b>             | Downloads XML format based on ID property.<br><br>You can also download XML format based on <b>Code</b> or <b>Name</b> property.             |
| Microsoft Excel | Click <b>Microsoft Excel</b> | Downloads XML format based on ID property.<br><br>You can also download Microsoft Excel format based on <b>Code</b> or <b>Name</b> property. |
| CSV             | Click <b>CSV</b>             | Downloads CSV format based on ID property.<br><br>You can also download CSV format based on <b>Code</b> or <b>Name</b> property.             |

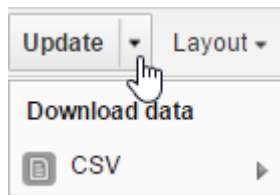
| Format       | Action  | Description  |
|--------------|---|--|
| JRXML        | Put the cursor on <b>Advanced</b> and click <b>JRXML</b>        | Produces a template of a Jasper Report which can be further customized based on your exact needs and used as the basis for a standard report in DHIS2.   |
| Raw data SQL | Put the cursor on <b>Advanced</b> and click <b>Raw data SQL</b> | Provides the actual SQL statement used to generate the pivot table. You can use it as a data source in a Jasper report, or as the basis for an SQL view. |

### Download a CSV format without rendering data in the web browser

You can download data in CSV format directly without rendering the data in the web browser. This helps to reduce any constraints in the system settings that has been set with regards to the maximum number of analytic records. This lets you download much larger batches of data that you can use for later offline analysis.

To download data in CSV format without first rendering data in the web browser:

1. Click the arrow beside **Update**.



2. Click **CSV** to download the format based on ID property.

The file downloads to your computer.

#### Tip

You can also download CSV format based on **Code** or **Name** property.

### Embed a pivot table in an external web page

Certain analysis-related resources in DHIS2, like pivot tables, charts and maps, can be embedded in any web page by using a plug-in. You will find more information about the plug-ins in the Web API chapter in the *DHIS2 Developer Manual*.

To generate a HTML fragment that you can use to display the pivot table in an external web page:

1. Click **Embed**.
2. Click **Select** to highlight the HTML fragment.



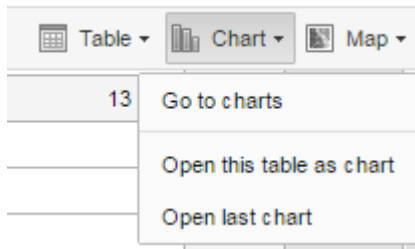
## Visualize pivot table data as a chart or a map

When you have made a pivot table you can switch between pivot table, chart and map visualization of your data.

### Open a pivot table as a chart

1. Click **Chart** > **Open this table as chart**.

Your current pivot table opens as a chart.



### Open a pivot table selection as a chart

If you want to visualize a small part of your pivot table as a chart you can click directly on a value in the table instead opening the whole table.

1. In the pivot table, click a value.

|        |        |         |       |
|--------|--------|---------|-------|
| 547    | 1 374  | 4 995   | 483   |
| 1 347  | 1 802  | 7 487   | 876   |
| 1 892  |        |         | 1 025 |
| 450    |        |         | 279   |
| 463    | 885    | 3 385   | 542   |
| 1 700  | 1 643  | 6 852   | 587   |
| 28 157 | 27 208 | 124 892 | 9 660 |

2. To verify the selection, hold the cursor over **Open selection as chart**. The highlighted dimension headers in the table indicate what data will be visualized as a chart.
3. Click **Open selection as chart**.

### Open a pivot table as a map

1. Click **Chart** > **Open this table as map**

Your current pivot table opens as a map.

### Open a pivot table selection as a map

1. In the pivot table, click a value.

A menu displays.

2. Click **Open selection as map**.

Your selection opens as a map.

## Using the Maps app

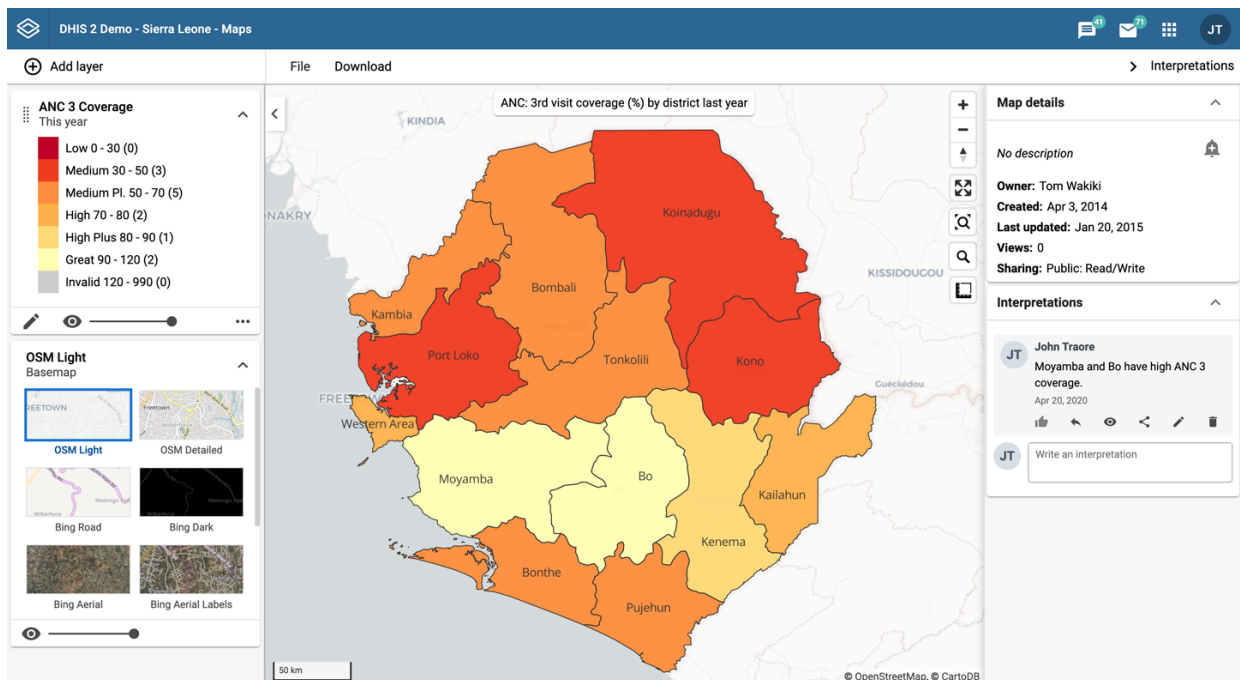
### About the Maps app

The Maps App is introduced in release 2.29 and serves as a replacement of the GIS App offering a more intuitive and user-friendly interface. The mapping engine from version 2.34 is based on WebGL technology, capable of showing thousands of features on a map simultaneously.

With the Maps app you can overlay multiple layers and choose among different base maps. You can create thematic maps of areas and points, view facilities based on classifications, and visualize catchment areas for each facility. You can add labels to areas and points, and search and filter using various criteria. You can move points and set locations on the fly. Maps can be saved as favorites and shared with other users and groups, or downloaded as an image.

#### Note

To use predefined legends in the **Maps** app, you need to create them first in the **Maintenance** app.



- The **layer panel** on the left side of the workspace shows an overview of the layers for the current map:
  - As layers are added, using the **(+)** **Add layer** button, they are arranged and managed in this panel.
  - The **basemap** is always shown in the panel. The default basemap is OSM Light and is selected by default. OpenStreetMap Detailed contains more map features and place names. There are 4 basemaps from Bing Maps, replacing Google Maps provided in previous versions. Bing Road and Bing Dark shows roads, borders and places. Use the dark version if the colors on your map layers are bright. Bing Aerial and Bing Aerial Labels shows satellite and detailed aerial imagery. Switch between them by selecting the desired image.

---

The small arrow button to the right of the layer panel, at the top, allows the panel to be hidden or shown.

- The **File** button near the top left allows you to open and save maps:
    - **New**

will clear any existing map layers to create a new map.
    - **Open**

will display a dialog box with a list of existing maps where they be opened, renamed, shared and deleted. *The title of the current map is displayed in the header bar above the File button.*
    - **Save**

will save any changes to the current map.
    - **Save as**

will save the current map with a new name.
    - **Rename**

allows you to change the name and/or description of the current map.
    - **Translate**

allows you to translate the name and/or description of the current map.
    - **Share**

will open a dialog where the current map can be shared with everyone or a group of users.
    - **Get link**

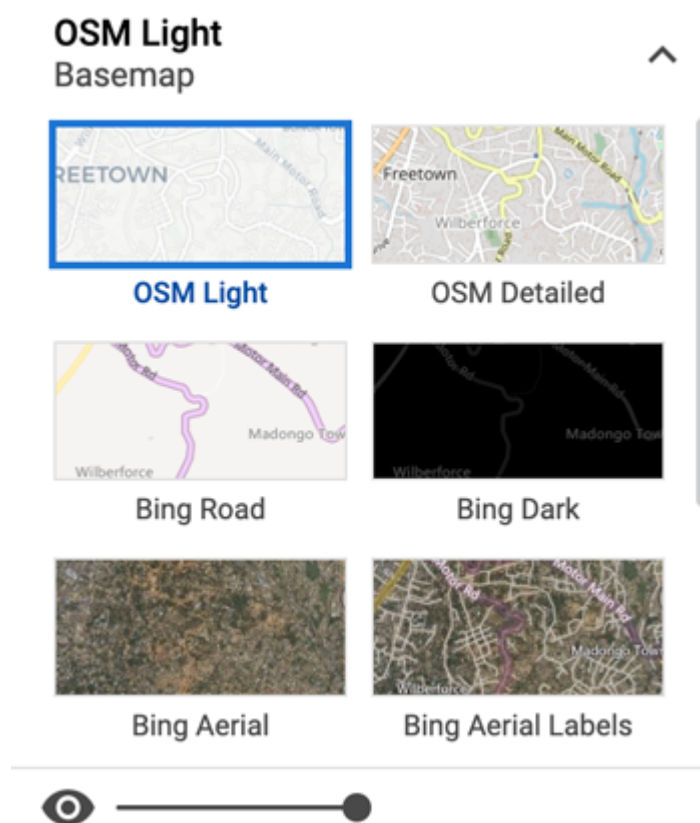
will provide a direct link to the current map.
    - **Delete**

deletes the current map.
  - The **Download** button next to the File button allows you to download the current map as a PNG image.
  - The **Interpretations** button at top right opens an interpretations panel on the right side of the workspace. The button is only clickable if the map is saved.
    - **Map details** shows information about the current map.
    - **Interpretations** allows you to view, add, edit and share interpretations about the current map.
  - The **+** and **-** buttons on the map allow you to zoom in and out of the map respectively. The mouse scroll wheel zoom is continuous, allowing us to fit the map perfectly to your content.
  - The **rotate map** button (triangle arrows) allows you to rotate and tilt the map to enhance the view of your data. Press the button (or the Control key on your keyboard) while moving your mouse to change the map view. Click to button again to reset the view.
-

- **Fullscreen** (four arrows) allows you to view the map in fullscreen. To exit fullscreen click the button again or the escape key on your keyboard.
- **Zoom to content** (bounded magnifying glass symbol) automatically adjusts the zoom level and map center position to put the data on your map in focus.
- **Search** (magnifying glass symbol) allows searching for and jumping to a location on the map.
- The **ruler** button allows you to measure distances and areas on the map.
- Right-click on the map to display the longitude and latitude of that location.

## Basemaps

Basemap layers are represented by layer *cards* in the layer panel such as:



Along the top of the basemap card from left to right are:

- The title of the selected basemap
- An arrow symbol to collapse and expand the basemap card

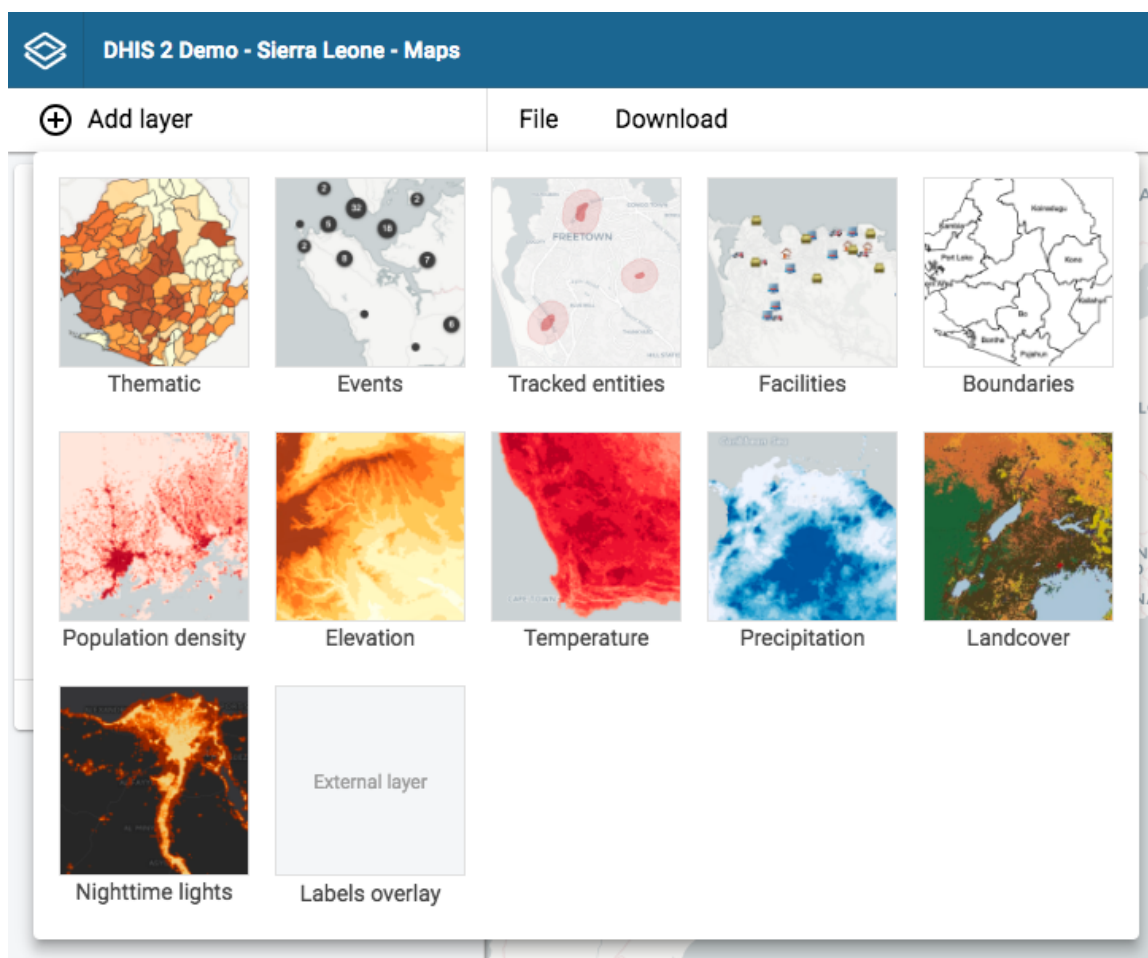
In the middle of the basemap card is the list of available basemaps. The current basemap is highlighted.

Along the bottom of the basemap card is:

- An eye symbol for toggling the visibility of the layer
- A slider for modifying the layer transparency

## Create a new map

1. In the **Apps** menu, click **Maps**. The **DHIS2 Maps** window opens.
2. Click the (+) Add layer button in the top left. You are presented with the layer selection dialog:



3. Select a layer to add to the current map. Possible options are:

- [Thematic](#)
- [Events](#)
- [Tracked entities](#)
- [Facilities](#)
- [Boundaries](#)

In addition, there are several layers provided by Google Earth Engine and other services:

- Population density
- Elevation
- Temperature
- Precipitation
- Landcover

## Nighttime lights

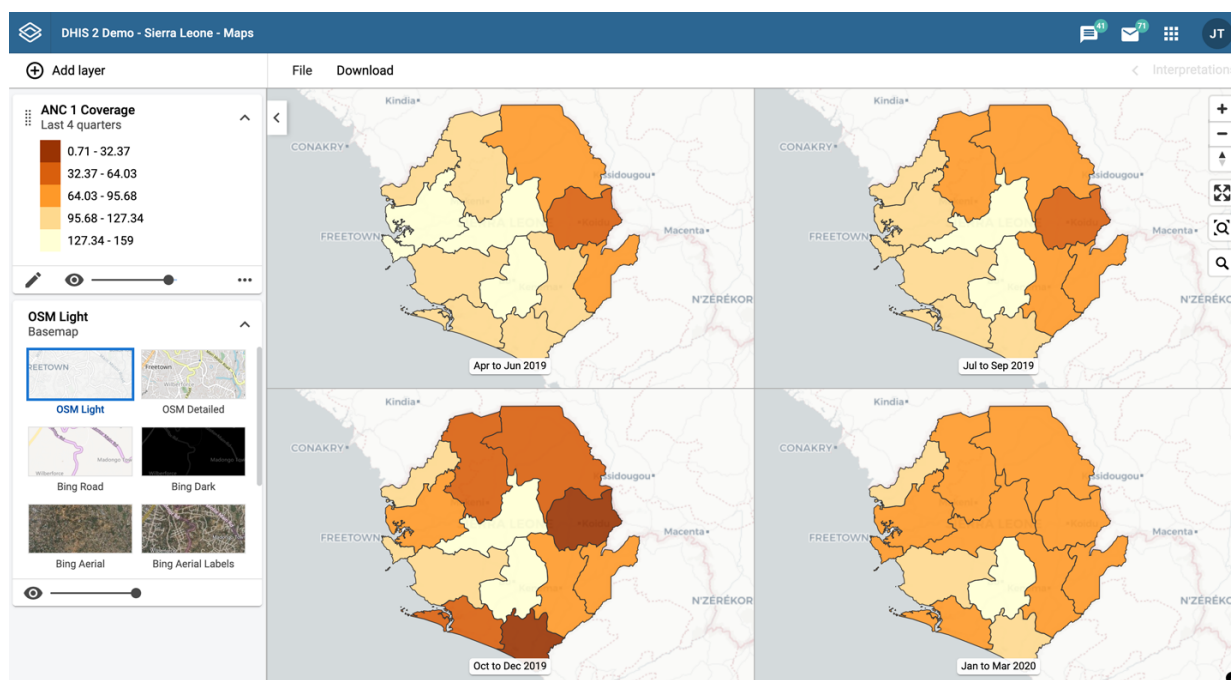
*Labels overlay* is an [external layer](#) defined in the Maintenance app.

## Manage thematic layers

*Thematic maps* represent spatial variation of geographic distributions. Select your desired combination of indicator/data element, period and organisation unit level. If your database has coordinates and aggregated data values for these organisation units, they will appear on the map.

### Note

You must generate the DHIS2 analytics tables to have aggregated data values available.



Thematic layers are represented by layer *cards* in the layer panel such as:

Along the top of the thematic card from left to right are:

- A grab field to allow dragging and re-ordering layers with the mouse
- The title and period associated with the layer
- An arrow symbol to collapse and expand the thematic card

In the middle of the thematic card is a legend indicating the value ranges displayed on the layer.

Along the bottom of the thematic card from left to right are:

- An edit (pencil) button to open the layer configuration dialog
- An eye symbol for toggling the visibility of the layer
- A slider for modifying the layer transparency

A more actions (three dots) button with additional options:

- A **data table** toggle button to show or hide the data table associated with the layer
- **Download data** allows you to download the data for this layer in GeoJSON format for use in other mapping software
- **Edit layer** is the same as edit button above
- **Remove layer** will remove this layer from the current map.

### Create a thematic layer

To create an event layer, choose **Thematic** on the **Add layer** selection. This opens the Events layer configuration dialog.

1. In the **DATA** tab:

#### Add new thematic layer

DATA
PERIOD
ORG UNITS
FILTER
STYLE

Item type

**Data element** ▼

---

Data element group

**ART enrollment** ▼

---

Totals  Details

Data element

**ART enrollment stage 1** ▼

---

Aggregation type

**By data element** ▼

CANCEL
ADD LAYER

- Select a data type and then select respectively the group and the target element. The available fields depend on the type of item selected.
- Select a value from the **Aggregation type** field for the data values to be shown on the map. By default, "By data element" is selected. Alternative values are: Count; Average; Sum; Standard deviation; Variance; Min; Max. See also [Aggregation operators](#).

2. In the **PERIOD** tab

## Add new thematic layer

| DATA  | PERIOD | ORG UNITS | FILTER | STYLE |
|---|--------|-----------|--------|-------|
| Period type   |        |           |        |       |
| Relative ▼  |        |           |        |       |
| Period  |        |           |        |       |
| Last 6 months ▼                                     |        |           |        |       |
| Display periods                                     |        |           |        |       |
| <input checked="" type="radio"/> Single (aggregate) |        |           |        |       |
| <input type="radio"/> Timeline                      |        |           |        |       |
| <input type="radio"/> Split map views               |        |           |        |       |

[CANCEL](#)
[ADD LAYER](#)

- select the time span over which the thematic data is mapped. You can select either a relative or a fixed period.

- Relative period

In the **Period type** field select **Relative**, then select one of the relative periods, for example **Last year** or **Last 12 months**, in the **Period** field. If you select a relative period covering multiple years/months/weeks/days the layer can be displayed as

- Single (aggregate)

Show aggregate values for the relative period selected (default).

- Timeline

Includes a timeline allowing you to step through the periods. Only one timeline layer can be added to the same map.

- Split map views

Show multiple maps allowing you to compare different periods side by side. Supported for relative periods with 12 items or below. Can not be combined with other layer types.

- Fixed period



In the **Period type** field select period length, then select the target in the **Period** field.

- Start/end dates

In the **Period type** field select **Start/end dates** and fill in a start date and an end date.

3. In the **ORG UNITS** tab:

### Add new thematic layer

DATA
PERIOD
ORG UNITS
FILTER
STYLE

- ▾  Sierra Leone
- Bo
- Bombali
- Bonthe
- Kailahun
- Kambia
- Kenema
- Koinadugu
- Kono
- Moyamba
- Port Loko
- Pujehun
- Tonkolili

Select levels

**Chiefdom** ▾

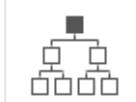
---

Select groups


▾

---


User organisation units



**Main**



**Below**



**2 x below**

CANCEL
ADD LAYER


- Select the organisation units you want to include in the layer. It is possible to select either
  - One or more specific organisation units, organisation unit levels in the hierarchy, organisation unit groups, or
  - A relative level in the organisation unit hierarchy, with respect to the user. By selecting a **User organisation unit** the map data will appear differently for users at different levels in the organisation unit hierarchy.

4. In the **FILTER** tab:

## Add new thematic layer

DATA      PERIOD      ORG UNITS      **FILTER**      STYLE

---

| Dimension     | Items    |   |
|---------------|----------|---|
| Facility Type | CHP, CHC |  |

**ADD FILTER**

---

**CANCEL**      **ADD LAYER**

- Click **ADD FILTER** and select an available data item to add a new filter to the data set.
  - Select a data dimension from the drop down box. You can reduce the number of dimensions shown by using the search field. Click on the name to select a dimension.
  - When a dimension is selected you get a second drop down with dimension items. Check the items you want to include in the filter.

Multiple filters may be added. Click the trash button on the right of the filter to remove it.

5. In the **STYLE** tab:

### Add new thematic layer

DATA
PERIOD
ORG UNITS
FILTER
STYLE


Automatic
 Predefined

Classification

**Equal counts** ▼

---

Classes

**6** ▼ 

Low size

**5**

High size

**15**

Labels

Size

**11**

B

I

▼

CANCEL
ADD LAYER

- Select either **Automatic** or **Predefined** legend.
  - Automatic legend types means that the application will create a legend set for you based on your what method, number of classes, low color and high color you select. Method alludes to the size of the legend classes. Set to
    - Equal intervals
 

the range of each interval will be **(highest data value - lowest data value / number of classes)**
    - Equal counts
 

the legend creator will try to distribute the organisation units evenly.
  - If you have facilities in your thematic layer, you can set the radius for minimum and maximum values by changing the values in the **Low size** and **High size** boxes respectively.

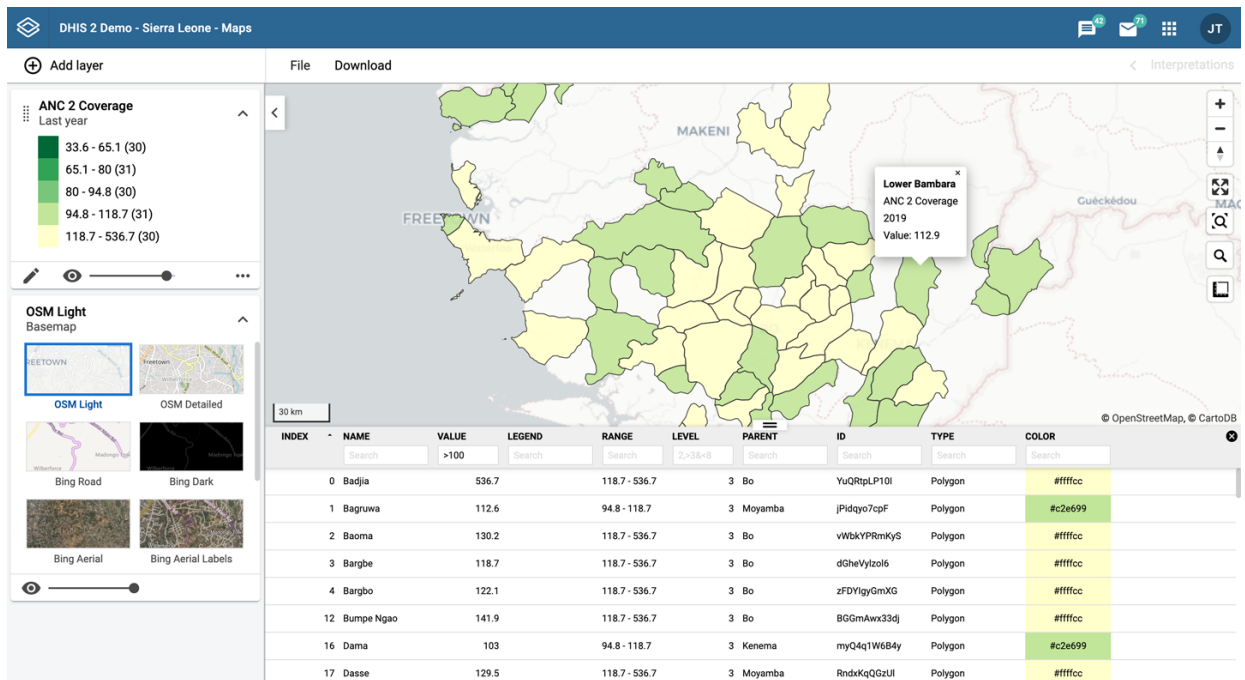
6. Click **ADD LAYER**.

### Modify a thematic layer

1. In the layer panel, click the edit (pencil) icon on the thematic layer card.
2. Modify the setting on any of the tabs as desired.
3. Click **UPDATE LAYER**.

## Filter values in a thematic layer

Thematic layers have a **data table** option that can be toggled on or off from the thematic layer card.



The data table displays the data forming the thematic layer.

- clicking on a title will sort the table based on that column; toggling between ascending and descending.
- entering text or expressions into the filter fields below the titles will apply those filters to the data, and the display will adjust according to the filter. The filters are applied as follows:
  - NAME  
filter by name containing the given text
  - VALUE  
filter values by given numbers and/or ranges, for example: 2,>3&<8
  - LEGEND  
filter by legend containing the given text
  - RANGE  
filter by ranges containing the given text
  - LEVEL  
filter level by numbers and/or ranges, for example: 2,>3&<8
  - PARENT  
filter by parent names containing the given text
  - ID

---

filter by IDs containing the given text

- TYPE

filter by GIS display types containing the given text

- COLOR

filter by color names containing the given text

#### Note

Data table filters are temporary and are not saved with the map layers as part of the favourite.

### Search for an organisation unit

The NAME filter field in the data table provides an effective way of searching for individual organisation units.

### Navigate between organisation hierarchies

When there are visible organisation units on the map, you can easily navigate up and down in the hierarchy without using the level/parent user interface.

1. Right-click one of the organisation units.
2. Select **Drill up one level** or **Drill down one level**.

The drill down option is disabled if you are on the lowest level or if there are no coordinates available on the level below. Likewise the drill up option is disabled from the highest level.

### Remove thematic layer

To clear all data in a thematic layer:

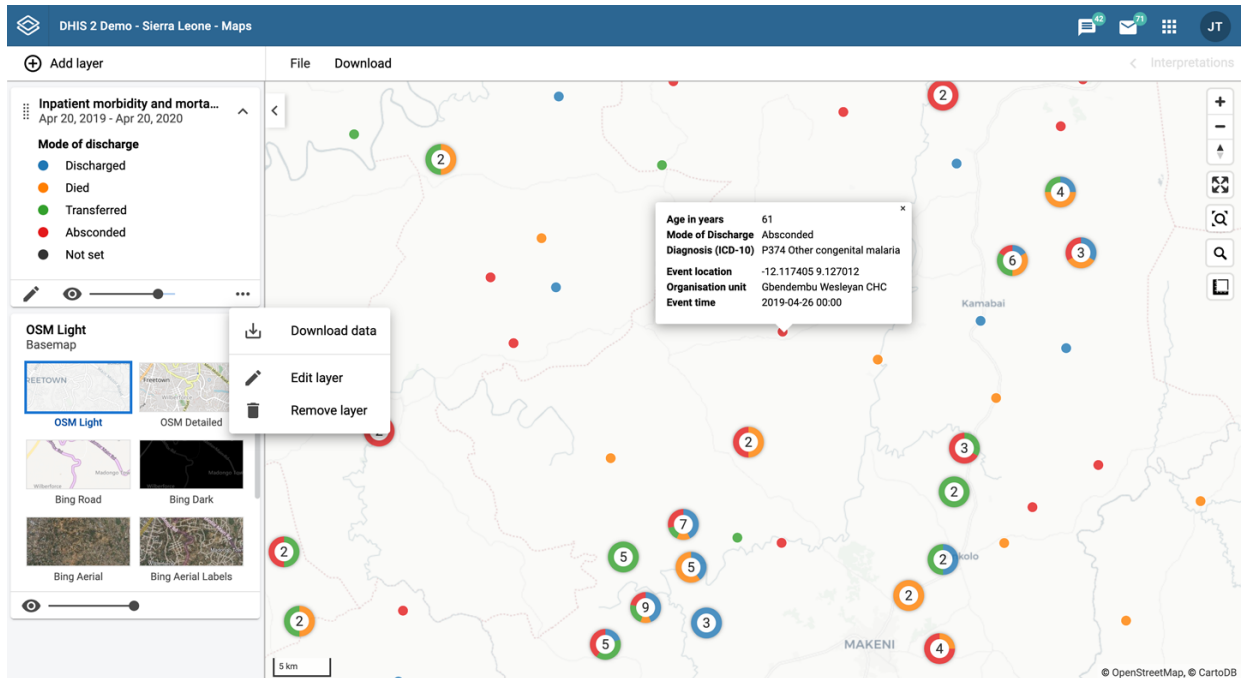
1. In the layer card to the left, click the *more actions* (three dots) icon and then on **Remove layer**.

The layer is removed from the current map.

### Manage event layers

The event layer displays the geographical location of events registered in the DHIS2 tracker. Provided that events have associated point or polygon coordinates, you can use this layer to drill down from the aggregated data displayed in the thematic layers to the underlying individual events or cases.

You can also display aggregated events at the facility or at the boundary level. You do this through a thematic layer using event data items. This is useful when you only have the coordinates for the Org Unit under which the events are recorded.



Event layers are represented by layer *cards* in the layer panel such as:

Along the top of the event card from left to right are:

- A grab field to allow dragging and re-ordering layers with the mouse
- The title and period associated with the layer
- An arrow symbol to collapse and expand the event card

In the middle of the event card is a legend indicating the styling of the layer.

Along the bottom of the event card from left to right are:

- An edit (pencil) button to open the layer configuration dialog
- An eye symbol for toggling the visibility of the layer
- A slider for modifying the layer transparency
- A more actions (three dots) button with additional options:
  - **Download data** allows you to download the data for this layer in GeoJSON format for use in other mapping software
  - **Edit layer** is the same as edit button above
  - **Remove layer** will remove this layer from the current map.

### Create an event layer

To create an event layer, choose **Events** on the **Add layer** selection. This opens the Events layer configuration dialog.

1. In the **DATA** tab:

## Add new event layer

| DATA                              | PERIOD | ORG UNITS | FILTER | STYLE |
|-----------------------------------|--------|-----------|--------|-------|
| Program                           |        |           |        |       |
| Inpatient morbidity and mortality |        |           |        |       |
| Stage                             |        |           |        |       |
| Inpatient morbidity and mortality |        |           |        |       |
| Coordinate field                  |        |           |        |       |
| Event location                    |        |           |        |       |

[CANCEL](#) [ADD LAYER](#)

- Select a program and then select a program stage. The **Stage** field is only shown once a program is selected.

If there is only one stage available for the selected program, the stage is automatically selected.

- Select a value from the **Coordinate field** for the positions shown on the map. By default, "Event location" is selected. Depending on the data elements or attributes that belong to a program, other coordinates such as "Household position" are available.

2. In the **PERIOD** tab

## Add new event layer

| DATA                           | PERIOD | ORG UNITS | FILTER | STYLE |
|--------------------------------|--------|-----------|--------|-------|
| Period                         |        |           |        |       |
| Start/end dates <span>▼</span> |        |           |        |       |
| Start date                     |        |           |        |       |
| 24.04.2018                     |        |           |        |       |
| End date                       |        |           |        |       |
| 24.04.2019                     |        |           |        |       |

[CANCEL](#) [ADD LAYER](#)

- select the time span for when the events took place. You can select either a fixed period or a relative period.
  - Fixed period

In the **Period** field, select **Start/end dates** and fill in a start date and an end date.
  - Relative period

In the **Period** field, select one of the relative periods, for example **This month** or **Last year**.

3. In the **ORG UNITS** tab:

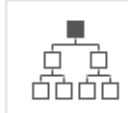


## Add new event layer

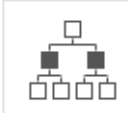
DATA
PERIOD
ORG UNITS
FILTER
STYLE

- Sierra Leone (2)
- ▶  Bo (1)
- ▶  Bombali (1)
- ▶  Bonthe
- ▶  Kailahun
- ▶  Kambia
- ▶  Kenema
- ▶  Koinadugu
- ▶  Kono
- ▶  Moyamba
- ▶  Port Loko
- ▶  Pujehun
- ▶  Tonkolili


**User organisation units**



Main



Below



2 x below




**Selected organisation units**  
Events in Bo, Bombali

CANCEL
ADD LAYER

- Select the organisation units you want to include in the layer. It is possible to select either
  - One or more specific organisation units, or
  - A relative level in the organisation unit hierarchy, with respect to the user. By selecting a **User organisation unit** the map data will appear differently for users at different levels in the organisation unit hierarchy.

4. In the **FILTER** tab:

## Add new event layer

| DATA                      | PERIOD | ORG UNITS                               | FILTER              | STYLE |   |
|---------------------------|--------|---|---------------------|-------|---|
| Data item<br>Gender       | ▼      | Operator<br>one of                      | ▼ Options<br>Female | ▼     |  |
| Data item<br>Age in years | ▼      | Operator<br><=                          | ▼ Value<br>20       |       |  |
| Data item<br>Pregnant     | ▼      | <input checked="" type="checkbox"/> Yes |                     |       |  |

**ADD FILTER**

**CANCEL** **ADD LAYER**


- Click **ADD FILTER** and select an available data item to add a new filter to the data set.
  - For data item of type *option set*, you can select any of the options from the drop down box by using the down-wards arrow or by start typing directly in the box to filter for options.
  - For data item of type *number*, you can select operators like equal, not equal, greater than or less than.
  - For data item of type *boolean* (yes/no), you can check the box if the condition should be valid or true.
  - For data item of type *text* you will get two choices: **Contains** implies that the query will match all values which contains your search value, and **Is exact** implies that only values which is completely identical to your search query will be returned.

Multiple filters may be added. Click the trash button on the right of the filter to remove it.

5. In the **STYLE** tab:

## Add new event layer


DATA
PERIOD
ORG UNITS
FILTER
STYLE



Group events

Color

Buffer



View all events

Radius

6

Radius in meters

100

Style by data element

Mode of Discharge ▼

- Discharged
- Died
- Transferred
- Absconded

CANCEL
ADD LAYER

- Select **Group events** to group nearby events (cluster), or **View all events** to display events individually.
- Select a **color** for the event or cluster points.
- Select the **radius** (between 1 and 20) for the events.
- Select **Show buffer** to display visual buffer around each event. The radius of the buffer can be modified here. This option is only available if you select **View all events** above.
- Select a **Style by data element** to colorise the events according to a data value. If you also select to group events, the clusters will be displayed as small donut charts showing the distribution of the data values. The options varies for different data types:
  - **Option sets:** Select a color for each option in an option set. You can set default colors for an option in the Maintenance app.
  - **Numbers:** You can style a numeric data element in [the same way as thematic layers](#) using automatic or predefined legends.
  - **Booleans:** Select a color for true/yes and another for false/no.

6. Click **ADD LAYER**.

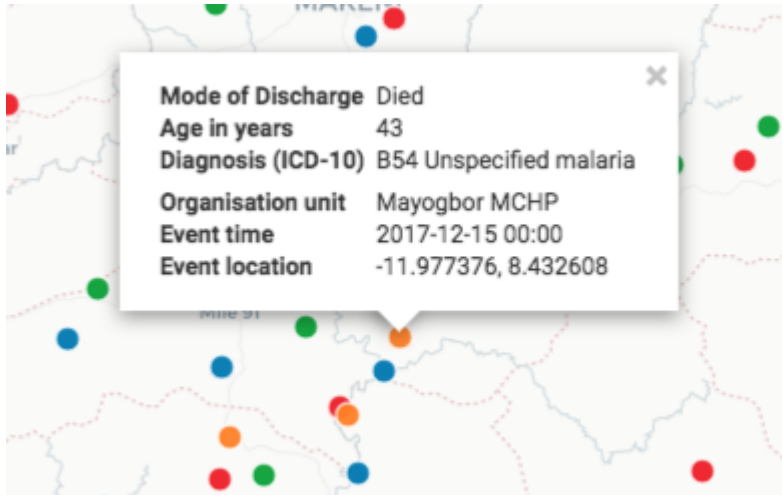
---

### Modify an event layer

1. In the layer panel, click the edit (pencil) icon on the event layer card.
2. Modify the setting on the DATA, PERIOD, FILTER, ORG UNIT and STYLE tabs as desired.
3. Click **UPDATE LAYER**.

### Modify information in event pop-up windows

You can modify the information displayed in the event pop-up window.



1. Open the **Maintenance** app.
2. Select **Program**.
3. Click the program you want to modify and select **2 Assign data elements**.
4. For every data element you want to display in the pop-up window, select corresponding **Display in reports**.
5. Click **Save**.

### Download raw event layer data

The raw data for event layers can be downloaded in GeoJSON format for more advanced geo-analytics and processing in desktop GIS software such as [QGIS](#). The downloaded data includes all individual events as GeoJSON features, including attributes for each data element selected for **Display in reports**.

## Download Layer Data

### Downloading GeoJSON data for "Malaria case registration"

 GeoJSON is supported by most GIS software, including QGIS and ArcGIS Desktop.

#### GeoJSON Properties:

ID Format

Name 

Use human-readable keys

CANCEL

DOWNLOAD

- In the layer card to the left, click the *more actions* (three dots) icon and then on **Download data**
- Select the **ID format** to use as the key for Data Element values in the downloaded GeoJSON file. There are three options available:
  - **ID** - Use the unique ID of the data element
  - **Name** - Use the human-friendly name of the data element (translated)
  - **Code** - Use the code of the data element
- Select whether or not to **Use human-readable keys** for other Event attributes, such as Program Stage, Latitude, Longitude, Event Data, and Organization Unit ID, Name, and Code. When this option is **not** selected these values will be the computer-friendly ID instead of the human-readable (and translated) name.
- Click the **DOWNLOAD** button to generate and download a GeoJSON file. The data will be requested from the DHIS2 server and processed by the maps application. This operation may take several minutes to complete.
- Once the GeoJSON file has been downloaded it can be imported into most standard GIS software applications.

Note that the downloaded data does not include style information as it is not natively supported by the GeoJSON format. Styles can optionally be recreated in external GIS applications using the attributes of each feature.

## Clear event layer

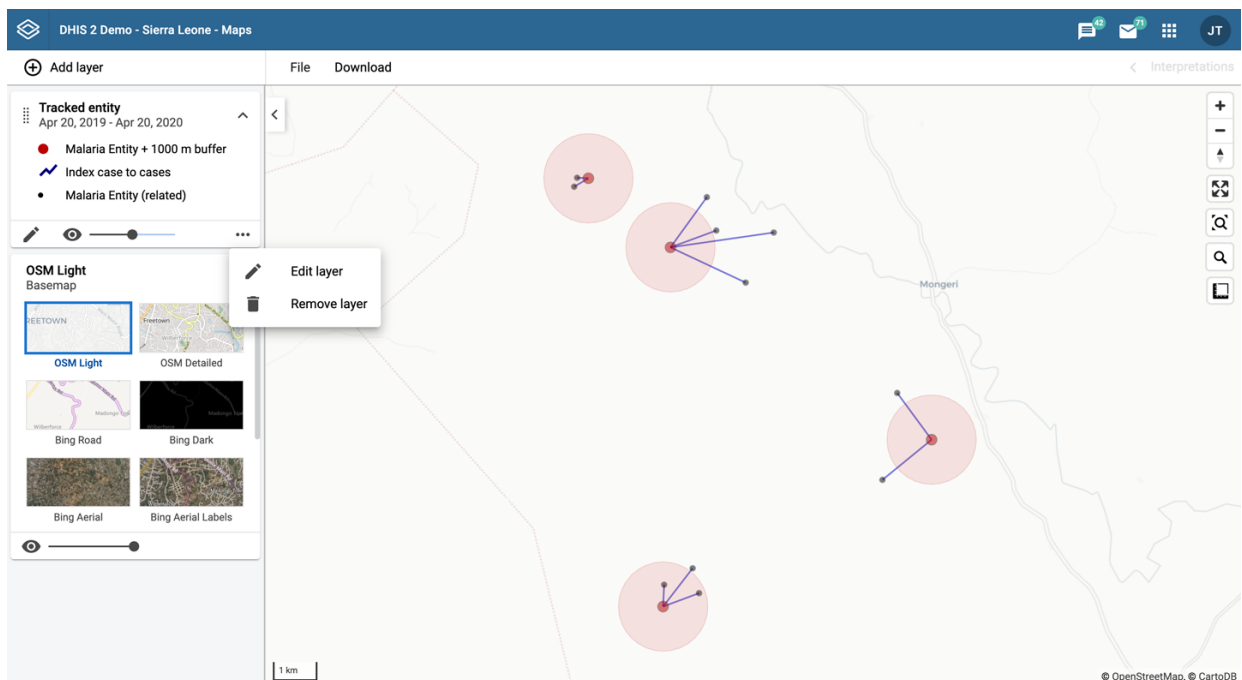
To clear all event layer data in a map:

1. In the layer card to the left, click the *more actions* (three dots) icon and then on **Remove layer**.

The layer is removed from the current map.

## Manage tracked entity layers

The tracked entity layer displays the geographical location of tracked entities registered in the DHIS2. Provided that tracked entities have associated point or polygon coordinates, you can explore these on a map.



Tracked entity layers are represented by layer cards in the layer panel such as:

Along the top of the tracked entity card from left to right are:

- A grab field to allow dragging and re-ordering layers with the mouse.
- The title and period associated with the layer.
- An arrow symbol to collapse and expand the tracked entity card.

In the middle of the tracked entity card is a legend indicating the styling of the layer.

Along the bottom of the tracked entity card from left to right are:

- An edit (pencil) button to open the layer configuration dialog
- An eye symbol for toggling the visibility of the layer
- A slider for modifying the layer transparency
- A more actions (three dots) button with additional options:
  - **Edit layer** is the same as edit button above

◦ **Remove layer** will remove this layer from the current map.

### Create a tracked entity layer

To create an tracked entity layer, choose **Tracked entities** on the **Add layer** selection. This opens the Tracked entity layer configuration dialog.

1. In the **DATA** tab:

#### Add new tracked entity layer

**DATA**   RELATIONSHIPS   PERIOD   ORG UNITS   STYLE

---

Tracked Entity Type  
**Person** ▼

---

Program  
**TB program** ▼

---

Program status  
**Active** ▼

Follow up

**CANCEL**   **ADD LAYER**

- Select the **Tracked Entity Type** you want to show on the map.
- Select a **Program** where the tracked entities belong.
- Set the **Program status** to be **Active** or **Completed**.
- Set the **Follow up** status of the tracked entity for the given program.

2. In the **Relationships** tab

### Add new tracked entity layer

DATA    **RELATIONSHIPS**    PERIOD    ORG UNITS    STYLE

---

**WARNING**  
Displaying tracked entity relationships in Maps is an experimental feature

Display Tracked Entity relationships

Relationship type ▼

---

CANCEL    **ADD LAYER**

**Caution**

Displaying tracked entity relationships in Maps is an experimental feature

- If a Tracked Entity Type with has been selected, you can select the **Display Tracked Entity relationships** checkbox
- Once checked, you can select the type of relationship to display on the map from the dropdown list. Only relationships FROM the selected Tracked Entity type are available.

3. In the **PERIOD** tab



### Add new tracked entity layer

DATA      RELATIONSHIPS      **PERIOD**      ORG UNITS      STYLE

---

Select period when tracked entities were last updated:

Start date  
04/30/2018

---

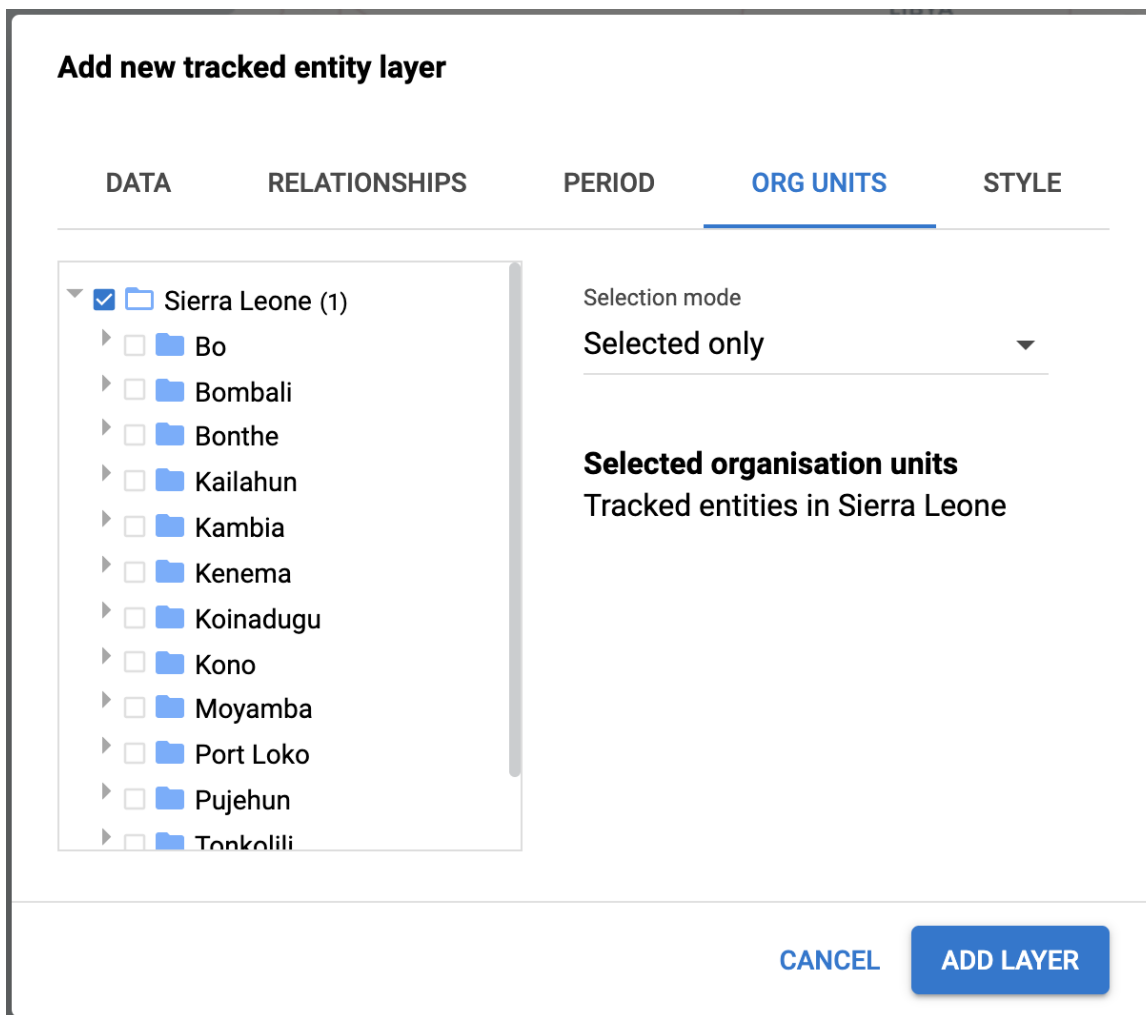
End date  
04/30/2019

---

CANCEL      **ADD LAYER**

- If no program is selected, you can set start and end dates when the tracked entities were last updated.
- If a program is selected, you can set start and end dates for the program period.

4. In the **ORG UNITS** tab:



- Select the organisation units you want to include in the layer. You have 3 selection modes:
  - **Selected only:** Include tracked entities belonging to selected org units only.
  - **Selected and below:** Included tracked entities in and right below selected org units.
  - **Selected and all below:** Included tracked entities in and all below selected org units.

5. In the **STYLE** tab:

### Add new tracked entity layer

DATA
RELATIONSHIPS
PERIOD
ORG UNITS
STYLE

**Tracked entity style:**

Color Point size

▼

6

Buffer

**Related entity style:**

Color Point size Line Color

▼

3

▼

CANCEL
ADD LAYER

- Select a **color** for the tracked entities points and polygons.
- Select the **point size** (radius between 1 and 20) for the points.
- Select **Show buffer** to display visual buffer around each tracked entity. The buffer distance in meters can be modified here.
- If a relationship type has been selected on the relationships tab you can select **color**, **point size**, and **line color** for relationships and related tracked entities instances

6. Click **ADD/UPDATE LAYER**.

#### Modify a tracked entity layer

1. In the layer panel, click the edit (pencil) icon on the tracked entity layer card.
2. Modify the setting on the DATA, PERIOD, ORG UNIT and STYLE tabs as desired.
3. Click **UPDATE LAYER**.

#### Clear a tracked entity layer

To clear a tracked entity layer from a map:

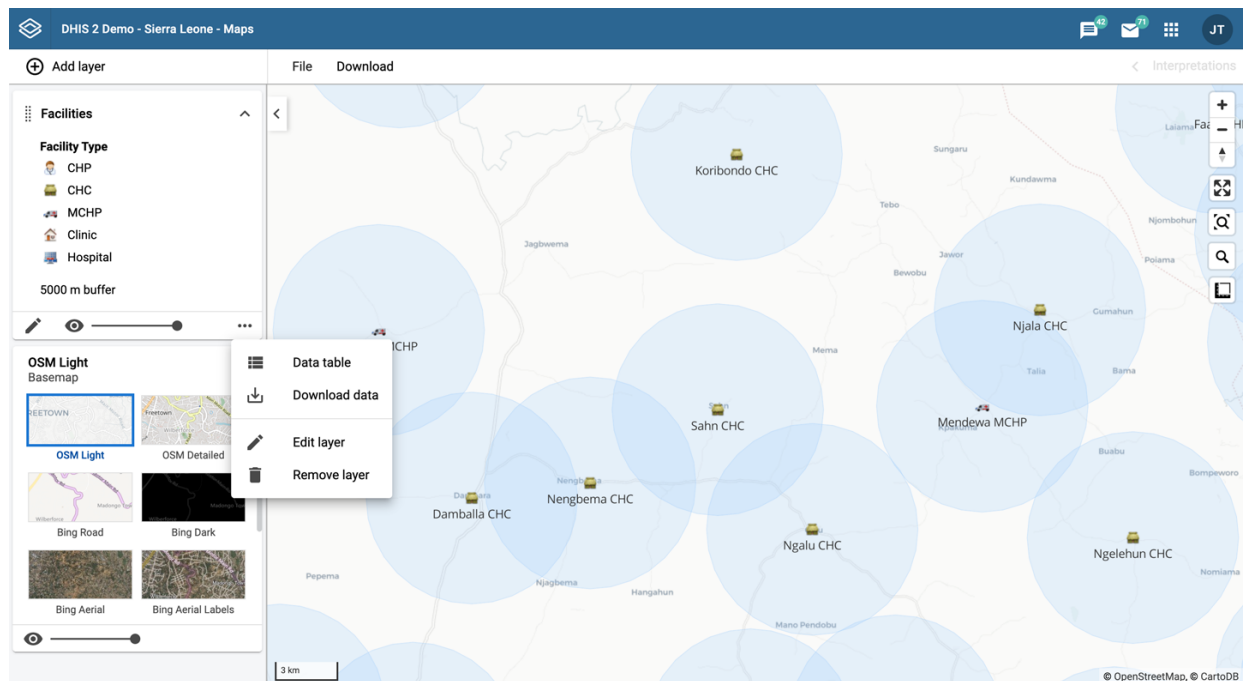
1. In the layer card to the left, click the *more actions* (three dots) icon and then on **Remove layer**.

The layer is removed from the current map.

## Manage facility layers

The facility layer displays icons that represent types of facilities. Polygons do not show up on the map, so make sure that you select an organisation unit level that has facilities.

*A polygon is an enclosed area on a map representing a country, a district or a park.*



Facility layers are represented by layer *cards* in the layer panel such as:

Along the top of the facilities card from left to right are:

- A grab field to allow dragging and re-ordering layers with the mouse
- The **Facilities** title
- An eye symbol for toggling the visibility of the layer
- An arrow symbol to collapse and expand the facilities card

In the middle of the facilities card is a legend indicating the group set representation.

Along the bottom of the facilities card from left to right are:

- An edit (pencil) button to open the layer configuration dialog
- A slider for modifying the layer transparency
- A more actions (three dots) button with additional options:
  - A **data table** toggle button to show or hide the data table associated with the layer
  - **Download data** allows you to download the data for this layer in GeoJSON format for use in other mapping software
  - **Edit layer** is the same as edit button above
  - **Remove layer** will remove this layer from the current map.

---

**Create a facility layer**

To create facility layer, choose **Facilities** on the **\*\*Add layer\*\*** selection. This opens the Facility layer configuration dialog.

1. In the **GROUP SET** tab:

**Edit facility layer**

| <b>GROUP SET</b>           | <b>ORGANISATION UNITS</b> | <b>STYLE</b> |
|----------------------------|---------------------------|--------------|
| Group set<br>Facility Type |                           |              |

---

**CANCEL****UPDATE LAYER**

- Select a **Group set** from the list of organisation unit group sets defined for your DHIS2 instance.

2. In the **ORGANISATION UNITS** tab

## Edit facility layer

GROUP SET
ORGANISATION UNITS
STYLE

▢ Sierra Leone

▢ Bo

▢ Bombali

▢ Bonthe

▢ Kailahun

▢ Kambia

▢ Kenema

▢ Koinadugu

▢ Kono

▢ Moyamba

▢ Port Loko

▢ Pujehun

▢ Tonkolili

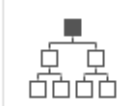
Select levels

▾ Facility

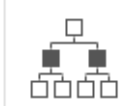
Select groups

▾

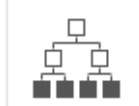
User organisation units



Main



Below



2 x below

Remember to select the organisation unit level containing the facilities.

CANCEL
UPDATE LAYER

- select the organisation unit level(s) and/or group(s) from the selection fields on the right hand side.
- Select the organisation units you want to include in the layer. It is possible to select either
  - One or more specific organisation units, or
  - A relative level in the organisation unit hierarchy, with respect to the user. By selecting a **User organisation unit** the map data will appear differently for users at different levels in the organisation unit hierarchy.

3. In the **STYLE** tab:

## Edit facility layer

| GROUP SET                                  | ORGANISATION UNITS       | STYLE               |
|--|--------------------------|---------------------|
| <input checked="" type="checkbox"/> Labels | Size<br>11               | <b>B</b> <i>I</i> ▼ |
| <input checked="" type="checkbox"/> Buffer | Radius in meters<br>5000 |                     |

[CANCEL](#) [UPDATE LAYER](#)

◦ select any styling you wish to apply to the facilities.

- Show labels

Allows labels to be shown on the layer. Font size, weight and color can be modified here.

- Show buffer

Allows a visual buffer to be displayed on the layer around each facility. The radius of the buffer can be modified here.

4. Click **ADD LAYER**.

### Create or modify a facility layer

1. In the layer panel, click the edit (pencil) icon on the facility layer card.
2. Modify the setting on the GROUP SET, ORGANISATION UNITS and STYLE tabs as desired.
3. Click **UPDATE LAYER**.

### Filter values in a facility layer

Facility layers have a **data table** option that can be toggled on or off from the facility layer card.

| INDEX | NAME                 | ID          | TYPE  |
|-------|----------------------|-------------|-------|
|       | CHC                  |             |       |
| 3     | Baama CHC            | r5WwF9Wdzoa | Point |
| 4     | Babara CHC           | yMCshbaVExv | Point |
| 5     | Bafodia CHC          | Jlymq0A01x  | Point |
| 13    | Bandajuma Clinic ... | FNn3jKGS7i  | Point |
| 15    | Bandajuma Yawei ...  | MpcMjLmbATv | Point |
| 20    | Baoma Oil Mill CHC   | Y8foq27WLi  | Point |
| 22    | Baomahun CHC         | FLjwMPWLRl2 | Point |
| 29    | Batkanu CHC          | agMOBKQITh3 | Point |

The data table displays the data forming the facility layer.

- clicking on a title will sort the table based on that column; toggling between ascending and descending.
- entering text or expressions into the filter fields below the titles will apply those filters to the data, and the display will adjust according to the filter. The filters are applied as follows:
  - NAME  
filter by name containing the given text
  - ID  
filter by IDs containing the given text
  - TYPE  
filter by GIS display types containing the given text

#### Note

Data table filters are temporary and are not saved with the map layers as part of the favourite.

### Search for a facility

The NAME filter field in the data table provides an effective way of searching for individual facilities.

### Remove facility layer

To clear all data in a facility layer:

1. In the layer card to the left, click the *more actions* (three dots) icon and then on **Remove layer**.



The layer is removed from the current map.

### Manage facilities in a layer

You can have facilities in **Facility**, **Boundary** and **Thematic** layers.

#### Relocate a facility

1. Right-click a facility and click **Relocate**.
2. Put the cursor in the new location.

The new coordinate is stored permanently. This cannot be undone.

#### Swap longitude and latitude of a facility

1. Right-click a facility and click **Swap longitude/latitude**.

This is useful if a user inverted latitude and longitude coordinates when creating the organisation unit.

#### Display facility information

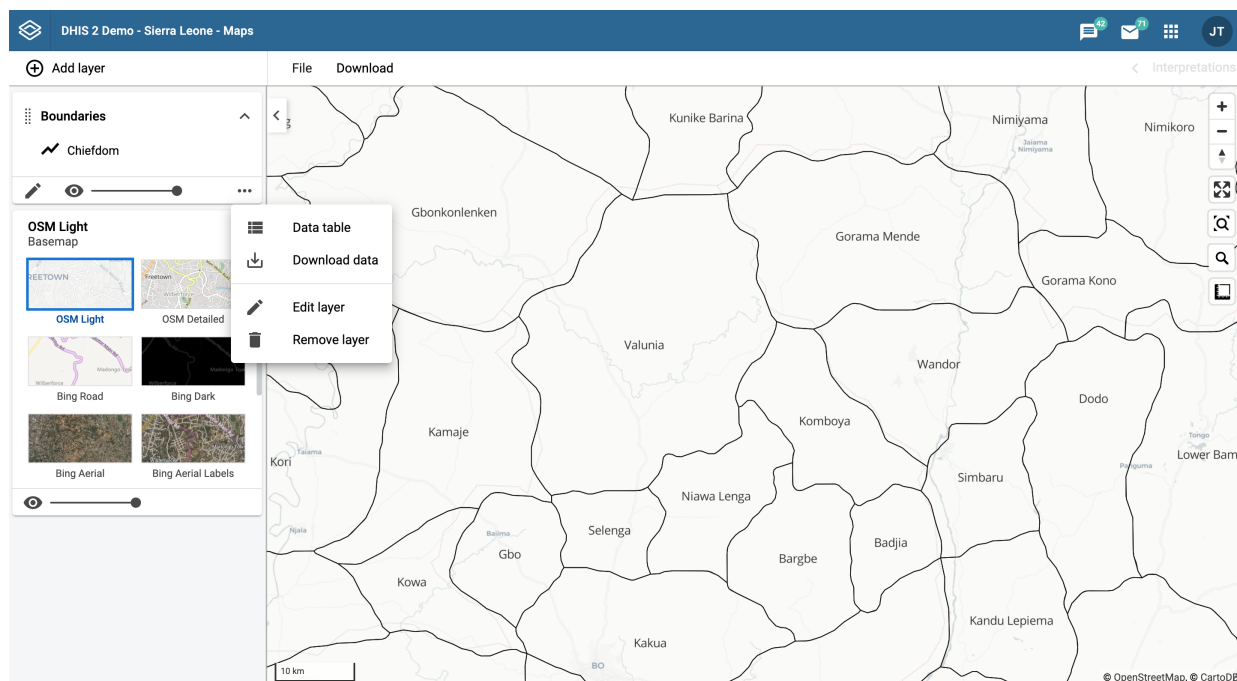
You can view organisation unit information set by the administrator as follows:

##### View organisation unit information

| Function                                | Action   |
|---|--|
| View information for the current period | 1. Click a facility.   |
| View information for a selected period  | <ol style="list-style-type: none"> <li>1. Right-click a facility and click <b>Show information</b>.</li> <li>2. In the <b>Infrastructural data</b> section, select a period.</li> </ol> <div style="border: 1px solid #add8e6; padding: 10px; margin-top: 10px;"> <p><b>Note</b></p> <p>You configure the displayed infrastructural data in the <b>System Settings</b> app.</p> </div> |

### Manage boundary layers

The boundary layer displays the borders and locations of your organisation units. This layer is particularly useful if you are offline and don't have access to background maps.



Boundary layers are represented by layer *cards* in the layer panel such as:

Along the top of the boundary card from left to right are:

- A grab field to allow dragging and re-ordering layers with the mouse
- The **Boundaries** title
- An arrow symbol to collapse and expand the boundary card

Along the bottom of the boundary card from left to right are:

- An edit (pencil) button to open the layer configuration dialog
- An eye symbol for toggling the visibility of the layer
- A slider for modifying the layer transparency
- A more actions (three dots) button with additional options:
  - A **data table** toggle button to show or hide the data table associated with the layer
  - **Download data** allows you to download the data for this layer in GeoJSON format for use in other mapping software
  - **Edit layer** is the same as edit button above
  - **Remove layer** will remove this layer from the current map.

### Create a boundary layer

To create boundary layer, choose **Boundaries** on the **Add layer** selection. This opens the Boundary layer configuration dialog.

1. In the **ORGANISATION UNITS** tab

## Edit boundary layer

### ORGANISATION UNITS

### STYLE

---

- ▼  ■ Sierra Leone
  - ▶  ■ Bo
  - ▶  ■ Bombali
  - ▶  ■ Bonthe
  - ▶  ■ Kailahun
  - ▶  ■ Kambia
  - ▶  ■ Kenema
  - ▶  ■ Koinadugu
  - ▶  ■ Kono
  - ▶  ■ Moyamba
  - ▶  ■ Port Loko
  - ▶  ■ Pujehun
  - ▶  ■ Tonkolili

Select levels

**Chieftdom** ▼

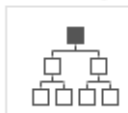
---

Select groups

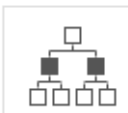
▼

---

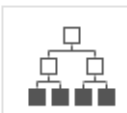
User organisation units



**Main**



**Below**



**2 x below**

**CANCEL**

**UPDATE LAYER**

- select the organisation unit level(s) and/or group(s) from the selection fields on the right hand side.
- Select the organisation units you want to include in the layer. It is possible to select either
  - One or more specific organisation units, or
  - A relative level in the organisation unit hierarchy, with respect to the user. By selecting a **User organisation unit** the map data will appear differently for users at different levels in the organisation unit hierarchy.

2. In the **STYLE** tab:

## Edit boundary layer

ORGANISATION UNITSSTYLE

---

Labels

Size

*I*

Point radius

CANCEL UPDATE LAYER

◦ select any styling you wish to apply to the boundaries.

- Show labels

Allows labels to be shown on the layer. Font size and weight can be modified here.

- Point radius

Sets the base radius when point type elements, such as facilities, are presented on the boundary layer.

3. Click **ADD LAYER**.

### Modify a boundary layer

1. In the layer panel, click the edit (pencil) icon on the boundary layer card.
2. Modify the setting on the ORGANISATION UNITS and STYLE tabs as desired.
3. Click **UPDATE LAYER**.

### Filter values in a boundary layer

Boundary layers have a **data table** option that can be toggled on or off from the boundary layer card.

| INDEX | NAME           | LEVEL   | PARENT    | ID          | TYPE         |
|-------|----------------|---------|-----------|-------------|--------------|
|       | Bo             | Z>3&*<8 | Search    | Search      | Search       |
| 4     | Bargbo         | 3       | Bo        | zFDYlgyGmXG | Polygon      |
| 9     | Bombali Sebola | 3       | Bombali   | KKKLOTpMXGV | Polygon      |
| 36    | Gbo            | 3       | Bo        | YmmeuGbgQwR | Polygon      |
| 37    | Gbonkonlenken  | 3       | Tonkolili | P69Sid31eDp | Polygon      |
| 41    | Jalama Bongor  | 3       | Bo        | daJPPxttrQn | Polygon      |
| 52    | Kargboro       | 3       | Moyamba   | Z9Qal6szTWW | MultiPolygon |
| 59    | Komboya        | 3       | Bo        | JdhagCUEMbj | Polygon      |
| 60    | Kongbora       | 3       | Moyamba   | Jlyc4ekaMMh | Polygon      |

The data table displays the data forming the boundary layer.

- clicking on a title will sort the table based on that column; toggling between ascending and descending.
- entering text or expressions into the filter fields below the titles will apply those filters to the data, and the display will adjust according to the filter. The filters are applied as follows:
  - NAME  
filter by name containing the given text
  - LEVEL  
filter level by numbers and/or ranges, for example: 2,>3&\<8
  - PARENT  
filter by parent names containing the given text
  - ID  
filter by IDs containing the given text
  - TYPE  
filter by GIS display types containing the given text

#### Note

Data table filters are temporary and are not saved with the map layers as part of the favourite.

### Search for an organisational unit

The NAME filter field in the data table provides an effective way of searching for individual organisational units displayed in the boundary layer.

## Navigate between organisation hierarchies

You can modify the target of the boundary layer in the hierarchy without using the level/parent user interface.

1. Right-click one of the boundaries.
2. Select **Drill up one level** or **Drill down one level**.

The drill down option is disabled if you are on the lowest level. Likewise the drill up option is disabled from the highest level.

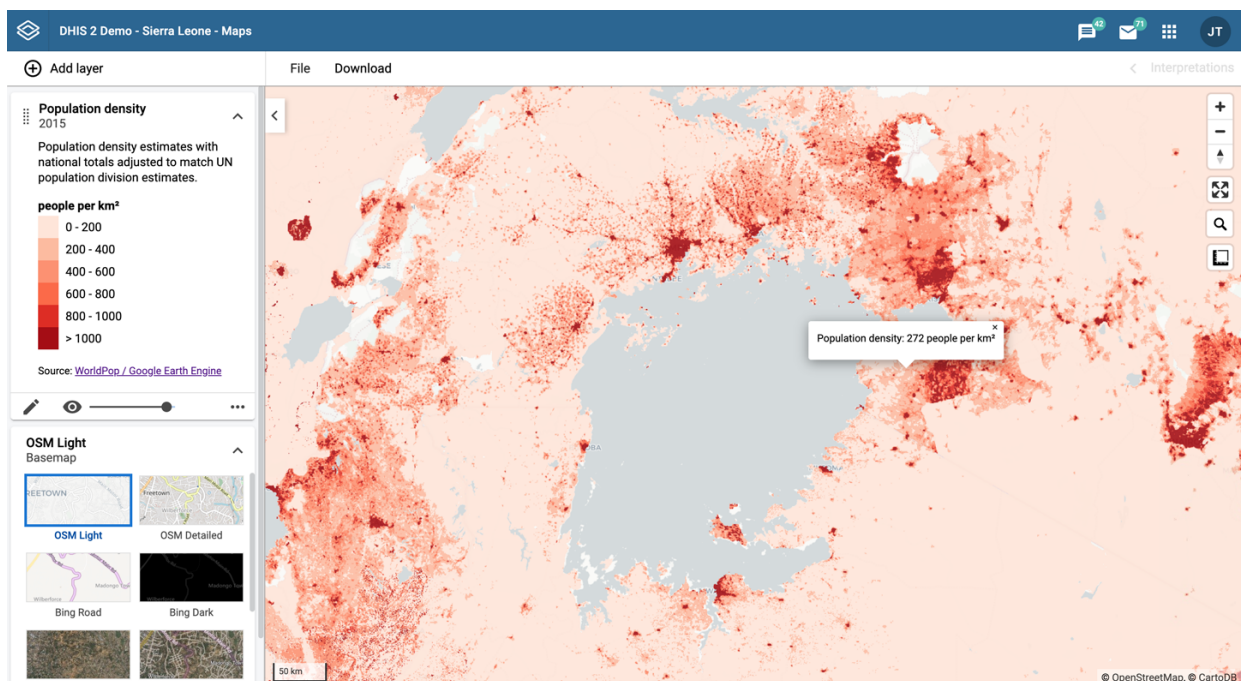
## Remove boundary layer

To clear all data in a boundary layer:

1. In the layer card to the left, click the *more actions* (three dots) icon and then on **Remove layer**.

The layer is removed from the current map.

## Manage Earth Engine layer



The Google Earth Engine layer lets you display satellite imagery and geospatial datasets from Google's vast catalog. These layers is useful in combination with thematic and event layers to enhance analysis. The following layers are supported:

- Population density estimates with national totals adjusted to match UN population division estimates. Population in 100 x 100 m grid cells (from 2010).
- Elevation above sea-level. You can adjust the min and max values so it better represents the terrain in your region.
- Temperature: Land surface temperatures collected from satellite. Blank spots will appear in areas with a persistent cloud cover.

- Precipitation collected from satellite and weather stations on the ground. The values are in millimeters within 5 days periods. Updated monthly, during the 3<sup>rd</sup> week of the following month.
- Land cover: 17 distinct landcover types collected from satellites.
- Nighttime lights: Lights from cities, towns, and other sites with persistent lighting, including gas flares (from 2013).

### Create an Earth Engine layer

To create an Earth Engine layer, choose the desired layer from the **\*\*Add layer\*\*** selection. This opens the layer configuration dialog.

1. In the **STYLE** tab

### Edit Earth Engine layer

#### STYLE

Population density estimates with national totals adjusted to match UN population division estimates. Try a different year if you don't see data for your country.

Select year

2015

Min people

0

Max people

1000

Steps

5

#### Legend preview

0 - 200

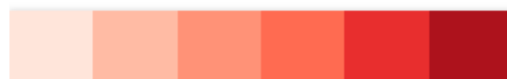
200 - 400

400 - 600

600 - 800

800 - 1000

> 1000



CANCEL

UPDATE LAYER

- Modify the parameters specific to the layer type.
- Adjust the legend range, steps and colors, as desired.

2. Click **ADD LAYER**.

### Add external map layers

External map layers are represented as either:

- Basemaps

These are available in the **basemap** card in the layers panel and are selected as any other basemap.

- Overlays

These are available in the **Add layer** selection. Unlike basemaps, overlays can be placed above or below any other overlay layers.

Overlay layers are represented by additional layer *cards* in the layer panel such as:

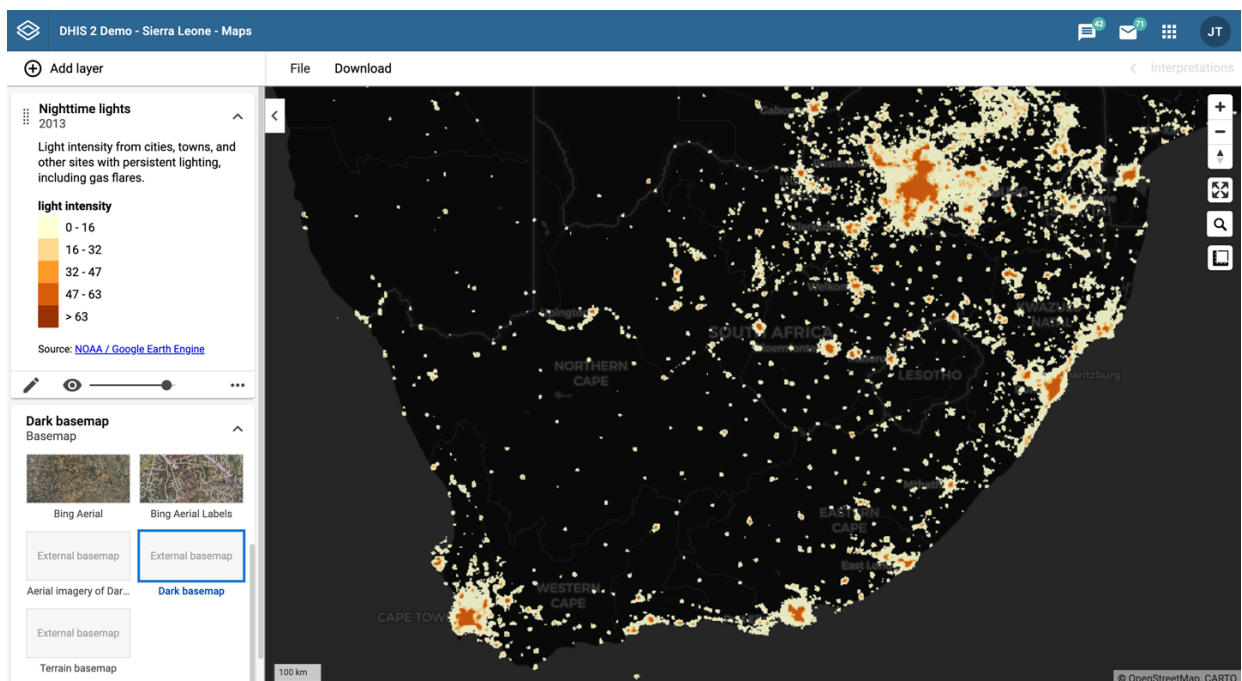
Along the top of the overlay card from left to right are:

- A grab field to allow dragging and re-ordering layers with the mouse
- The title of the external map layer
- An arrow symbol to collapse and expand the overlay card

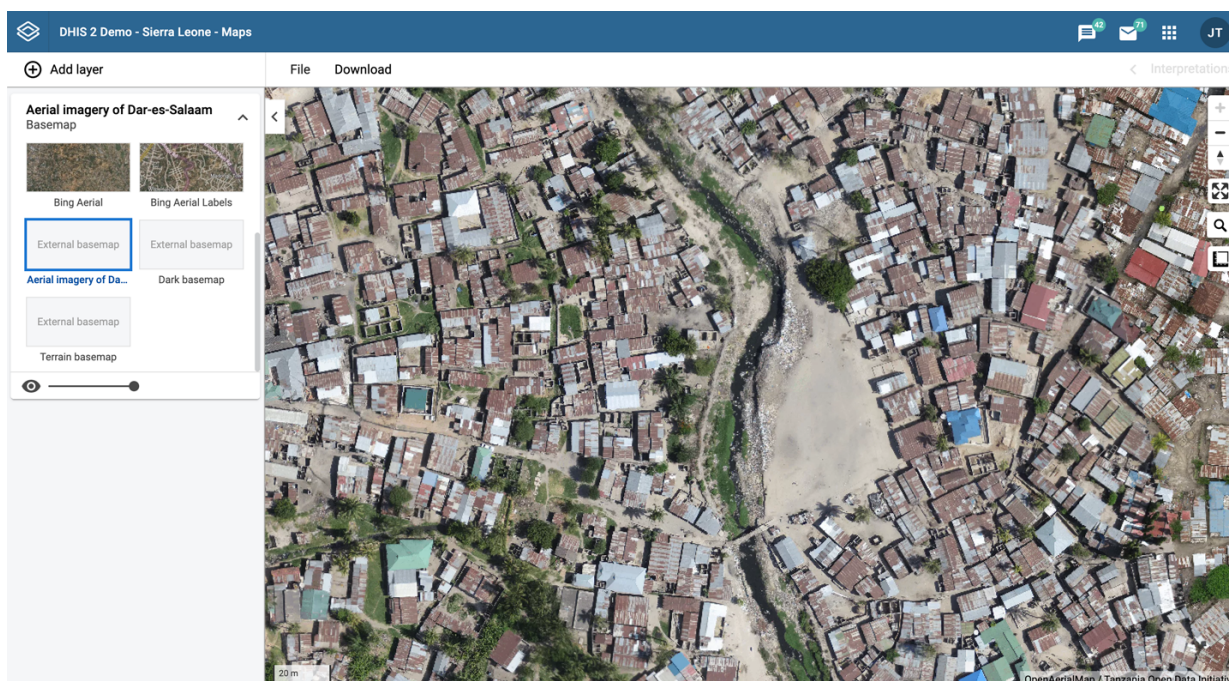
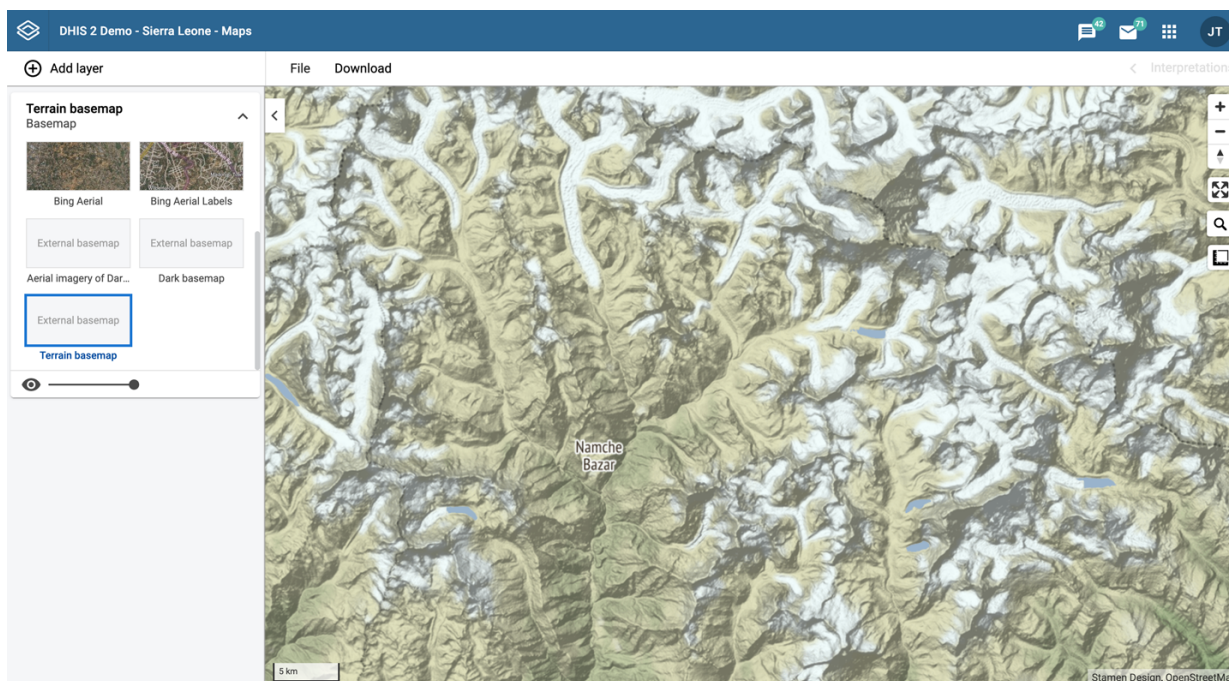
Along the bottom of the overlay card from left to right are:

- A slider for modifying the layer transparency
- A delete (trash can) icon to remove the layer from the current thematic map.

Here are some examples of external layers:







## File menu

Use the **File menu** to manage your maps. Several menu items will be disabled until you open or save a map.

Saving your maps makes it easy to restore them later. It also gives you the opportunity to share them with other users as an interpretation or put it on the dashboard. You can save all types of layer configurations as a favorite.

### Create a new map

Click **File > New**.

NB! This will clear the current map layers you have without saving.

**Open a new map**

1. Click **File > Open**. A dialog box opens with a list of maps.
2. Find the favorite you want to open. You can either use \< and > or the search field to find a saved map. The list is filtered on every character that you enter. You can filter the list by selecting **Show all**, **Created by me** or **Created by others**.
3. Click the name of the map you want to open.

**Save a map**

When you have created a map it is convenient to save it for later use:

1. Click **File > Save**.
2. Enter a **Name** (required) and a **Description** (optional) the first time you save a map.
3. Click **SAVE**.

**Save a copy of a map**

1. Click **File > Save as...**
2. Enter a **Name** (required) and a **Description** (optional) for the map.
3. Click **SAVE**.

**Rename a map**

1. Click **File > Rename**.
2. Enter a new **Name** and/or **Description** for your map.
3. Click **RENAME**. The map is updated.

**Translate a map**

1. Click **File > Translate**.
2. Select the **Locale** (language) your translation.
3. Enter a translated **Name** and **Description**. The original text will show below the field.
4. Click **SAVE**.

**Modify sharing settings for a map**

After you have created a map and saved it, you can share the map with everyone or a user group. To modify the sharing settings:

1. Click **File > Share**. The sharing settings dialog opens.
2. In the text box, search for the name of the user or group you want to share your favorite with and select it.

The chosen user or group is added to the list of recipients.

Repeat the step to add more user groups.

3. If you want to allow external access, select the corresponding box.

For each user group, choose an access setting. The options are:

4.
  - None (for default groups only, as they cannot be removed)
  - Can view
  - Can edit and view
5. Click **CLOSE** to close the dialog.

### Get the link to a map

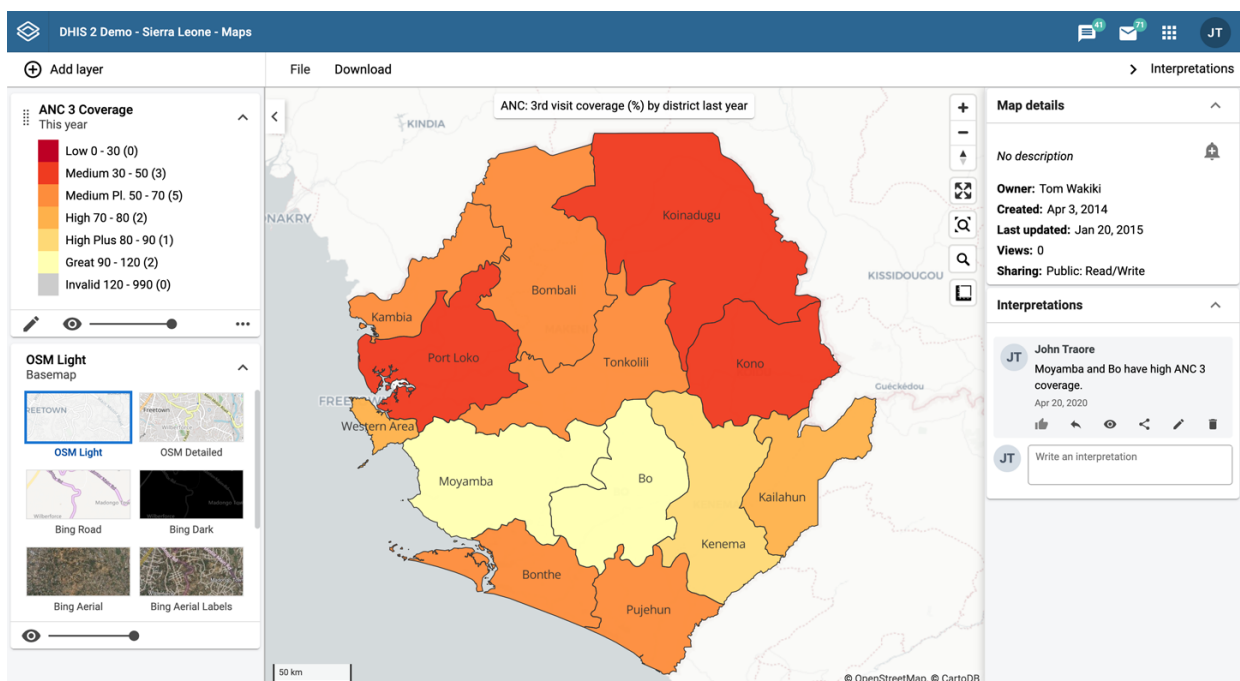
1. Click **File** > **Get link**. A link dialog opens.
2. Copy the link.

### Delete a map

1. Click **File** > **Delete**. A confirmation dialog is displayed.
2. Click **DELETE** to confirm that you want to delete the favorite. Your map is deleted and the layers are cleared from the view.

### Map interpretations

An interpretation is a description of a map at a given period. This information is visible in the **Dashboard app**. Click **Interpretations** in the top right of the workspace to open the interpretations panel. The button is only clickable if the map is saved.



### View interpretations based on relative periods

To view interpretations for relative periods, such as a year ago:

1. Open a favorite with interpretations.
2. Click **Interpretations** in the top right of the workspace to open the interpretations panel.

- 
- Click an interpretation. Your map displays the data and the date based on when the
  3. interpretation was created. To view other interpretations, click them.

### Write interpretation for a map

To create an interpretation, you first need to create a map and save it. If you've shared your map with other people, the interpretation you write is visible to those people.

1. Open a favorite with interpretations.
2. Click **Interpretations** in the top right of the workspace to open the interpretations panel.
3. A text field will appear with a placeholder "Write an interpretation" for users that have read access to the favorite.
4. In the text field, type a comment, question or interpretation. You can also mention other users with '@username'. Start by typing '@' plus the first letters of the username or real name and a mentioning bar will display the available users. Mentioned users will receive an internal DHIS2 message with the interpretation or comment. You can see the interpretation in the **Dashboard app**.
5. Click **SAVE** if you want your interpretation to have the same sharing settings as the map.

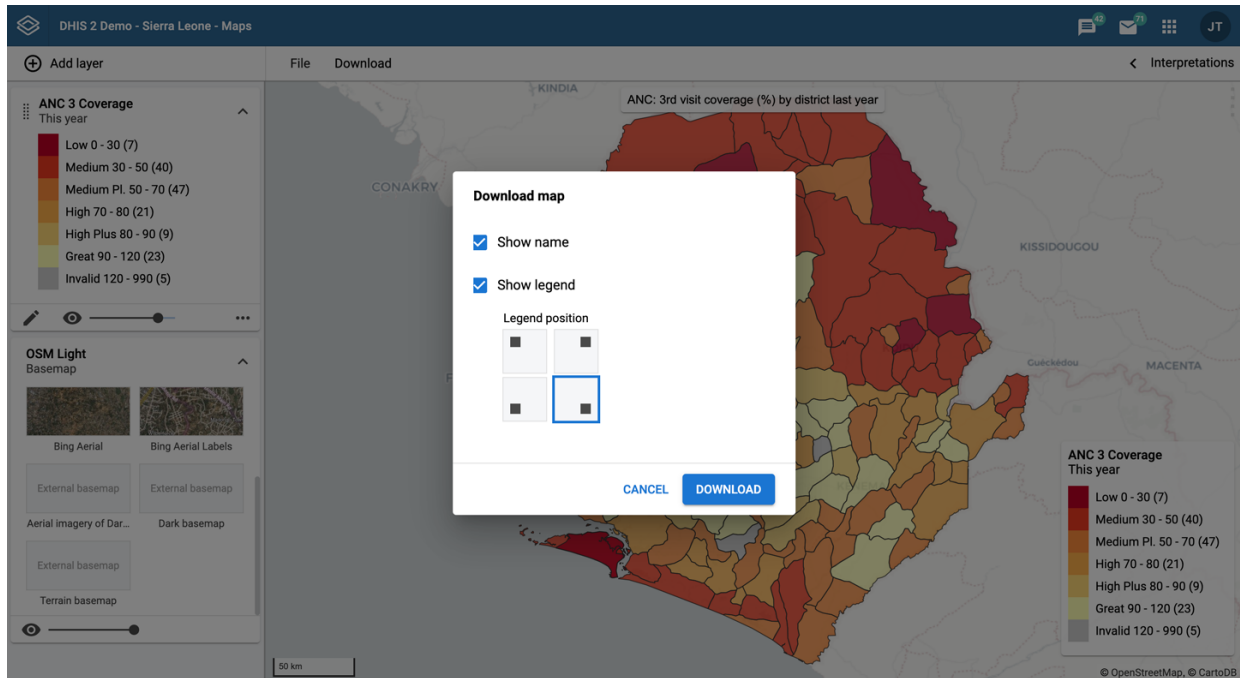
Click **SAVE & SHARE** if you want to change the sharing settings (see below) for your interpretation.

### Change sharing settings for an interpretation

1. Click an interpretation (see how to view an interpretation above).
2. Click **Share** below the interpretation. The sharing settings dialog opens.
3. Search for and add a users and user groups that you want to share your map with.
4. Change sharing settings for the users you want to modify:
  - **Can edit and view**: Everyone can view and edit the object.
  - **Can view only**: Everyone can view the object.
  - **No access**: The public won't have access to the object. This setting is only applicable to Public access.
5. Click **CLOSE** when sharing settings are updated.

### Save a map as an image

You can download your map as an image by clicking on the Download button in the top menu

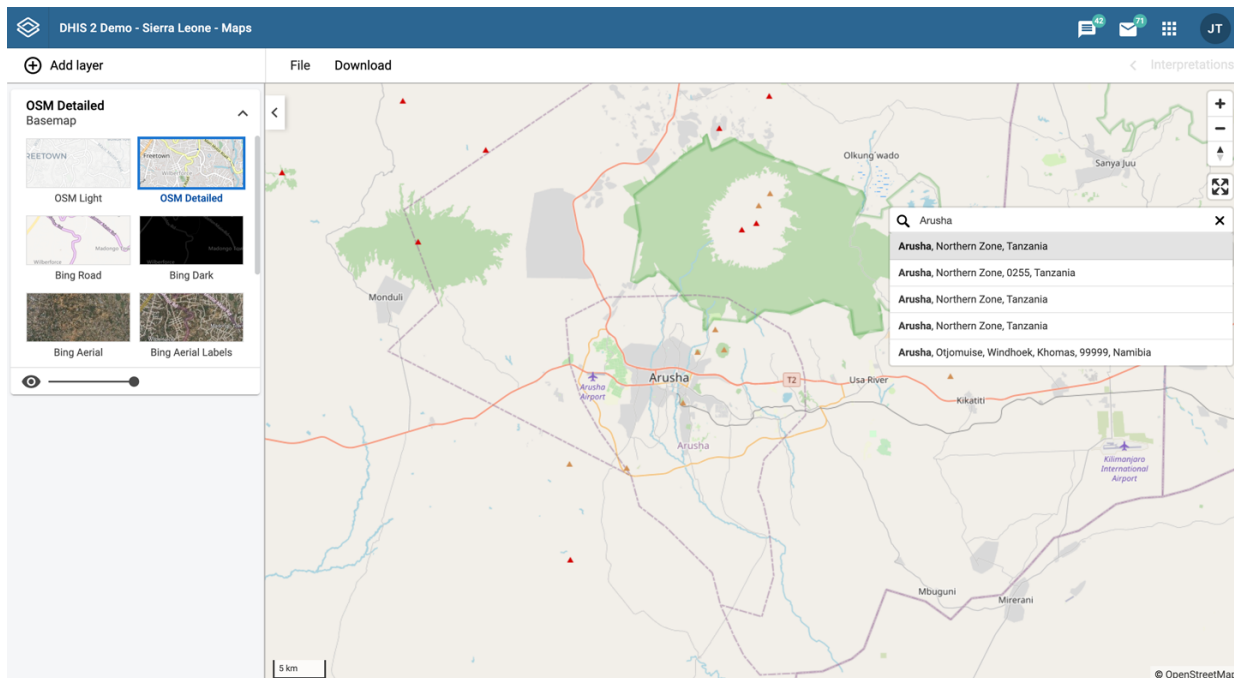


Map download is not supported in Internet Explorer or Safari, we recommend to use Google Chrome or Firefox.

1. Select if you want to include the map name or not. This option is only available if the map is saved.
2. Select if you want to include the map legend. You can position the legend in one of the 4 corners of your map.
3. Click **Download** to download your map.

## Search for a location

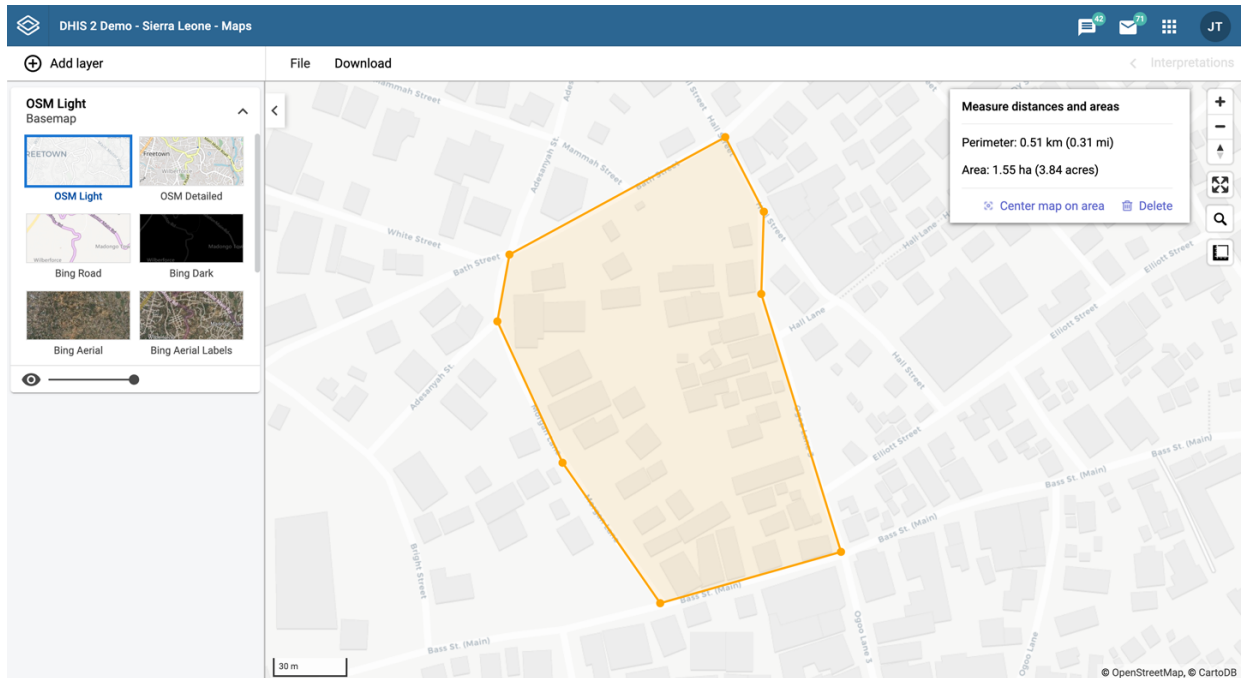
The place search function allows you to search for almost any location or address. This function is useful in order to locate for example sites, facilities, villages or towns on the map.



1. On the right side of the Maps window, click the magnifier icon.
2. Type the location you're looking.  
A list of matching locations appear as you type.
3. From the list, select a location. A pin indicates the location on the map.

### Measure distances and areas in a map

1. In the upper left part of the map, put the cursor on the **Measure distances and areas** (ruler) icon and click **Create new measurement**.
2. Add points to the map.
3. Click **Finish measurement**.



## Get the latitude and longitude at any location

Right-click a point on the map and select **Show longitude/latitude**. The values display in a pop-up window.

### See also

- [Manage legends](#)

# Managing dashboards

## About dashboards

Dashboards are intended to provide quick access to different analytical objects (maps, charts, reports, tables, etc) to an individual user. Dashboards can also be shared with user groups.

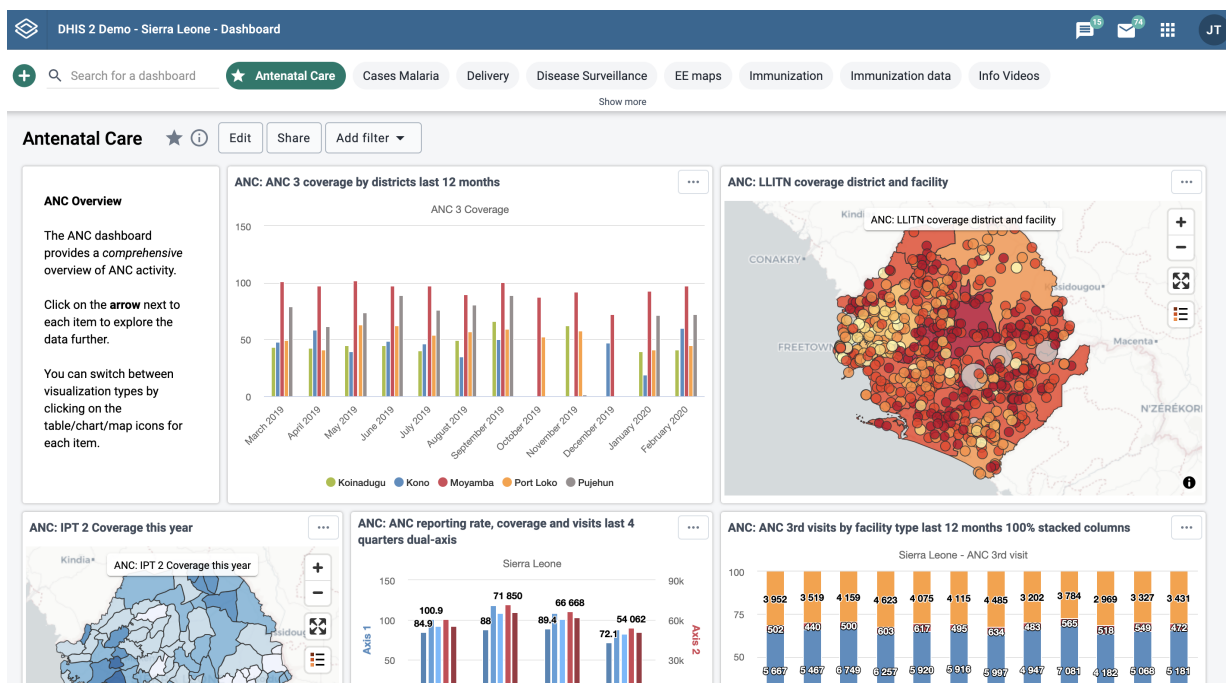
A user or administrator could create a dashboard called "Antenatal care" which might contain all relevant information on antenatal care. This dashboard could then be shared with the user group called "ANC control", which might consist of all users of the ANC control program. All users within this group would then be able to view the same dashboard.

## Dashboard and control bar

Dashboards have a title, description, and any number of dashboard items. The dashboard items can be of many different types, including charts, maps, reports, tables, resources, messages, and text items. Above the dashboard is the control bar, which shows all your available dashboards, including a dashboard search field, and a + button for creating a new dashboard.

The dashboard has two modes: view and edit/create. When you first log in to DHIS2, your most recently used dashboard will be displayed in view mode, if you are on the same computer as you were previously. If you are using a different computer, then the first starred dashboard will be displayed. If there are no starred dashboards, then the first dashboard (alphabetically) will be displayed. Starred dashboards always show first in the dashboard list.

The screenshot below shows a dashboard called "Antenatal Care", which has been populated with charts and maps.



## Searching in the list of dashboards

You can search for a specific dashboard using the search field in the upper left of the control bar entitled "Search for a dashboard". The search is case insensitive, and as you type, the list of dashboards will filter down to those that match your search text.



## Customizing the height of the control bar

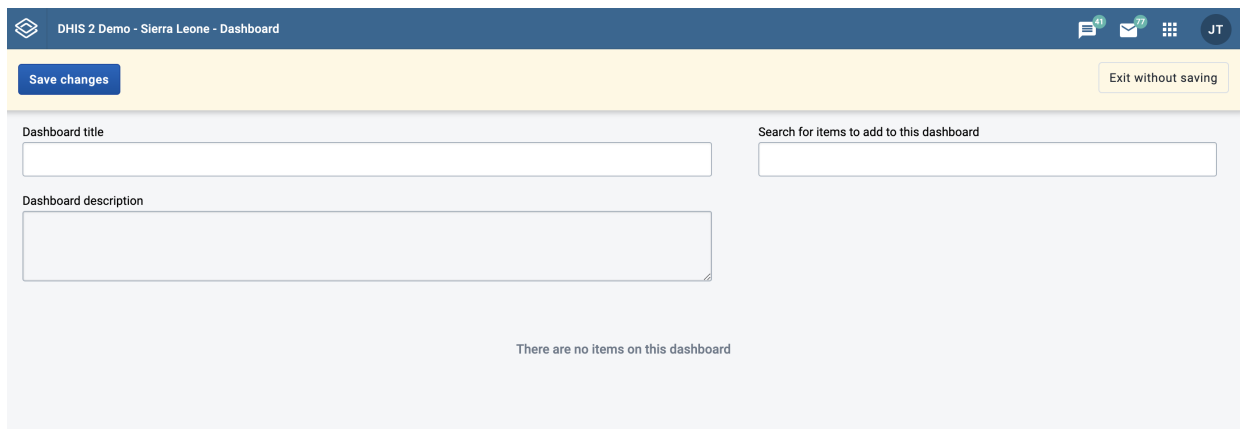
You can set a specific height for the dashboards control bar by down-clicking and dragging the bottom edge of the control bar. When you finish dragging, the new height will be set. Clicking on **Show more** will expand the control bar to its maximum height (10 "rows"). Clicking on **Show less** will reset the height to your customized height.

## Creating a dashboard

To create a new dashboard, click the green + button in the left corner of the control bar to go into create mode. Add a title in the title field, and optionally a description in the description field.



### Create mode:



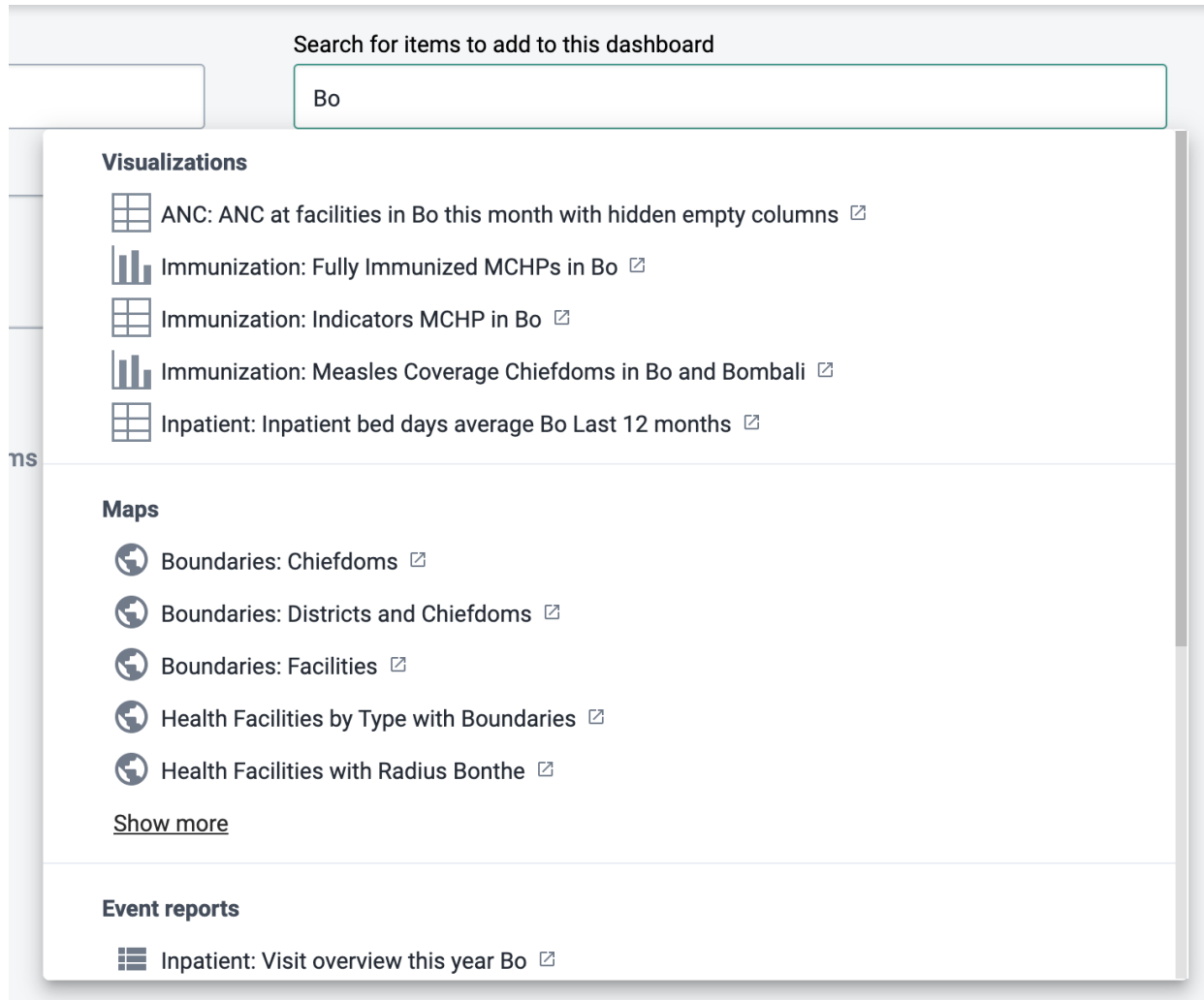
## Adding items to the dashboard

Add items to the dashboard by searching from the item selector in the upper right part of the dashboard area. Available items include:

- Visualizations
- Maps
- Event reports
- Event charts
- Report
- Resources
- Apps
- Email
- Text boxes

## Spacer

The list of items in the drop-down initially displays 10 visualizations (charts and tables), and 5 from each of the other categories, based on the search text you enter. Email, text boxes and spacer items are also found in the drop-down. To view more items, click on **Show more**, and the list for that type will be extended to 25 items. If you still do not find the item you want, try typing a more specific search text.



Once you select an item, it will be added to the top left position of the dashboard. The added items can be moved using the mouse by down-clicking on the item and dragging it to the desired position. It can also be resized with the mouse by down-clicking on the drag handle in the lower right corner of the item and dragging to the desired size.

## Spacer items

The dashboard is configured with the "anti-gravity" setting for positioning items. This means that items will "rise" upwards until they run into another item. In order to force empty vertical space between items (like an empty row), you can add spacer items to the dashboard. They are only visible in edit/create mode. In view mode, they are not displayed, but take up the defined space.

### Spacer in edit/create mode:

**Text item**

Prenatal care, also known as antenatal care, is a type of preventative health care. Its goal is to provide regular check-ups that allow doctors or midwives to treat and prevent potential health problems throughout the course of the pregnancy and to promote healthy lifestyles the benefit both mother and child. During check-ups, pregnant women receive medical information over maternal physiological changes in pregnancy, biological changes, and prenatal nutrition including prenatal vitamins.

**Spacer**

Use a spacer to create empty vertical space between other dashboard items.

**ANC: ANC by area last 12 months**

| Period        | Area / Data   | ANC 1 Coverage | ANC 1-3 Dropout Rate |
|---------------|---------------|----------------|----------------------|
| February 2019 | Northern Area | 90.4           | 41                   |
|               | Western Area  | 96.7           | 39.5                 |
|               | Southern Area | 132.3          | 40.8                 |
|               | Eastern Area  | 93.7           | 27                   |
|               |               | 413.1          | 148.3                |
|               | Northern Area | 82.7           | 40.6                 |

**Spacer in view mode:**

Prenatal care, also known as antenatal care, is a type of preventative health care. Its goal is to provide regular check-ups that allow doctors or midwives to treat and prevent potential health problems throughout the course of the pregnancy and to promote healthy lifestyles the benefit both mother and child. During check-ups, pregnant women receive medical information over maternal physiological changes in pregnancy, biological changes, and prenatal nutrition including prenatal vitamins.

**ANC: ANC by area last 12 months**

| Period        | Area / Data   | ANC 1 Coverage | ANC 1-3 Dropout Rate |
|---------------|---------------|----------------|----------------------|
| February 2019 | Northern Area | 90.4           | 41                   |
|               | Western Area  | 96.7           | 39.5                 |
|               | Southern Area | 132.3          | 40.8                 |
|               | Eastern Area  | 93.7           | 27                   |
|               |               | 413.1          | 148.3                |
|               | Northern Area | 82.7           | 40.6                 |

## Removing items

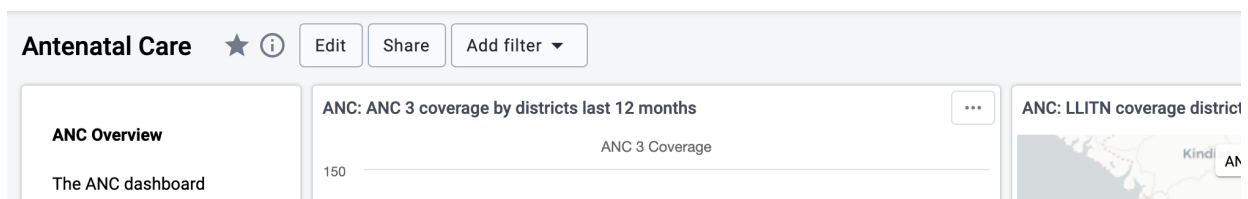
Remove items by clicking on the red trash can at the upper right of the item. Be aware that because of the "anti-gravity" setting in the dashboard, when you remove an item, the items that are positioned below the removed item will "rise" upwards.

## Saving the dashboard

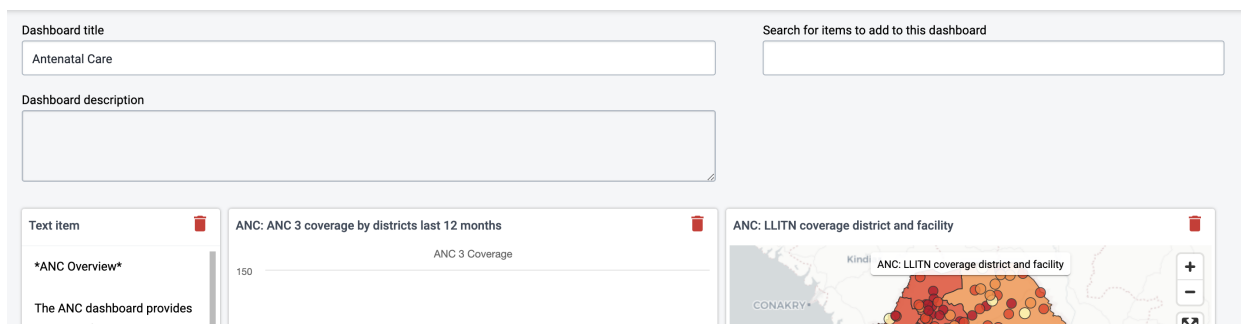
When creating or editing a dashboard, changes are only saved when you click **Save changes** button in the dashboard edit bar at the top of the page. If you don't want to save your changes, click the **Exit without saving** button to the upper right. You will then be returned to view mode with the dashboard you were previously viewing.

## Editing an existing dashboard

If you have access rights to edit the currently active dashboard, there will be an **Edit** button to the right of the dashboard title in view mode. Click on this button to enter edit mode.

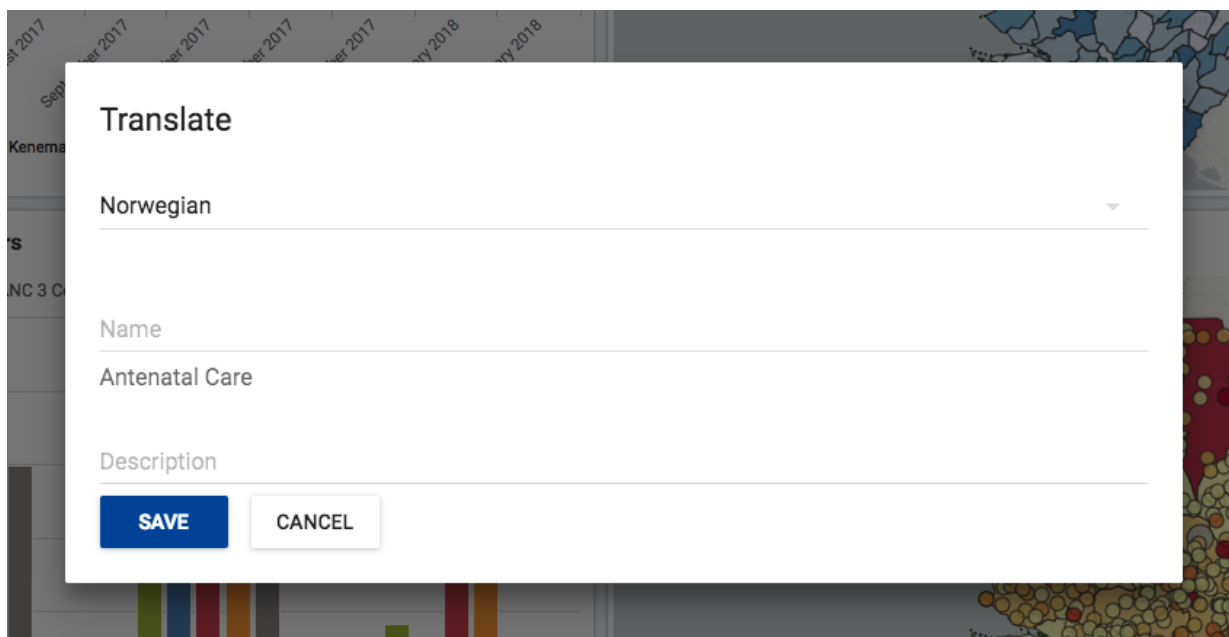


Refer to the above section about creating dashboards for information on adding and removing items to the dashboard.



## Translating dashboard title and description

You can add translations for dashboard title and description while in edit mode. The dialog provides a list of languages to translate to, and shows the original dashboard title underneath the name input field.



1. Click on the **TRANSLATE** button located above the dashboard
2. Select the language you wish to add a translation for.
3. Add the title and/or description, and click **SAVE**

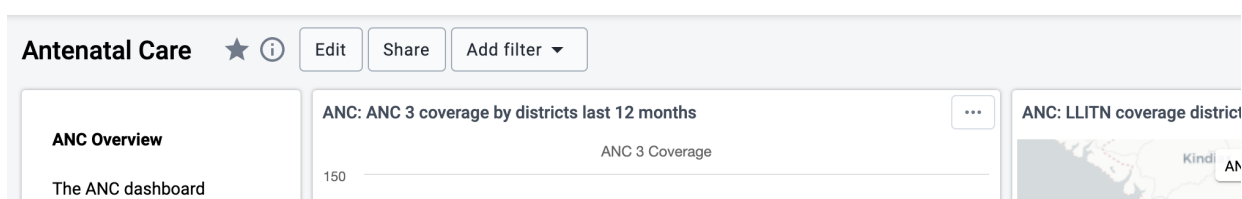
## Deleting a dashboard

If you have access to delete the dashboard, then there will be a **Delete** button located above the dashboard, when in edit mode. A confirmation dialog will first be displayed to confirm that you want to delete the dashboard.

## Viewing a dashboard

When in view mode, you can toggle showing the description, star a dashboard, apply filters, and share the dashboard with other users and groups.

To view the description, click on the **i** button to the right of the title



## Starred dashboards

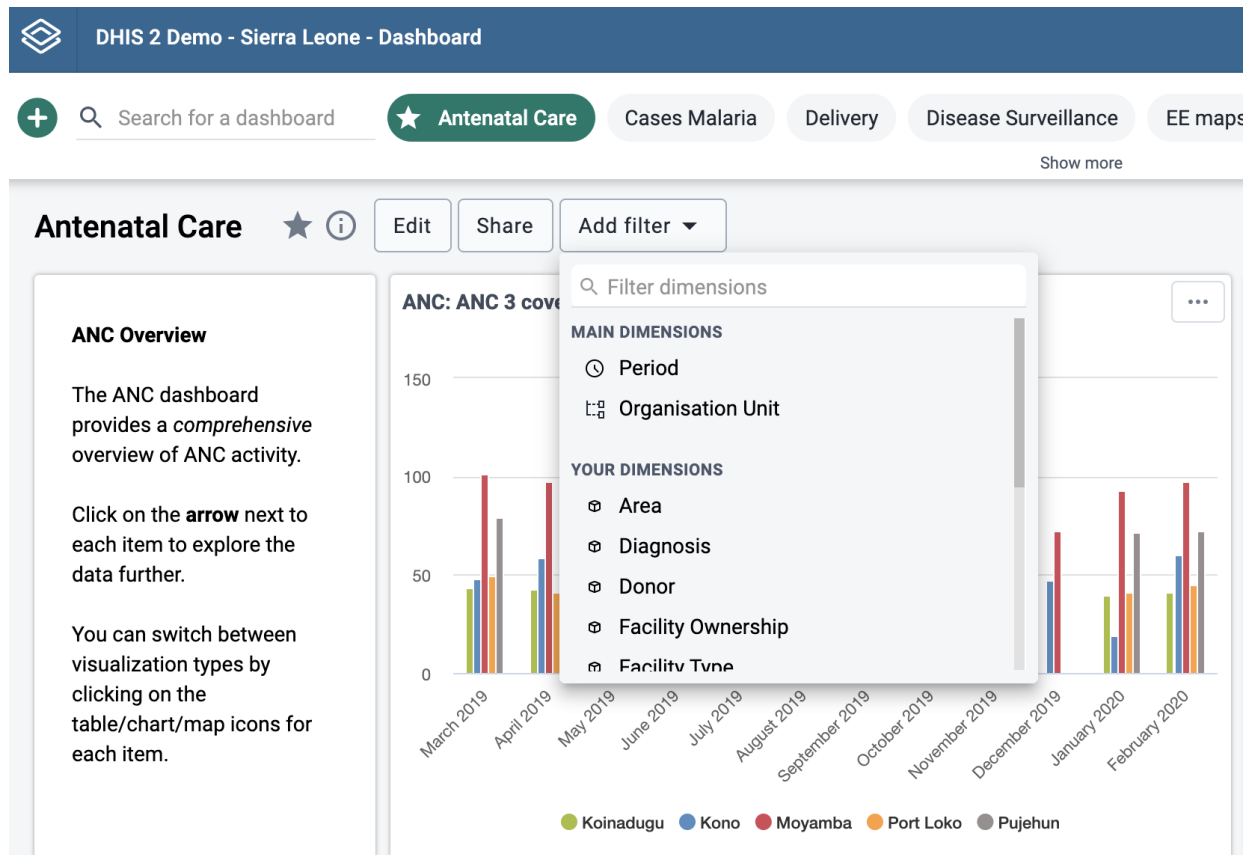
Your starred dashboards are listed first in the list of dashboards. To star a dashboard, click on the star button to the right of the title. When the star is “filled”, that means the dashboard is starred. Starring a dashboard only applies to you, not other users.

## Filtering a dashboard

Multiple filters can be applied to a dashboard for changing the data displayed in the various dashboard items. The filters are applied to each dashboard item in the same way: each added filter overrides the original value for that dimension in the original chart, table or map

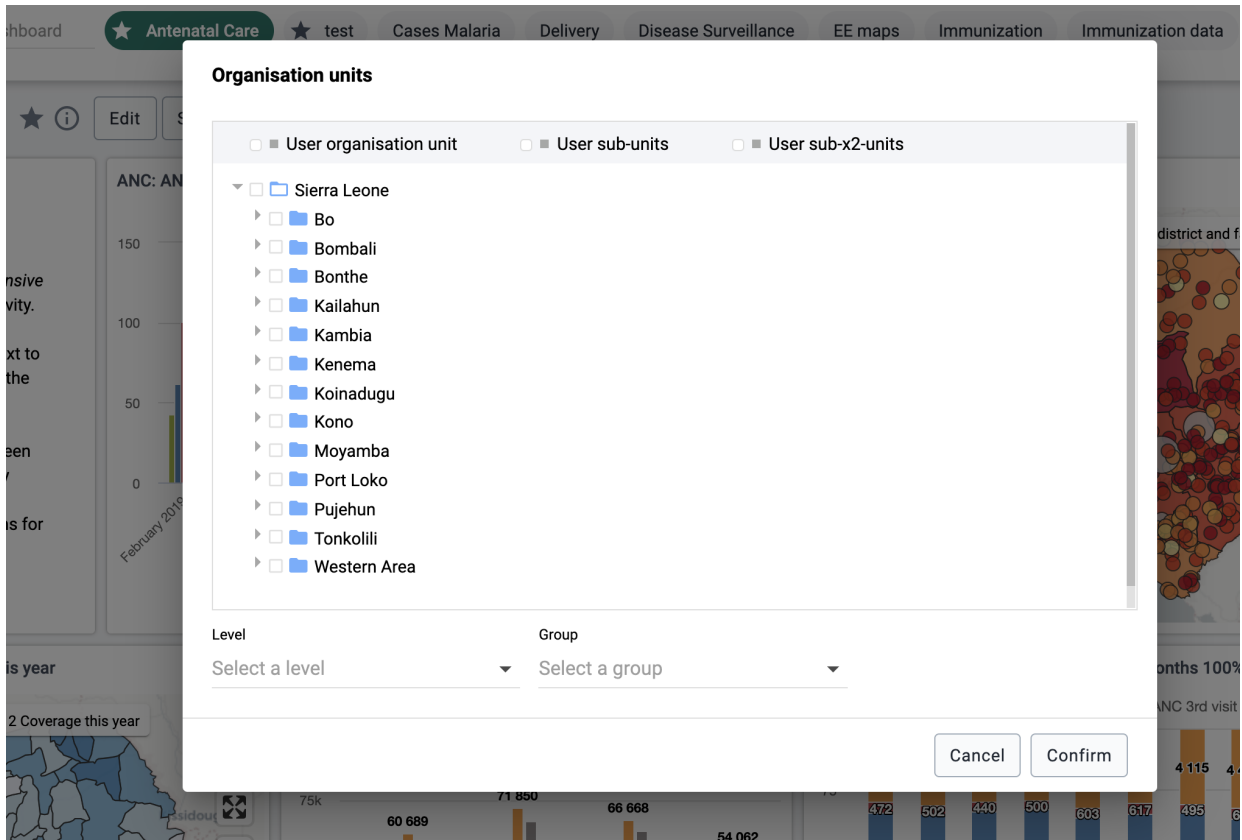
(visualization). It is possible to filter on Organisation Units, Periods and other dynamic dimensions depending on the DHIS2 instance.

To add a filter, click on the **Add Filter** button and choose the dimension:



*Adding a filter*

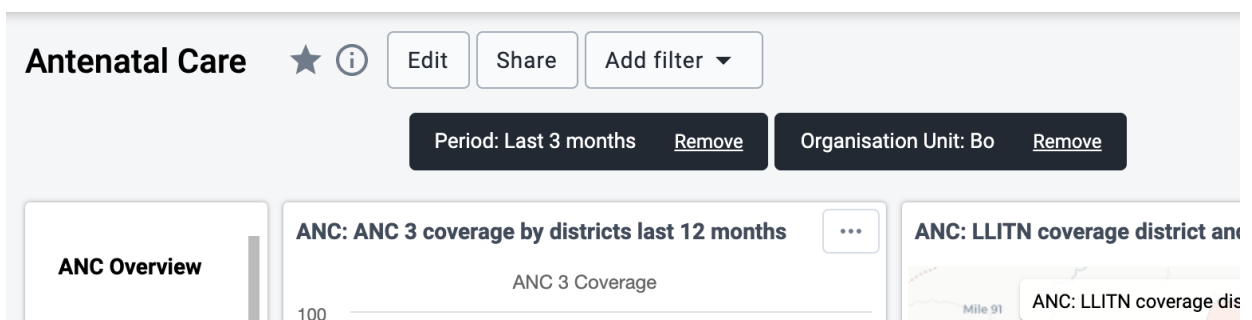
A dialog opens where the filter selection can be made.



*Org Unit filter selection*

Click on **Confirm** in the dialog to apply the filter to the current dashboard.

Filters are not stored, so when switching to a different dashboard they are lost. Filter badges appear above the dashboard items to indicate that what is shown in the dashboard items is not the original visualization, but a manipulated one where the filters override the stored dimensions' values.



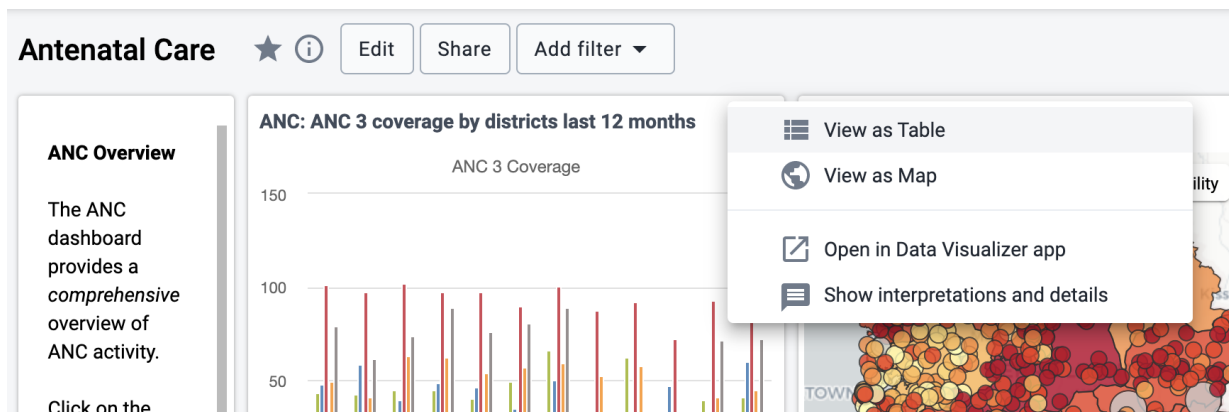
*Current filters displayed as badges above the dashboard*

Filter badges can be clicked for opening the filter selection dialogs thus allowing for filter editing. A filter can be removed by clicking on the **Remove** button in the badge. Whenever a filter is added, edited or removed, the dashboard items reload to show the updated data. Filter badges are always visible at the top of the page when scrolling the dashboard content.

## Dashboard items with charts, pivot tables and maps

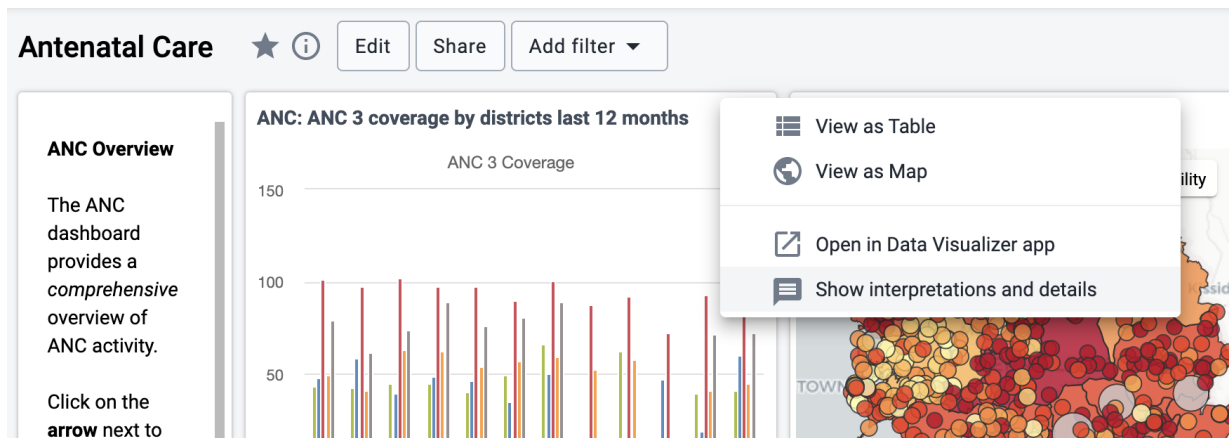
### Switching between visualizations

Dashboard items showing charts, pivot tables and maps can be toggled between these visualizations. Click on the item menu button in the upper right corner of the item and choose the desired view:



### Interpretations

You can write interpretations for the chart, pivot table, map, event report, and event chart items. From the dashboard item menu, click on **Show interpretations and details**:

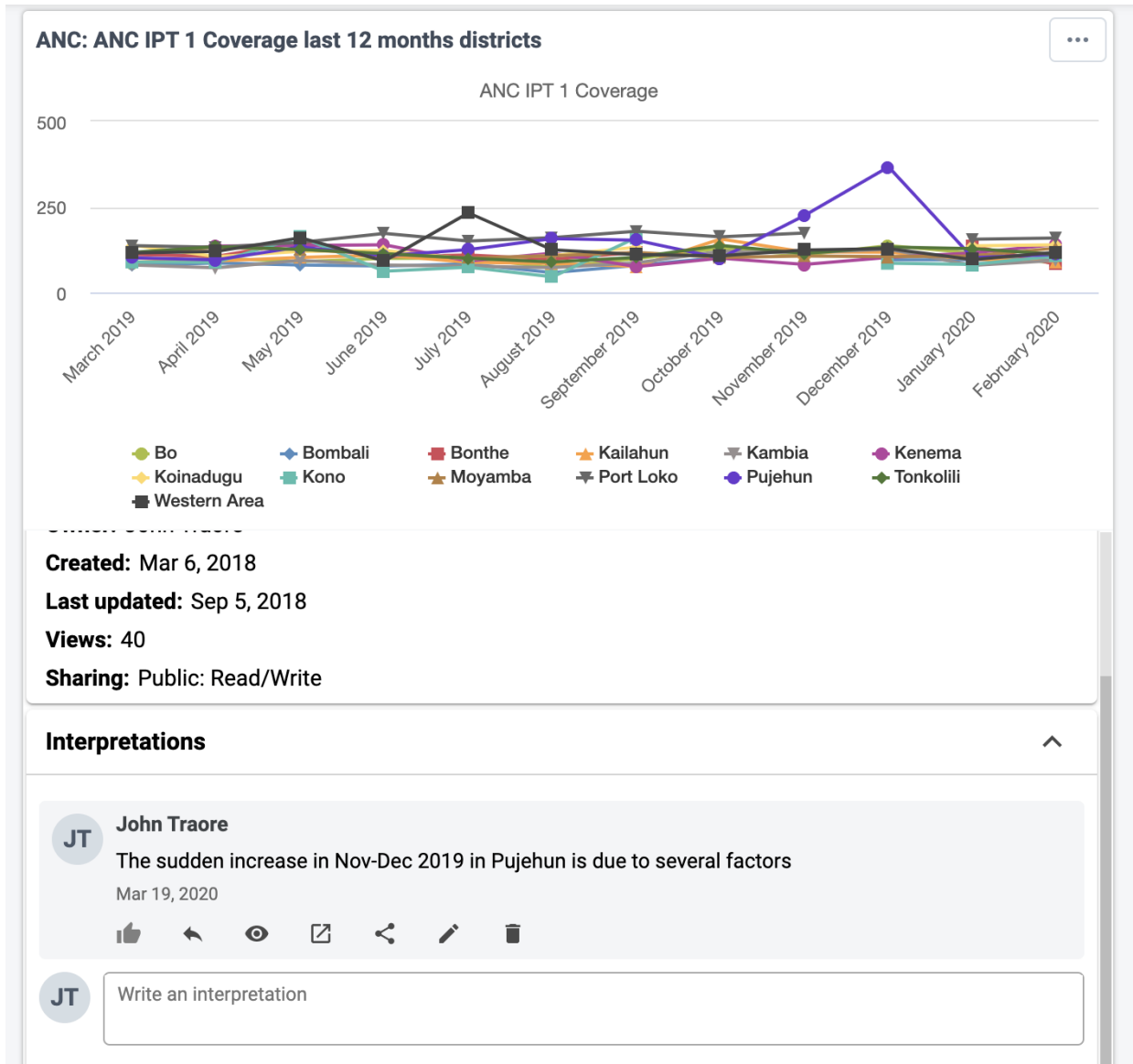


and the item will be expanded vertically underneath to show the description, interpretations and replies. You can like an interpretation, reply to an interpretation, and add your own interpretation. You can edit, share or delete your own interpretations and replies, and if you have moderator access, you can delete others' interpretations.

It is possible to format the description field, and interpretations with **bold**, *italic* by using the Markdown style markers \* and \_ for **bold** and *italic* respectively. The text field for writing new interpretations has a toolbar for adding rich text. Keyboard shortcuts are also available: Ctrl/Cmd + B and Ctrl/Cmd + I. A limited set of smilies is supported and can be used by typing one of the following character combinations: :) :-): (:-( :+1 :-1. URLs are automatically detected and converted into a clickable link.

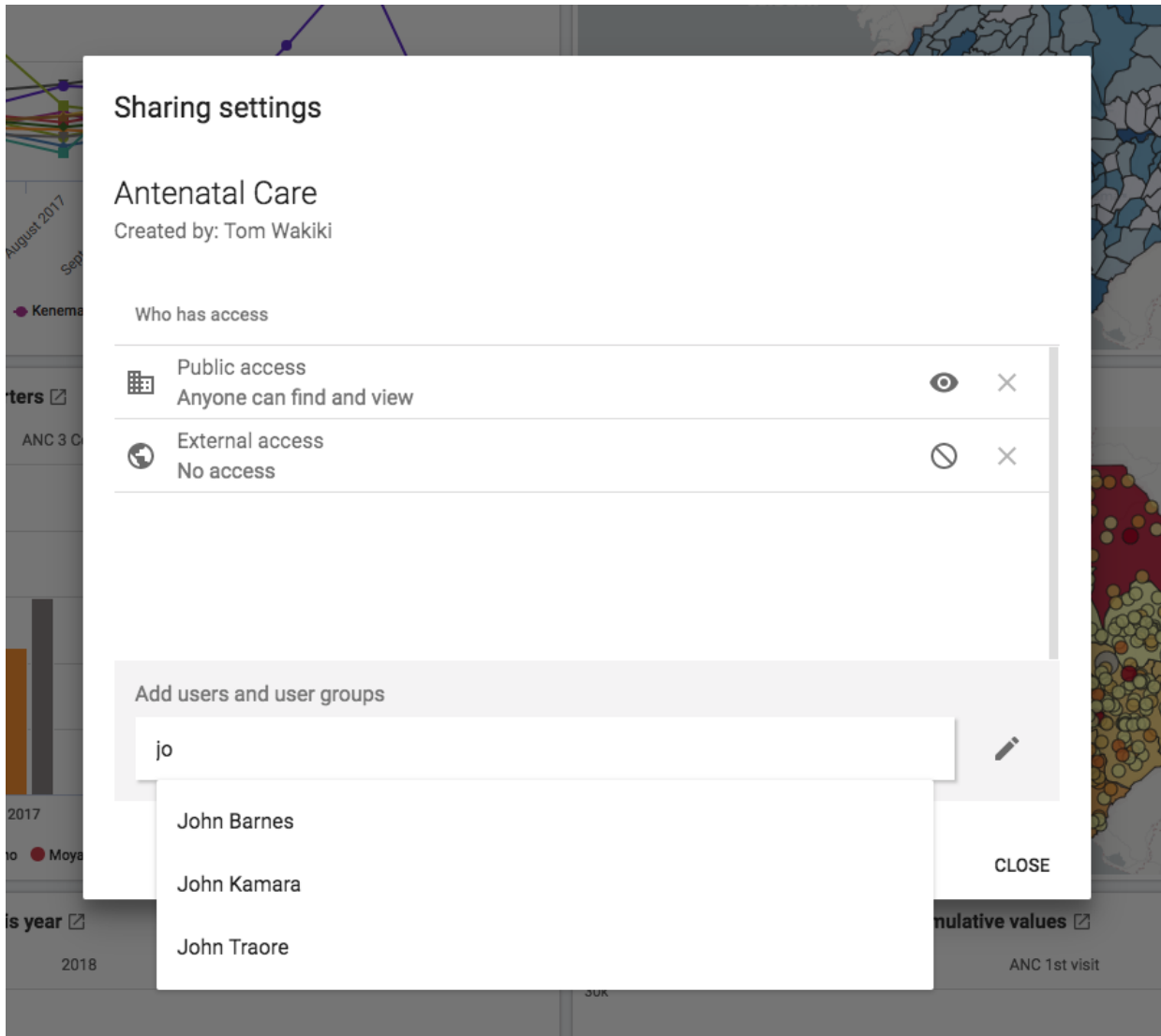
Interpretations are sorted in descending order by date, with the most recent shown on top. Interpretation replies are sorted in ascending order by date, with the oldest shown on top.





### Sharing a dashboard

In order to share a dashboard with user groups, click on the **SHARE** button to the right of the dashboard title to display the dashboard sharing settings options. To share the dashboard with specific users or user groups, type in the name in the input field to add them to the dashboard sharing settings



All dashboards have two sharing groups set by default.

- External access (without login)

This option, when selected, provides access to the dashboard as an external resource through the API. This is useful for when you are creating an external web portal but would like to call information from a dashboard you have made internally within DHIS2. By default, this option is not selected. For more information, see [Viewing analytical resource representations](#) in the developer guide.

- Public access (with login)

This option allows the selected dashboard to be pushed to all users within your DHIS2 instance. This can also be hidden from public view by selecting the "None" option, which is the default option for new dashboards.

User groups that have been added manually can be assigned two types of permissions within the dashboard

- Can view

Provides the user group with view only rights to the dashboard.

- Can edit and view

---

Allows the user groups to edit the dashboard in addition to viewing it. Editing allows for altering the layout, resizing and removing items, renaming/deleting the dashboard etc.

You can provide users with the url of the dashboard, allowing them to navigate directly to the dashboard. To get the dashboard url, just access the dashboard in view mode, and copy the browser url. For example, the url to the Antenatal Care dashboard in play.dhis2.org/demo is:

<https://play.dhis2.org/demo/dhis-web-dashboard/#/nghVC4wtyzi>

## Using the Event Reports app

### About the Event Reports app

| Aggregated values<br>Show aggregated event report |             |             | Events<br>Show individual event overview |            |     | <<< Update Layout Options Favorites Download Share >>> |           |           |             |                |              |               |  |
|---|-------------|-------------|--|------------|-----|--|-----------|-----------|-------------|----------------|--------------|---------------|--|
| Data  |             |             |  |            |     | May 2015   | June 2015 | July 2015 | August 2015 | September 2015 | October 2015 | November 2015 |  |
| Bo  | Male        | Discharged  | 58                                       | 60         | 61  | 70   | 54        | 72        |             |                |              |               |  |
|   |             | Died        | 55                                       | 51         | 62  | 64   | 66        | 60        |             |                |              |               |  |
|   |             | Absconded   | 71                                       | 62         | 70  | 51   | 70        | 69        |             |                |              |               |  |
|   |             | Transferred | 38                                       | 47         | 70  | 76   | 62        | 70        |             |                |              |               |  |
|   |             | Discharged  | 60                                       | 46         | 60  | 73   | 65        | 65        |             |                |              |               |  |
|   |             | Transferred | 56                                       | 64         | 62  | 66   | 53        | 69        |             |                |              |               |  |
|   | Female      | Died        | 63                                       | 57         | 51  | 53   | 62        | 63        |             |                |              |               |  |
|   |             | Absconded   | 72                                       | 52         | 67  | 68   | 52        | 65        |             |                |              |               |  |
|   |             | Transferred | 56                                       | 64         | 62  | 66   | 53        | 69        |             |                |              |               |  |
|   |             |             |  | 473        | 439 | 503  | 521       | 504       | 533         |                |              |               |  |
|   |             | Bombali     | Male                                     | Discharged | 53  | 58   | 51        | 49        | 41          | 52             |              |               |  |
|   |             |             |  | Died       | 55  | 48   | 53        | 48        | 39          | 47             |              |               |  |
| Absconded   | 59          |             |  | 53         | 47  | 56   | 37        | 36        |             |                |              |               |  |
| Female  | Transferred |             | 43                                       | 43         | 55  | 47   | 37        | 49        |             |                |              |               |  |
|   | Discharged  |             | 54                                       | 56         | 48  | 64   | 44        | 44        |             |                |              |               |  |
|   | Died        |             | 51                                       | 58         | 50  | 51   | 49        | 53        |             |                |              |               |  |
|   |             | 412         | 404                                      | 410        | 423 | 336  | 384       |           |             |                |              |               |  |
| Bonthe  | Male        | Discharged  | 28                                       | 29         | 29  | 30   | 28        | 20        |             |                |              |               |  |
|   |             | Died        | 34                                       | 23         | 33  | 24   | 24        | 30        |             |                |              |               |  |
|   |             | Absconded   | 35                                       | 27         | 30  | 42   | 23        | 32        |             |                |              |               |  |
|   | Female      | Transferred | 26                                       | 35         | 29  | 34   | 26        | 20        |             |                |              |               |  |
|   |             | Discharged  | 31                                       | 25         | 28  | 28   | 27        | 23        |             |                |              |               |  |
|   |             | Died        | 20                                       | 27         | 34  | 19   | 34        | 29        |             |                |              |               |  |
|   |             | 240         | 230                                      | 249        | 226 | 207  | 215       |           |             |                |              |               |  |
| Male  | Discharged  | 47          | 44                                       | 23         | 53  | 47   | 28        |           |             |                |              |               |  |
|   | Died        | 38          | 28                                       | 44         | 32  | 46   | 24        |           |             |                |              |               |  |
|   | Absconded   | 30          | 44                                       | 32         | 33  | 41   | 47        |           |             |                |              |               |  |

With the **Event Report**s app you can analyse events in two types of reports:

- Aggregated event reports: Pivot table-style analysis with aggregated numbers of events

By selecting **Aggregated values** from the top-left menu you can use the **Event Reports** app to create pivot tables with aggregated numbers of events. An event report is always based on a program. You can do analysis based on a range of dimensions. Each dimension can have a corresponding filter. Dimensions can be selected from the left-side menu. Similar to the pivot tables app, aggregated event reports may be limited by the amount of RAM accessible by the browser. If your requested table exceeds a set size, you will receive a warning prompt asking whether or not you want to continue.

- Individual event reports: Lists of events

By selecting **Events** from the top-left menu you can use the **Event Reports** app to make searches or queries for events based on a flexible set of criteria. The report will be displayed as a table with one row per event. Each dimension can be used as a column in the table or as a filter. Each dimension can have a criteria (filter). Data elements of type option set allows for "in" criteria, where multiple options can be selected. Numeric values can be compared to filter values using greater than, equal or less than operators.

### Create an event report

1. Open the **Event Reports** app.
2. Select **Aggregated values** or **Events**.
3. In the menu to the left, select the meta data you want to analyse.
4. Click **Layout** and arrange the dimensions.

---

You can keep the default selection if you want.

5. Click **Update**.

## Select dimension items

An event report is always based on a program and you can do analysis based on a range of dimensions. For programs with category combinations, you can use program categories and category option group sets as dimensions for tables and charts. Each dimension item can have a corresponding filter.

1. Select data elements:

1. Click **Data**.
2. Select a program and a program stage.

The data elements associated with the selected program are listed under **Available**. Each data element acts as a dimension.

3. Select the data elements you need by double-clicking their names.

Data elements can be filtered by type (Data elements, Program attributes, Program indicators) and are prefixed to make them easily recognizable.

After selecting a data element, it is visible under **Selected data items**.

4. (Optional) For each data element, specify a filter with operators such as "greater than", "in" or "equal" together with a filter value.

2. Select periods.

1. Click **Periods**.
2. Select one or several periods.

You have three period options: relative periods, fixed periods and start/end dates. You can combine fixed periods and relative periods in the same chart. You cannot combine fixed periods and relative periods with start/end dates in the same chart. Overlapping periods are filtered so that they only appear once.

- Fixed periods: In the **Select period type** box, select a period type. You can select any number of fixed periods from any period type. Fixed periods can for example be "January 2014".
- Relative periods: In the lower part of the **Periods** section, select as many relative periods as you like. The names are relative to the current date. This means that if the current month is March and you select **Last month**, the month of February is included in the chart. Relative periods has the advantage that it keeps the data in the report up to date as time goes.
- Start/end dates: In the list under the **Periods** tab, select **Start/end dates**. This period type lets you specify flexible dates for the time span in the report.

3. Select organisation units.

1. Click **Organisation units**.
2. Click the gearbox icon.

Select a **Selection mode** and an organisation unit.

3.

There are three different selection modes:

#### *Selection modes*

| Selection mode                   | Description  |
|----------------------------------|--|
| <b>Select organisation units</b> | <p>Lets you select the organisation units you want to appear in the chart from the organization tree.</p> <p>Select <b>User org unit</b> to disable the organisation unit tree and only select the organisation unit that is related to your profile.</p> <p>Select <b>User sub-units</b> to disable the organisation unit tree and only select the sub-units of the organisation unit that is related to your profile.</p> <p>Select <b>User sub-x2-units</b> to disable the organisation unit tree and only select organisation units two levels down from the organisation unit that is related to your profile.</p> <p>This functionality is useful for administrators to create a meaningful "system" favorite. With this option checked all users find their respective organisation unit when they open the favorite.</p> |
| <b>Select levels</b>             | <p>Lets you select all organisation units at one or more levels, for example national or district level.</p> <p>You can also select the parent organisation unit in the tree, which makes it easy to select for example, all facilities inside one or more districts.</p>  |
| <b>Select groups</b>             | <p>Lets you select all organisation units inside one or several groups and parent organisation units at the same time, for example hospitals or chiefdoms.</p>   |

4. Click **Update**.

### **Select series, category and filter**

You can define which data dimension you want to appear as columns, rows and filters in the pivot table. Each data element appears as individual dimensions and can be placed on any of the axes.

#### **Note**

Data elements of continuous value types (real numbers/decimal numbers) can only be used as filters, and will automatically be positioned as filters in the layout dialog. The reason for this is that

continuous number cannot be grouped into sensible ranges and used on columns and rows.

1. Click **Layout**.
2. Drag and drop the dimensions to the appropriate space.
3. Click **Update**.

## Change the display of your table

You can customize the display of an event report.

1. Click **Options**.
2. Set the options as required. Available options are different between aggregated event reports and individual event reports.

### *Event reports options*

| Option      | Description                          | Available for report type  |  |
|-------------|--------------------------------------|--|--|
| <b>Data</b> | <b>Show column totals</b>            | Displays totals at the end of each column in the pivot table.  | Aggregated event report                            |
|             | <b>Show column sub-totals</b>        | Displays sub-totals for each column in the pivot table.  | Aggregated event report                            |
|             | <b>Show row totals</b>               | Displays totals at the end of each row in the pivot table.   | Aggregated event report                            |
|             | <b>Show row sub-totals</b>           | Displays sub-totals for each row in the pivot table.   | Aggregated event report                            |
|             | <b>Show dimension labels</b>         | Displays labels for dimensions.  | Aggregated event report                            |
|             | <b>Hide empty rows</b>               | Hides empty rows in the pivot table.   | Aggregated event report                            |
|             | <b>Hide n/a data</b>                 | Hides data tagged as N/A from the chart.   | Aggregated event report                            |
|             | <b>Include only completed events</b> | Includes only completed events in the aggregation process. This is useful when you want for example to exclude partial events in indicator calculations. | Aggregated event report<br>Individual event report |

| Option                    | Description                  | Available for report type  |  |
|---------------------------|------------------------------|--|--|
|                           | <b>Limit</b>                 | Sets a limit of the maximum number of rows that you can display in the table, combined with a setting for showing top or bottom values.  | Aggregated event report                                |
|                           | <b>Output type</b>           | Defines the output type. The output types are <b>Event</b> , <b>Enrollment</b> and <b>Tracked entity instance</b> .  | Aggregated event report                                |
|                           | <b>Program status</b>        | Filters data based on the program status: <b>All</b> , <b>Active</b> , <b>Completed</b> or <b>Cancelled</b> .  | Aggregated event report                                |
|                           | <b>Event status</b>          | Filters data based on the event status: <b>All</b> , <b>Active</b> , <b>Completed</b> , <b>Scheduled</b> , <b>Overdue</b> or <b>Skipped</b> .  | Aggregated event report                                |
| <b>Organisation units</b> | <b>Show hierarchy</b>        | Includes the names of all parents of each organisation unit in labels.   | Aggregated event report                                |
| <b>Style</b>              | <b>Display density</b>       | Controls the size of the cells in the table. You can set it to <b>Comfortable</b> , <b>Normal</b> or <b>Compact</b> .<br><br><b>Compact</b> is useful when you want to fit large tables into the browser screen. | Aggregated event report<br><br>Individual event report |
|                           | <b>Font size</b>             | Controls the size of the table text font. You can set it to <b>Large</b> , <b>Normal</b> or <b>Small</b> .   | Aggregated event report<br><br>Individual event report |
|                           | <b>Digit group separator</b> | Controls which character to separate groups of digits or "thousands". You can set it to <b>Comma</b> , <b>Space</b> or <b>None</b> .   | Aggregated event report<br><br>Individual event report |

3. Click **Update**.



## Download chart data source

You can download the data source behind an event report in HTML, JSON, XML, Microsoft Excel or CSV formats.

1. Click **Download**.
2. Under **Plain data source**, click the format you want to download.

### *Available formats*

| Format          | Description   |
|-----------------|---|
| HTML            | Creates HTML table based on selected meta data                              |
| JSON            | Downloads data values in JSON format based on selected meta data            |
| XML             | Downloads data values in XML format based on selected meta data             |
| Microsoft Excel | Downloads data values in Microsoft Excel format based on selected meta data |
| CSV             | Downloads data values in CSV format based on selected meta data             |

## Manage favorites

Saving your charts or pivot tables as favorites makes it easy to find them later. You can also choose to share them with other users as an interpretation or display them on the dashboard.

You view the details and interpretations of your favorites in the **Pivot Table**, **Data Visualizer**, **Event Visualizer**, **Event Reports** apps. Use the **Favorites** menu to manage your favorites.

### Open a favorite

1. Click **Favorites > Open**.
2. Enter the name of a favorite in the search field, or click **Prev** and **Next** to display favorites.
3. Click the name of the favorite you want to open.

### Save a favorite

1. Click **Favorites > Save as**.
2. Enter a **Name** and a **Description** for your favorite. The description field supports a rich text format, see the interpretations section for more details.
3. Click **Save**.

### Rename a favorite

1. Click **Favorites > Rename**.
2. Enter the new name for your favorite.

---

Click **Update**.

3.

### Write an interpretation for a favorite

An interpretation is a link to a resource with a description of the data at a given period. This information is visible in the **Dashboard** app. To create an interpretation, you first need to create a favorite. If you've shared your favorite with other people, the interpretation you write is visible to those people.

1. Click **Favorites > Write interpretation**.

2. In the text field, type a comment, question or interpretation. You can also mention other users with '@username'. Start by typing '@' plus the first letters of the username or real name and a mentioning bar will display the available users. Mentioned users will receive an internal DHIS2 message with the interpretation or comment. You can see the interpretation in the **Dashboard** app.

It is possible to format the text with **bold**, *italic* by using the Markdown style markers \* and \_ for **bold** and *italic* respectively. Keyboard shortcuts are also available: Ctrl/Cmd + B and Ctrl/Cmd + I. A limited set of smilies is supported and can be used by typing one of the following character combinations: :) :-) :( :-(:+1 :-1. URLs are automatically detected and converted into a clickable link.

3. Search for a user group that you want to share your favorite with, then click the + icon.

4. Change sharing settings for the user groups you want to modify.

- **Can edit and view**: Everyone can view and edit the object.
- **Can view only**: Everyone can view the object.
- **None**: The public won't have access to the object. This setting is only applicable to **Public access**.

5. Click **Share**.

### Subscribe to a favorite

When you are subscribed to a favorite, you receive internal messages whenever another user likes/creates/updates an interpretation or creates/update an interpretation comment of this favorite.

1. Open a favorite.

2. Click >>> in the top right of the workspace.

3. Click on the upper-right bell icon to subscribe to this favorite.

### Create a link to a favorite

1. Click **Favorites > Get link**.

2. Select one of the following:

- **Open in this app**: You get a URL for the favorite which you can share with other users by email or chat.
- **Open in web api**: You get a URL of the API resource. By default this is an HTML resource, but you can change the file extension to ".json" or ".csv".

**Delete a favorite**

1. Click **Favorites > Delete**.
2. Click **OK**.

**View interpretations based on relative periods**

To view interpretations for relative periods, such as a year ago:

1. Open a favorite with interpretations.
2. Click **>>>** in the top right of the workspace.
3. Click an interpretation. Your chart displays the data and the date based on when the interpretation was created. To view other interpretations, click them.

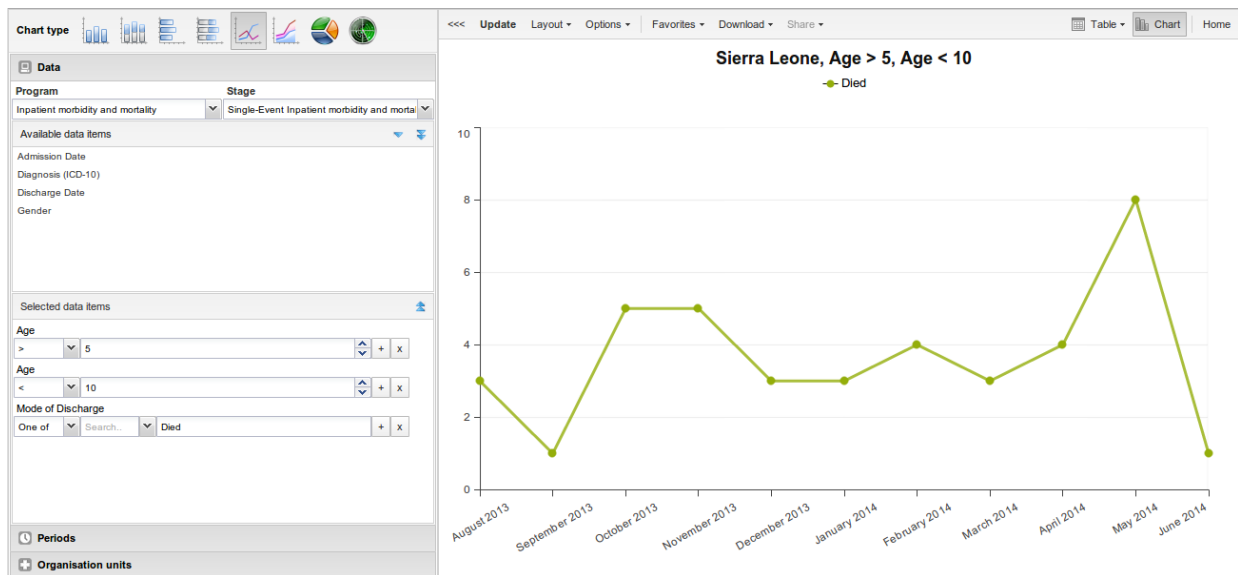
**Visualize an event report as a chart**

When you have made an event report you can open it as a chart:

Click **Chart > Open this chart as table**.

## Using the Event Visualizer app

### About the Event Visualizer app



With the **Event Visualizer** app, you can create charts based on event data.

#### Create a chart

1. Open the **Event Visualizer** app and select a chart type.
2. In the menu to the left, select the meta data you want to analyse.
3. Click **Layout** and arrange the dimensions.

You can keep the default selection if you want.

4. Click **Update**.

#### Select a chart type

The **Event Visualizer** app has eight different chart types, each with different characteristics. To select a chart type:

1. In **Chart type**, click the chart type you need.

##### Chart types

| Chart type   | Description  |
|--------------|--|
| Column chart | <p>Displays information as vertical rectangular columns with lengths proportional to the values they represent.</p> <p>Useful when you want to, for example, compare performance of different districts.</p> |

| Chart type           | Description   |
|----------------------|---|
| Stacked column chart | Displays information as vertical rectangular columns, where bars representing multiple categories are stacked on top of each other.<br><br>Useful when you want to, for example, display trends or sums of related data elements. |
| Bar chart            | Same as column chart, only with horizontal bars.  |
| Stacked bar chart    | Same as stacked column chart, only with horizontal bars.  |
| Line chart           | Displays information as a series of points connected by straight lines. Also referred to as time series.<br><br>Useful when you want to, for example, visualize trends in indicator data over multiple time periods.              |
| Area chart           | Is based on line chart, with the space between the axis and the line filled with colors and the lines stacked on top of each other.<br><br>Useful when you want to compare the trends of related indicators.                      |
| Pie chart            | Circular chart divided into sectors (or slices).<br><br>Useful when you want to, for example, visualize the proportion of data for individual data elements compared to the total sum of all data elements in the chart.          |
| Radar chart          | Displays data on axes starting from the same point. Also known as spider chart.   |

2. Click **Update**.

### Select dimension items

An event chart is always based on a program and you can do analysis based on a range of dimensions. For programs with category combinations, you can use program categories and category option group sets as dimensions for tables and charts. Each dimension item can have a corresponding filter. You select dimension items from the left-side menu.

1. Select data elements:

1. Click **Data**.
2. Select a program and a program stage.

The data elements associated with the selected program are listed under **Available**. Each data element acts as a dimension.

3. Select the data elements you need by double-clicking their names.

---

Data elements can be filtered by type (Data elements, Program attributes, Program indicators) and are prefixed to make them easily recognizable.

After selecting a data element, it is visible under **Selected data items**.

4. (Optional) For each data element, specify a filter with operators such as "greater than", "in" or "equal" together with a filter value.

2. Select periods.

1. Click **Periods**.
2. Select one or several periods.

You have three period options: relative periods, fixed periods and start/end dates. You can combine fixed periods and relative periods in the same chart. You cannot combine fixed periods and relative periods with start/end dates in the same chart. Overlapping periods are filtered so that they only appear once.

- Fixed periods: In the **Select period type** box, select a period type. You can select any number of fixed periods from any period type. Fixed periods can for example be "January 2014".
- Relative periods: In the lower part of the **Periods** section, select as many relative periods as you like. The names are relative to the current date. This means that if the current month is March and you select **Last month**, the month of February is included in the chart. Relative periods has the advantage that it keeps the data in the report up to date as time goes.
- Start/end dates: In the list under the **Periods** tab, select **Start/end dates**. This period type lets you specify flexible dates for the time span in the report.

3. Select organisation units.

1. Click **Organisation units**.
2. Click the gearbox icon.
3. Select a **Selection mode** and an organisation unit.

There are three different selection modes:

***Selection modes***

| Selection mode                   | Description  |
|----------------------------------|--|
| <b>Select organisation units</b> | <p>Lets you select the organisation units you want to appear in the chart from the organization tree.</p> <p>Select <b>User org unit</b> to disable the organisation unit tree and only select the organisation unit that is related to your profile.</p> <p>Select <b>User sub-units</b> to disable the organisation unit tree and only select the sub-units of the organisation unit that is related to your profile.</p> <p>Select <b>User sub-x2-units</b> to disable the organisation unit tree and only select organisation units two levels down from the organisation unit that is related to your profile.</p> <p>This functionality is useful for administrators to create a meaningful "system" favorite. With this option checked all users find their respective organisation unit when they open the favorite.</p> |
| <b>Select levels</b>             | <p>Lets you select all organisation units at one or more levels, for example national or district level.</p> <p>You can also select the parent organisation unit in the tree, which makes it easy to select for example, all facilities inside one or more districts.</p>  |
| <b>Select groups</b>             | <p>Lets you select all organisation units inside one or several groups and parent organisation units at the same time, for example hospitals or chiefdoms.</p>   |

4. Click **Update**.

### Select series, category and filter

You can define which data dimension you want to appear as series, category and filter. Each data element appears as individual dimensions and can be placed on any of the axes. Series and category panels can only have one dimension at the time.

#### Note

Data elements of continuous value types (real numbers/decimal numbers) can only be used as filters, and will automatically be positioned as filters in the layout dialog. The reason for this is that continuous number cannot be grouped into sensible ranges and used on columns and rows.

1. Click **Layout**.

2. Drag and drop the dimensions to the appropriate space. Only one dimension can be in each section.

3. Click **Update**.

## Change the display of your chart

You can customize the display of an event report.

1. Click **Options**.
2. Set the options as required.

### Chart options

| Option      | Description                          |   |
|-------------|--------------------------------------|---|
| <b>Data</b> | <b>Show values</b>                   | Displays values as numbers on top of each series.   |
|             | <b>Use 100% stacked values</b>       | Displays 100 % stacked values in column charts.   |
|             | <b>Use cumulative values</b>         | Displays cumulative values in line charts.  |
|             | <b>Hide n/a data</b>                 | Hides data tagged as N/A from the chart.  |
|             | <b>Include only completed events</b> | Includes only completed events in the aggregation process. This is useful when you want for example to exclude partial events in indicator calculations.  |
|             | <b>Hide empty categories</b>         | <p>Hides the category items with no data from the chart.</p> <p><b>None:</b> doesn't hide any of the empty categories</p> <p><b>Before first:</b> hides missing values only before the first value</p> <p><b>After last:</b> hides missing values only after the last value</p> <p><b>Before first and after last:</b> hides missing values only before the first value and after the last value</p> <p><b>All:</b> hides all missing values</p> <p>This is useful for example when you create column and bar charts.</p> |



| Option      | Description                    |   |
|-------------|--------------------------------|---|
|             | <b>Trend line</b>              | Displays the trend line which visualizes how your data evolves over time. For example if performance is improving or deteriorating. Useful when periods are selected as category.           |
|             | <b>Target line value/title</b> | Displays a horizontal line and title (optional) at the given domain value. Useful for example when you want to compare your performance to the current target.                              |
|             | <b>Base line value/title</b>   | Displays a horizontal line and title (optional) at the given domain value. Useful for example when you want to visualize how your performance has evolved since the beginning of a process. |
|             | <b>Sort order</b>              | Allows you to sort the values on your chart from either low to high or high to low.   |
|             | <b>Output type</b>             | Defines the output type. The output types are <b>Event</b> , <b>Enrollment</b> and <b>Tracked entity instance</b> .   |
|             | <b>Program status</b>          | Filters data based on the program status: <b>All</b> , <b>Active</b> , <b>Completed</b> or <b>Cancelled</b> .   |
|             | <b>Event status</b>            | Filters data based on the event status: <b>All</b> , <b>Active</b> , <b>Completed</b> , <b>Scheduled</b> , <b>Overdue</b> or <b>Skipped</b> .   |
| <b>Axes</b> | <b>Range axis min/max</b>      | Defines the maximum and minimum value which will be visible on the range axis.  |
|             | <b>Range axis tick steps</b>   | Defines the number of ticks which will be visible on the range axis.  |
|             | <b>Range axis decimals</b>     | Defines the number of decimals which will be used for range axis values.  |

| Option         | Description                |   |
|----------------|----------------------------|---|
|                | <b>Range axis title</b>    | Type a title here to display a label next to the range axis (also referred to as the Y axis). Useful when you want to give context information to the chart, for example about the unit of measure. |
|                | <b>Domain axis title</b>   | Type a title here to display a label below the domain axis (also referred to as the X axis). Useful when you want to give context information to the chart, for example about the period type.      |
| <b>General</b> | <b>Hide chart legend</b>   | Hides the legend and leaves more room for the chart itself.   |
|                | <b>Hide chart title</b>    | Hides the title (default or custom) of your chart.  |
|                | <b>Chart title</b>         | Type a title here to display a custom title above the chart. If you don't enter a title, the default title is displayed.  |
|                | <b>Hide chart subtitle</b> | Hides the subtitle of your chart.   |
|                | <b>Chart subtitle</b>      | Type a subtitle here to display a custom subtitle above the chart but below the title. If you don't enter a subtitle, no subtitle is displayed in the chart.  |

3. Click **Update**.

### Download a chart as an image or a PDF

After you have created a chart you can download it to your local computer as an image or PDF file.

1. Click **Download**.
2. Under **Graphics**, click **PNG (.png)** or **PDF (.pdf)**.

The file is automatically downloaded to your computer. Now you can for example embed the image file into a text document as part of a report.

### Download chart data source

You can download the data source behind a chart in HTML, JSON, XML, Microsoft Excel or CSV formats. The data document uses identifiers of the dimension items and opens in a new browser window to display the URL of the request to the Web API in the address bar. This is useful for

developers of apps and other client modules based on the DHIS2 Web API or for those who require a plain data source, for instance for import into statistical packages.

To download plain data source formats:

1. Click **Download**.
2. Under **Plain data source**, click the format you want to download.

#### *Available formats*

| Format          | Description   |
|-----------------|---|
| HTML            | Creates HTML table based on selected meta data                              |
| JSON            | Downloads data values in JSON format based on selected meta data            |
| XML             | Downloads data values in XML format based on selected meta data             |
| Microsoft Excel | Downloads data values in Microsoft Excel format based on selected meta data |
| CSV             | Downloads data values in CSV format based on selected meta data             |

## Manage favorites

Saving your charts or pivot tables as favorites makes it easy to find them later. You can also choose to share them with other users as an interpretation or display them on the dashboard.

You view the details and interpretations of your favorites in the **Pivot Table**, **Data Visualizer**, **Event Visualizer**, **Event Reports** apps. Use the **Favorites** menu to manage your favorites.

### Open a favorite

1. Click **Favorites > Open**.
2. Enter the name of a favorite in the search field, or click **Prev** and **Next** to display favorites.
3. Click the name of the favorite you want to open.

### Save a favorite

1. Click **Favorites > Save as**.
2. Enter a **Name** and a **Description** for your favorite. The description field supports a rich text format, see the interpretations section for more details.
3. Click **Save**.

### Rename a favorite

1. Click **Favorites > Rename**.
2. Enter the new name for your favorite.

---

Click **Update**.

3.

### Write an interpretation for a favorite

An interpretation is a link to a resource with a description of the data at a given period. This information is visible in the **Dashboard** app. To create an interpretation, you first need to create a favorite. If you've shared your favorite with other people, the interpretation you write is visible to those people.

1. Click **Favorites > Write interpretation**.

2. In the text field, type a comment, question or interpretation. You can also mention other users with '@username'. Start by typing '@' plus the first letters of the username or real name and a mentioning bar will display the available users. Mentioned users will receive an internal DHIS2 message with the interpretation or comment. You can see the interpretation in the **Dashboard** app.

It is possible to format the text with **bold**, *italic* by using the Markdown style markers \* and \_ for **bold** and *italic* respectively. Keyboard shortcuts are also available: Ctrl/Cmd + B and Ctrl/Cmd + I. A limited set of smilies is supported and can be used by typing one of the following character combinations: :) :-) :( :-(:+1 :-1. URLs are automatically detected and converted into a clickable link.

3. Search for a user group that you want to share your favorite with, then click the + icon.

4. Change sharing settings for the user groups you want to modify.

- **Can edit and view**: Everyone can view and edit the object.
- **Can view only**: Everyone can view the object.
- **None**: The public won't have access to the object. This setting is only applicable to **Public access**.

5. Click **Share**.

### Subscribe to a favorite

When you are subscribed to a favorite, you receive internal messages whenever another user likes/creates/updates an interpretation or creates/update an interpretation comment of this favorite.

1. Open a favorite.

2. Click >>> in the top right of the workspace.

3. Click on the upper-right bell icon to subscribe to this favorite.

### Create a link to a favorite

1. Click **Favorites > Get link**.

2. Select one of the following:

- **Open in this app**: You get a URL for the favorite which you can share with other users by email or chat.
- **Open in web api**: You get a URL of the API resource. By default this is an HTML resource, but you can change the file extension to ".json" or ".csv".

**Delete a favorite**

1. Click **Favorites > Delete**.
2. Click **OK**.

**View interpretations based on relative periods**

To view interpretations for relative periods, such as a year ago:

1. Open a favorite with interpretations.
2. Click **>>>** in the top right of the workspace.
3. Click an interpretation. Your chart displays the data and the date based on when the interpretation was created. To view other interpretations, click them.

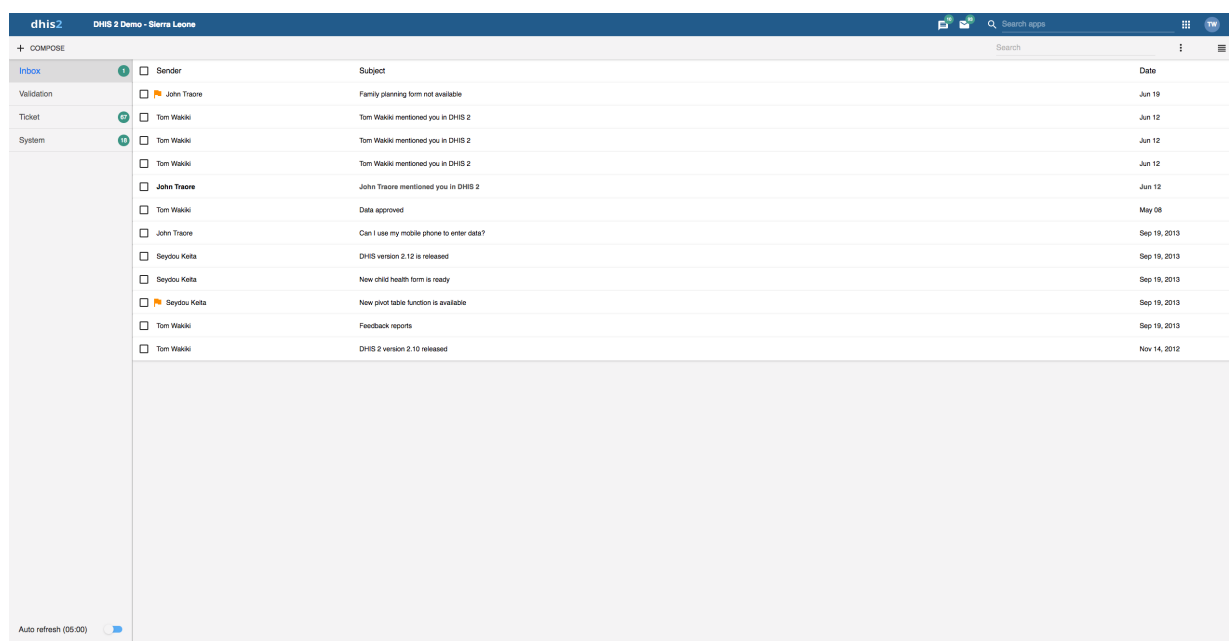
**Visualize a chart as a pivot table**

When you have made a chart you can open it as a pivot table:

Click **Chart > Open this chart as table**.

# Messaging

## About messages and feedback messages



Within DHIS2 you can send messages and feedback messages to users, user groups and organisation units. When you send a feedback message, it is routed to a particular user group called the feedback recipient group. If you are a member of this user group, you have access to feedback handling tools. You can, for example, set the status of an incoming feedback to "Pending" while you are waiting for information.

In addition to the user-to-user and feedback messages, depending on your configuration the system will also send you system-generated messages. These messages could be triggered by different events, including system or background job failures and validation analysis results. Feedback handling tools are also available for validation results and the priority will be set to the importance of the validation rule violated.

To visit the app click **message icon in header bar** or find the **Messaging** app in the app search box.

### Note

Messages and feedback messages are not sent to users' e-mail addresses, the messages only appear within DHIS2.

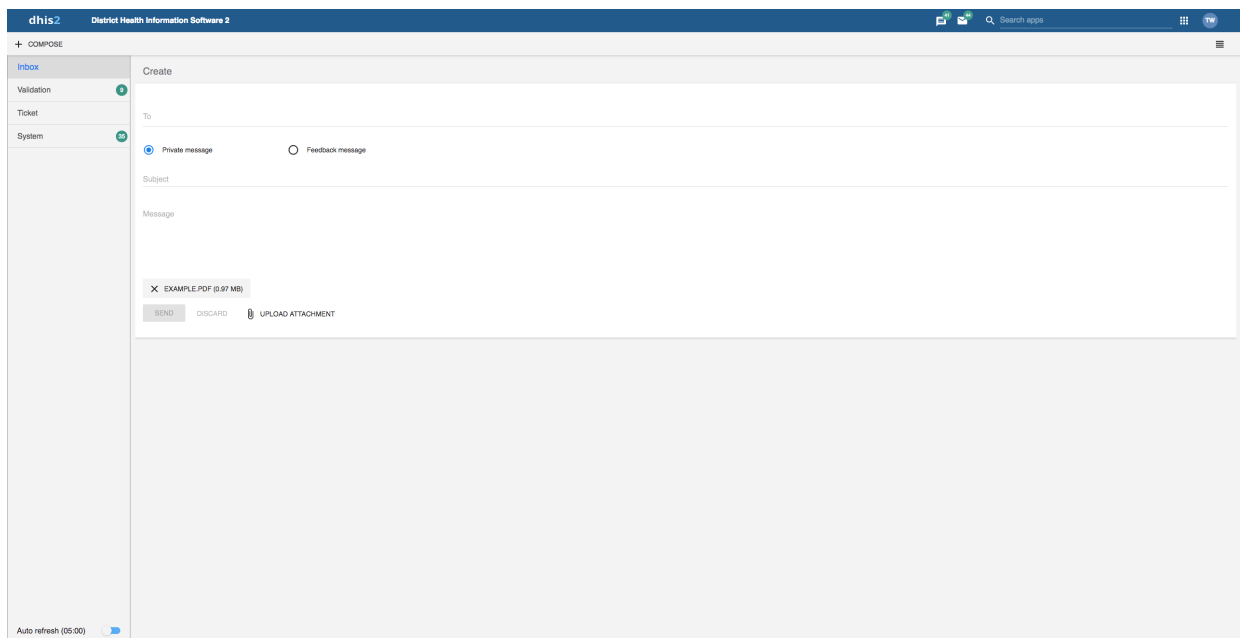
With 2.30 we introduced a new messaging app which offers a richer messaging experience. Specifically:

- Switch between list view and compact view by clicking the icon in the top right corner.
  - The list view is simplistic and gives a good overview of all messages and is especially suited for feedback and validation messages.
  - The compact view is a modern way of view messages where the user has more information in one view, hence viewing and replying several messages is easier.

The first screenshot in this section displays list view, while the screenshot in section **Read a message** displays the compact view.

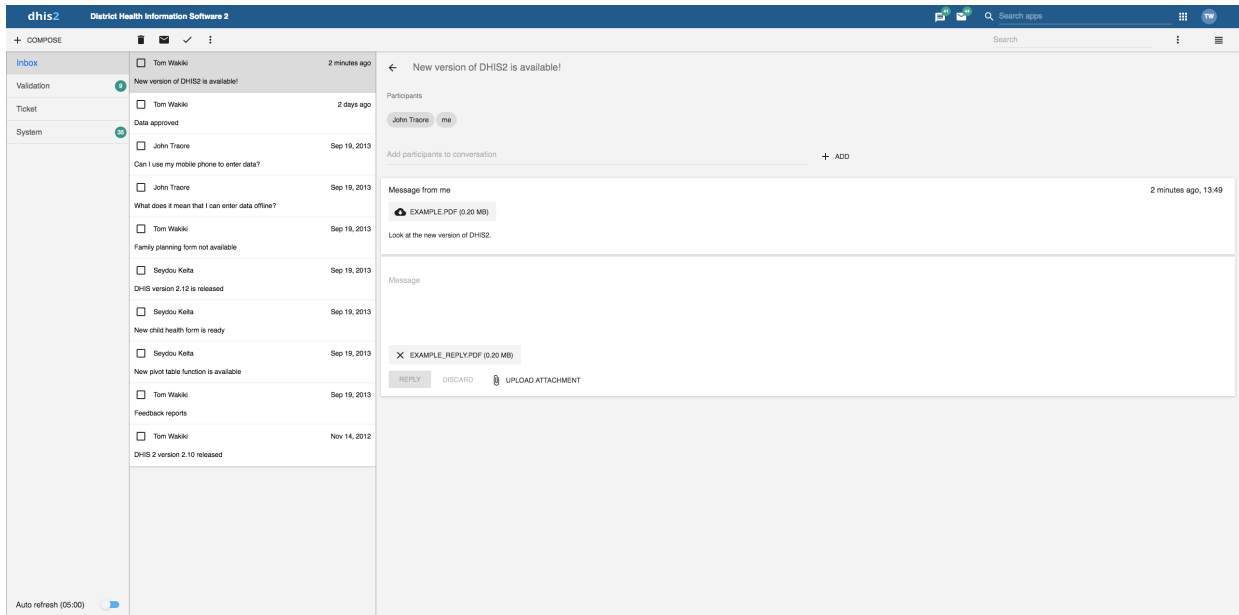
- A new search field is added which enables the user to search for messages. The search filters messages on different message attributes; subject, text and senders. This implies that you are able to narrow down the message conversation list by entering a search.
- A auto refresh feature is added so that the app fetches new messages at a set interval, every 5 minutes. This feature is disabled by default.
- For every message conversation you are able to add participants to the conversation. This is very useful if you want input on that particular conversation or if someone should also see the information. It is not possible to delete participants from a conversation.

## Create a message



1. Click **Compose**.
2. Define who you want to receive the message. You can send a message to organisation units, users and user groups.
  - In the **To** field you can search for organisation units, users and user groups and select the wished recipients.
3. Type a subject and a message.
4. Click **Send**.

## Read a message



1. Select the appropriate message type to the left.
2. Click a message.

If the message is part of a conversation, you will see all messages in this conversation.

### Create a feedback message

1. Follow the steps as for creating a message, only selecting **Feedback message** instead of entering recipients.
2. The message will be created as a feedback message and will appear in all of the specified users' **Ticket** folder.

### Attachments

With 2.31 we introduced attachments to messages. When creating or replying to a message conversation you have the possibility to add attachments. Currently there are no limitations to type or size of the file.

### Manage validation and feedback messages

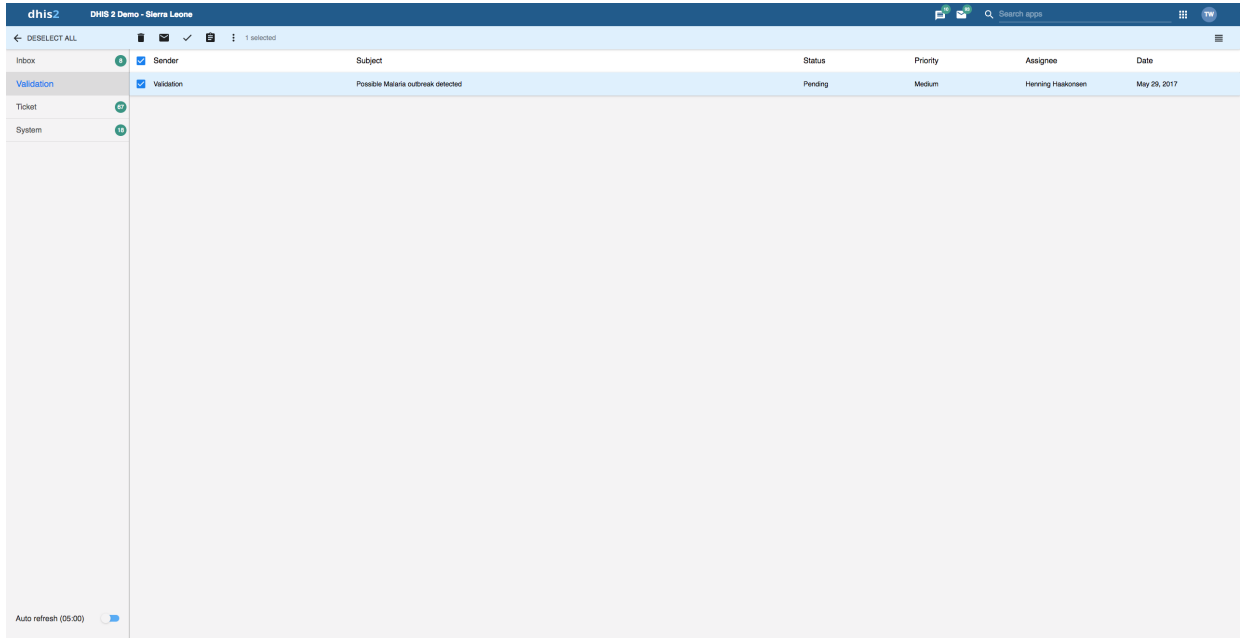
#### Note

You will only see feedback messages and have access to the extended handling tools if you are a member of the user group that is set up to handle feedback messages.

With the new app you manage extended tools for tickets and validation messages through the icon menu which appears when viewing a message or checking of messages in the conversation list.

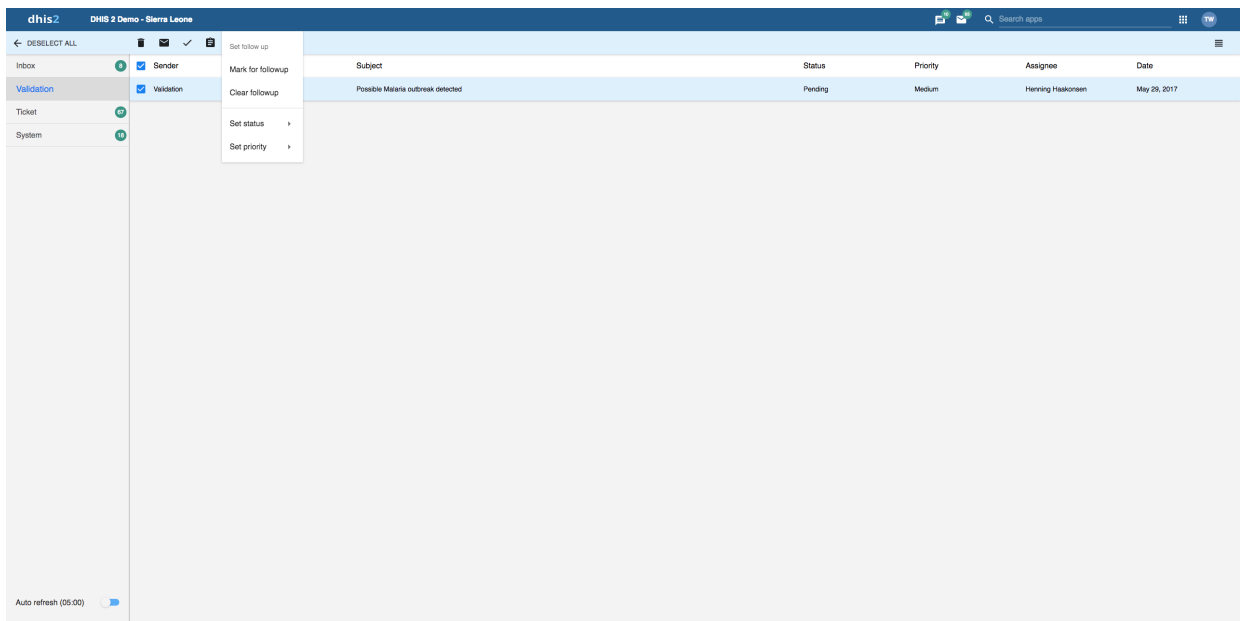
### All messages selected





*All Messages Selected*

**All messages selected and extended choice picker selected**



*All messages selected and extended choice picker selected*

You will receive feedback messages to your **Ticket** folder and validation messages to your **Validation** folder. For feedback and validation messages you have the following options in addition to the messages options:

***Feedback handling tools***

| Function                     | Description  |
|------------------------------|--|
| <p><b>Priority</b></p>       | <p>You can mark a feedback/validation message with different priorities: <b>None</b>, <b>Low</b>, <b>Medium</b> or <b>High</b>.</p> <p>Setting the priority makes it easier to keep track of which feedback message you need resolved first, and which feedback messages that can wait.</p>  |
| <p><b>Status</b></p>         | <p>All feedback/validation messages get the status <b>Open</b> when created.</p> <p>To keep track of existing feedback messages, you can change the status to <b>Pending</b>, <b>Invalid</b> or <b>Solved</b>.</p> <p>You can filter feedback/validation messages based on their status with the two drop down menus in the internal header bar.</p> |
| <p><b>Assigned to</b></p>    | <p>You can assign a feedback message to any member of the user group that is set up to handle feedback messages.</p> <p>You can assign a validation message to any user in the system.</p> <p>- means that you haven't assigned a user to the feedback message.</p>  |
| <p><b>Internal reply</b></p> | <p>When you work in a feedback handling team you might want to discuss the feedback before sending an answer to the sender. You can keep this discussion in the same message conversation as the feedback itself.</p> <p>To send a reply that within the feedback handling user group, click <b>INTERNAL REPLY</b>.</p>                              |

**Configure feedback message function**

To configure the feedback message function, you must:

1. Create a user group (for example "Feedback message recipients") that contains all the users who should receive feedback messages.
2. Open the **System Settings** app and click **General** > **Feedback recipients** and select the user group you created in the previous step.

## Set user account preferences

In **User settings**, you can change the display language of DHIS2 and the language of the database. The database language is the translated content of the metadata, such as data elements and indicators. You can also choose a display style, and enable or disable SMS and email notifications. If you wish to, you can choose to display a short name, such as "Joe" in the analysis modules, rather than your full name.

In **User profile**, you can add personal information to your profile such as your email address, mobile phone number, date of birth, profile picture and more. When you send messages, the person receiving the message can see these profile details. You can also provide account names for various direct messaging services, which will be used by the system.

In **Account settings**, you can reset your password and setup 2-Factor authentication. Setting up 2-Factor authentication will require you to download the Google Authenticator app on you mobile device.

In the **View full profile** section, you find a summary of your profile details. This section includes a few fields that you cannot edit yourself, such as user roles and user organisation units.

In the **About DHIS2** section, you find a list of details about the DHIS2 instance.

## Configure metadata

### About the Maintenance app

In the **Maintenance** app you configure all the metadata objects you need to collect and analyze data:

- Categories
- Data elements
- Data sets and data entry forms
- Indicators
- Organisation units
- Program metadata: tracked entity, tracked entity attribute and relationship type
- Validation rules
- Attributes
- Constants
- Options sets
- Legends
- Predictors
- Push reports
- External map layers

**Note**

The functions you have access to depend on your user role's access permissions.

### Navigating metadata objects

Metadata objects are presented in a list with predefined columns that are relevant for each object. You may customize which columns are shown in the list for the current object. These customizations are per user, and therefore will not affect other users. Note that these changes do not edit any metadata, just how the list is presented.

## Managing visible columns

### Manage columns

---

**Selected columns**

☰ Name X

☰ Data dimension type X

☰ Public access X

☰ Last updated X

RESET TO DEFAULT

---

**Available columns**

|                    |                     |               |
|--------------------|---------------------|---------------|
| Aggregation type + | Api URL +           | Code +        |
| Created +          | Data dimension type | Description + |
| External access +  | Favorite +          | Id +          |
| Last updated       | Last updated by +   | Name          |
| Owner +            | Public access       | Short name +  |

CANCEL    SAVE

1. Click the



*settings-icon*

-icon to the top right of the list of objects you want to configure.

2. A dropdown-menu will appear, select **Manage columns**.
3. A dialog will appear, with the default columns selected.
4. Click any column-name in the list of **Available columns** to add them to the list of selected columns.
5. You may reorder the selected columns by drag-and-dropping the



*reorder-icon*

-icon.

6. You may also remove any column from the view by clicking the X-icon next to the name.
7. Click **Save** once you are satisfied with your changes.

You may easily reset to the default values by clicking the **Reset to default** button.

### Download metadata

You can download the metadata for the object you are currently viewing. The metadata download will respect any filters you have active for the list.

1. Click the



*settings-icon*

-icon to the top right of the list of objects you want to configure.

2. A dropdown-menu will appear, select **Download**.
3. A dialog will appear, where you can select the desired format and compression.
4. **With sharing** can be selected to include sharing-data for the metadata.

### Manage categories

#### About categories

Categories are typically a concept, for example "Gender", "Age" or "Disease Status". Data elements such as "Number of cases of confirmed malaria" are often broken into smaller component parts to determine, for example, the number of confirmed malaria cases of particular age groups.

Use categories to disaggregate data elements into individual components. You can also use categories to assign metadata attributes to all data recorded in a specific dataset, such as "Implementing partner" or "Funding agency."

Create three categories: "Under 1", "1-5" and "Over 5". Assign them as categories to the data element. This creates three separate fields for this data in the data entry forms:

- Number of confirmed malaria cases (Under 1)
- Number of confirmed malaria cases (1-5)
- Number of confirmed malaria cases (Over 5)

Without categories, you would have had to create each of the data elements listed above separately.

In the **Maintenance** app, you manage the following and category objects:

#### Category objects in the Maintenance app

| Object type     | Available functions  |
|-----------------|--|
| Category option | Create, edit, clone, share, delete, show details and translate |
| Category        | Create, edit, clone, share, delete, show details and translate |

| Object type                 | Available functions  |
|-----------------------------|--|
| Category combination        | Create, edit, clone, share, delete, show details and translate |
| Category option combination | Edit and show details  |
| Category option group       | Create, edit, clone, share, delete, show details and translate |
| Category option group set   | Create, edit, clone, share, delete, show details and translate |

### Workflow

1. Create all category options.
2. Create categories composed by the multiple category options you've created.
3. Create category combinations composed by either one or multiple categories.
4. Create data elements and assign them to a category combination.

### Create or edit a category option

When possible, recycle category options. For instance, there might be two categories which might share a particular category option (for example <1 year of age). When creating the categories, this category option could be reused. This is important if particular category options (or category option combinations) that need to be analyzed together.

1. Open the **Maintenance** app and click **Category > Category option**.
2. Click the add button.
3. Fill in the form:
  1. **Name**
  2. **Start date**
  3. **End date**
4. Select organisation units and assign them.

#### Tip

You can automatically select all organisation units that belong to an organisation unit level or organisation unit group, for example "Chiefdom" or "Urban. To do this:

Select an **Organisation unit level** or **Organisation unit group** and click **Select**.

5. Click **Save**.

---

### Create or edit a category

When you have created all category options for a particular category, you can create that category.

1. Open the **Maintenance** app and click **Category > Category**.
2. Click the add button.
3. Fill in the form:

1. **Name**

2. **Code**

3. **Data dimension type**

A category either be of type "Disaggregation" or "Attribute". For disaggregation of data elements, you select **Disaggregation**. The data dimension type "Attribute" allows the category to be used to assign a combination of categories to data recorded through a data set.

4. **Data dimension**

If you select **Data dimension**, the category will be available to the analytics as another dimension, in addition to the standard dimensions of "Period" and "Organisation unit".

4. Select category options and assign them.
5. Click **Save**.

### Create or edit a category combination

Category combinations lets you combine multiple categories into a related set.

You can disaggregate the data element "Number of new HIV infections" into the following categories:

- HIV Service: "Other", "PMTCT", "TB"
- Gender: "Male", "Female"

In this example, there are two levels of disaggregation that consist of two separate data element categories. Each data element category consist of several data element category options.

In DHIS2, different data elements are disaggregated according to a common set of categories. By combining these different categories into a category combination and assigning these combinations to data elements, you can apply the appropriate disaggregation levels quickly to a large number of data elements.

1. Open the **Maintenance** app and click **Category > Category combination**.
2. Click the add button.
3. Fill in the form:

1. **Name**

2. **Code**



**Data dimension type**

- 3.
4. **Skip category total in reports**

4. Select categories and assign them.
5. Click **Save**.

**Create or edit a category option group**

You can group and classify category options by using category option groups. The main purpose of the category option group set is to add more dimensionality to your captured data for analysis in for example the **Pivot table** or **Data Visualizer** apps.

Consider a system where data is collected by "projects", and projects are modelled as category options. The system must be able to analyse data based on which donor supports the project. In this case, create a category option group set called "Donor". Each donor can be created as a category option group, where each category option / project is put in the appropriate group. In the data analysis applications, the "Donor" group set will appear as a data dimension, while each donor appear as dimension items, ready to be included in reports.

To create a category option group:

1. Open the **Maintenance** app and click **Category > Category option group**.
2. Click the add button.
3. Fill in the form:
  1. **Name**
  2. **Short name**: Define a short name for the data element.
  3. **Code**
  4. **Data dimension type**
4. Select **Category options** and assign them.
5. Click **Save**.

**Create or edit a category option group set**

You can group category option groups in category option group sets. The main purpose of the category option group set is to add more dimensionality to your captured data for analysis in for example the **Pivot table** or **Data Visualizer** apps.

1. Open the **Maintenance** app and click **Category > Category option group set**.
  2. Click the add button.
  3. Fill in the form:
    1. **Name**
    2. **Description**
    3. **Data dimension**
    4. **Data dimension type**
  4. Select **Category option groups** and assign them.
-

Click **Save**.

5.

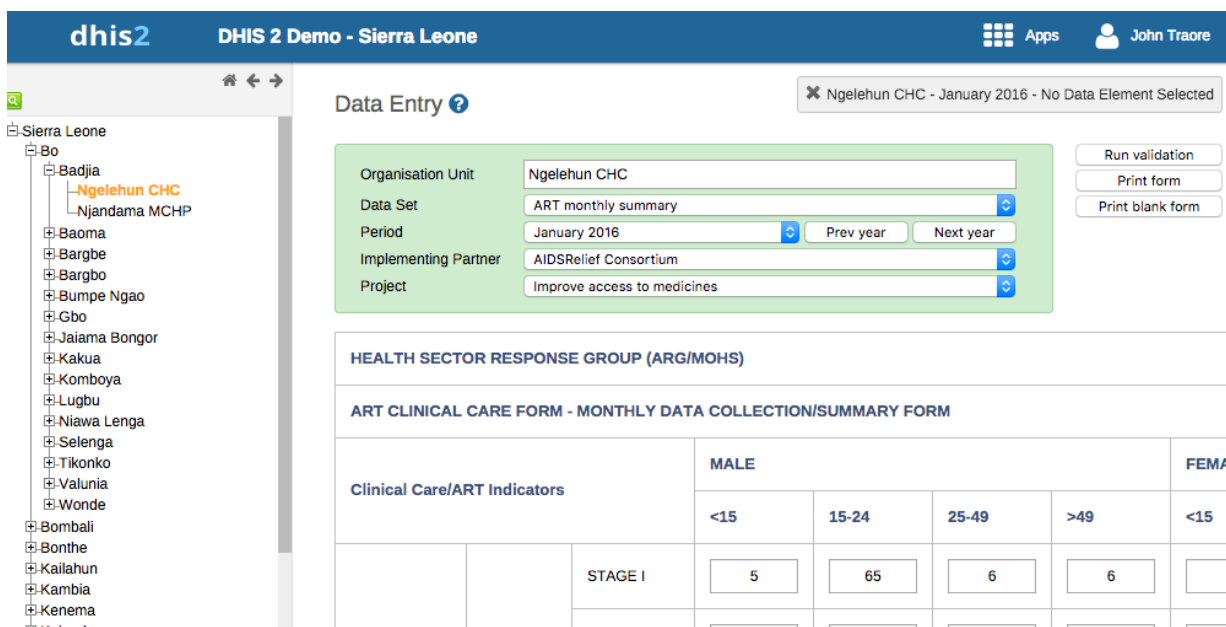
### Use category combinations for data sets

When categories and category combinations have the data dimension type "Attribute", they can apply a common set of attributes to a related set of data values contained in a data set. When category combinations are used as an attribute, they serve as another dimension (similar to "Period" and "Organisation unit") which you can use in your analysis.

Suppose that a NGO is providing ART services in a given facility. They would need to report each month on the "ART monthly summary", which would contain a number of data elements. The NGO and project could potentially change over time. In order to attribute data to a given NGO and project at any point in time, you need to record this information with each data value at the time of data entry.

1. Create two categories with the data dimension type "Attribute": "Implementing partner" and "Projects".
2. Create a category combination with the data dimension type "Attribute": "Implementing partners and projects".
3. Assign the categories you've created to the category combination.
4. Create a data set called "ART monthly summary" and select the "Implementing partners and projects" category combination.

When you enter data in the **Data entry** app, you can select an "Implementing partner" and a "Project". Each recorded data value, is assigned a specific combination of these categories as an attribute. These attributes (when specified as a dimension) can be used in the analysis applications similar to other dimensions, for example the period and organisation unit.



### Assign a code to a category option combination

You can assign a code to category option combinations. This makes data exchange between DHIS2 and external systems easier. The system creates the category option combinations automatically.

1. Open the **Maintenance** app and click **Category > Category option combination**.

- 
- In the list, find the object you want to modify.
  - 
  - Click the options menu and select **Edit**.
  - Enter a code.
  - Click **Save**.

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

- Open the **Maintenance** app and find the type of metadata object you want to clone.
- In the object list, click the options menu and select **Clone**.
- Modify the options you want.
- Click **Save**.

### Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

#### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

- Open the **Maintenance** app and find the type of metadata object you want to modify.
- In the object list, click the context menu and select **Sharing settings**.
- (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
- Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.
  - **No access** (only applicable to **Public access**): The public won't have access to the object.
- Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.
  - **No access**: The access group won't have access to data for the object.
- Click **Close**.

---

## Delete metadata objects

### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

## Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

## Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

---

## Manage data elements

### About data elements

Data elements are the base of DHIS2. Data elements define what is actually recorded in the system, for example number of immunisations or number of cases of malaria.

Data elements such as "Number of cases of confirmed malaria" are often broken into smaller component parts to determine, for example, the number of confirmed malaria cases of particular age groups.

In the **Maintenance** app, you manage the following data elements objects:

#### *Data element objects in the Maintenance app*

| Object type            | Available functions  |
|------------------------|--|
| Data element           | Create, edit, clone, share, delete, show details and translate |
| Data element group     | Create, edit, clone, share, delete, show details and translate |
| Data element group set | Create, edit, clone, share, delete, show details and translate |

### Workflow

1. Create all category options.
2. Create categories composed by the multiple category options you've created.
3. Create category combinations composed by either one or multiple categories.
4. Create data elements and assign them to a category combination.

## Create or edit a data element

The screenshot shows the DHIS2 interface for creating or editing a data element. The top navigation bar includes 'dhis2', 'DHIS 2 Demo - Sierra Leone', a search bar, and user initials 'JT'. Below the navigation bar are tabs for 'ALL', 'DATA ELEMENTS', 'DATA SET', 'INDICATORS', 'ORGANISATION UNITS', and 'OTHER'. The left sidebar contains a tree view of metadata types, with 'Data Element' highlighted. The main content area displays a form with the following fields and options:

- Name (\*)**: A text input field.
- Short name (\*)**: A text input field.
- Code**: A text input field.
- Description**: A text input field.
- Form name**: A text input field.
- Domain Type (\*)**: A dropdown menu.
- Value type (\*)**: A dropdown menu with 'Text' selected.
- Aggregation operator (\*)**: A dropdown menu with 'None' selected.
- Store zero data values**: A checkbox.

A lock icon and the message 'This object will be created with public edit and view rights' are displayed at the top of the form area.

1. Open the **Maintenance** app and click **Data elements > Data element**.

2. Click the add button.

3. In the **Name** field, define the precise name of the data element.

Each data element must have a unique name.

4. In the **Short name** field, define a short name for the data element.

Typically, the short name is an abbreviation of the full data element name. This attribute is often used in reports to display the name of the data element, where space is limited.

5. (Optional) In the **Code** field, assign a code.

In many countries data elements are assigned a code.

6. (Optional) In the **Color** field, assign a color which will be used for this data element in the data capture apps.

7. (Optional) In the **Icon** field, assign an icon which will be used for this data element in the data capture apps.

8. In the **Description** field, type a description of the data element. Be as precise as possible and include complete information about how the data element is measured and what its purpose is.

9. (Optional) In the **Field mask** field, you may type a template that's used to provide hints for correct formatting of the data element.

**NOTE**

So far this is only implemented in the DHIS2 Android Capture app; not in the Capture and Tracker Capture web apps.

The following are special characters that can be used in the mask. The special characters match exactly one character of the given type.

| Character | Match                      |
|-----------|----------------------------|
| \d        | digit                      |
| \x        | lower case letter          |
| \X        | capital letter             |
| \w        | any alphanumeric character |

For example, the pattern can be used to show hyphens as needed in the input field of the data element. E.g. "\d\d\d-\d\d\d-\d\d\d", would show a hyphen for every third digit.

10. In the **Form name** field, type an alternative name of the data element. This name can be used in either section or automatic data entry forms. The form name is applied automatically.
11. In the **Domain type** field, select whether the data element is an aggregate or tracker type of data element.
12. In the **Value type** field, select the type of data that the data element will record.

#### **Value types**

| Value type  | Description  |
|-------------|--|
| Age         | -  |
| Coordinate  | A point coordinate specified as longitude and latitude in decimal degrees. All coordinate should be specified in the format "-19.23 , 56.42" with a comma separating the longitude and latitude. |
| Date        | Dates rendered as calendar widget in data entry.   |
| Date & time | Is a combination of the <b>DATE</b> and <b>TIME</b> data elements.   |
| Email       | Email.   |
| File        | A file resource where you can store external files, for example documents and photos.  |

| Value type               | Description  |
|--------------------------|--|
| Image                    | A file resource where you can store photos.<br><br>Unlike the <b>FILE</b> data element, the <b>IMAGE</b> data element can display the uploaded image directly in forms.                  |
| Integer                  | Any whole number (positive and negative), including zero.  |
| Letter                   | A single letter.   |
| Long text                | Textual value. Renders as text area with no length constraint in forms.  |
| Negative integer         | Any whole number less than (but not including) zero.   |
| Number                   | Any real numeric value with a single decimal point. Thousands separators and scientific notation is not supported.   |
| Percentage               | Whole numbers inclusive between 0 and 100.   |
| Phone number             | Phone number.  |
| Positive integer         | Any whole number greater than (but not including) zero.  |
| Positive of zero integer | Any positive whole number, including zero.   |
| Organisation unit        | Organisation units rendered as a hierarchy tree widget.<br><br>If the user has assigned "search organisation units", these will be displayed instead of the assigned organisation units. |
| Unit interval            | Any real number greater than or equal to 0 and less than or equal to 1.  |
| Text                     | Textual value. The maximum number of allowed characters per value is 50,000.   |



| Value type        | Description   |
|-------------------|---|
| Time              | Time is stored in HH:mm format.<br>HH is a number between 0 and 23<br>mm is a number between 00 and 59  |
| Tracker associate | Tracked entity instance. Rendered as dialog with a list of tracked entity instances and a search field.   |
| Username          | DHIS2 user. Rendered as a dialog with a list of users and a search field. The user will need the "View User" authority to be able to utilise this data type |
| Yes/No            | Boolean values, renders as drop-down lists in data entry.   |
| Yes only          | True values, renders as check-boxes in data entry.  |

13. In the **Aggregation type** field, select the default aggregation operation that will be used on the data element.

Most data elements should have the **Sum** operator. This includes all data elements which should be added together. Other data elements, such as staffing levels, should be set to use the **Average** operator, when values along the time dimension should not be added together, but rather averaged.

#### **Aggregation operators**

| Aggregation operator                         | Description  |
|--|--|
| Average                                      | Average the values in both the period as and the organisation unit dimensions.           |
| Average (sum in organisation unit hierarchy) | Average of data values in the period dimension, sum in the organisation unit dimensions. |
| Count  | Count of data values.  |
| Min  | Minimum of data values.  |
| Max  | Maximum of data values.  |

| Aggregation operator | Description   |
|----------------------|---|
| None                 | No aggregation is performed in any dimension.                     |
| Sum                  | Sum of data values in the period and organisation unit dimension. |
| Standard deviation   | Standard deviation (population-based) of data values.             |
| Variance             | Variance (population-based) of data values.                       |

14. If you want to save zeros for a particular reason, select **Store zero data values**. By default, DHIS2 does not store zeros entered in the data entry module.

15. In the **URL** field, enter a link to an in-depth description of the data element.

For example a link to a metadata repository or registry that contains detailed technical information about the definition and measurement of the data element.

16. In the **Category combination** field, define which category combination the data element should have. This is also known as the "disaggregation".

17. Select an **Option set**.

Option sets are predefined lists of options which can be used in data entry.

18. Select an **Option set for comments**.

Option sets for comments are predefined lists of options which can be used to specify standardized comments for data values in data entry.

19. Assign one or multiple **Legends**.

Legends are used in for example the **Maps** app to display certain data elements with certain icons.

20. Set the **Aggregation levels** to allow the data element to be aggregated at one or more levels:

1. In the left pane, select the levels you want to assign to the data element.
2. Click the right arrow to assign the aggregation levels.

By default, the aggregation will start at the lowest assigned organisation unit. If you for example select "Chiefdom", it means that "Chiefdom", "District", and "National" aggregates use "Chiefdom" (the highest aggregation level available) as the data source, and PHU data will not be included. PHU data will still be available for the PHU level, but not included in aggregations to the levels above.

If you select both "District" and "Chiefdom", it means that the "District" and "National" level aggregates use District data as their source, "Chiefdom" will use Chiefdom, and "PHU" will use PHU.

- If applicable, enter custom attributes values, for example **Classification** or **Collection**
21. **method.**

**Note**

You create custom attributes in the **Maintenance** app: **Other > > Attributes.**

22. If applicable, select compulsory data element group sets, for example **Main data element group** or **Tracker-based data.**

**Note**

You'll only see data element group sets in this form if you've created them and set them to **Compulsory.**

You create data element group sets in the **Maintenance** app: **Data element > Date element group set.**

23. Click **Save.**

**Create or edit a data element group**

Data element groups lets you classify related data elements into a common theme. For example, two data elements "Measles immunisation" and "BCG Immunisation" might be grouped together into a data element group "Childhood immunisation".

To create a data element group:

1. Open the **Maintenance** app and click **Data elements > Data element group.**
2. Click the add button.
3. Fill in the form:
  1. **Name**
  2. **Short name**
  3. **Code**
4. Select data elements and assign them.
5. Click **Save.**

**Create or edit a data element group set**

Data element group sets allows you to categorise multiple data element groups into a set. The system uses data element group sets during analysis and reporting to combine similar data element groups into a common theme. A data element group can be part of multiple data element group sets.

1. Open the **Maintenance** app and click **Data elements > Data element group set.**
2. Click the add button.
3. Fill in the form:
  1. **Name**
  2. **Code**

---

**Description**

3.

4. **Compulsory**5. **Data dimension**

4. Select data element groups and assign them.

Available data element groups are displayed in the left panel. Data element groups that are currently members of the data element group set are displayed in the right hand panel.

5. Click **Save**.

**Clone metadata objects**

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

**Change sharing settings for metadata objects**

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

**Note**

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.
  - **No access** (only applicable to **Public access**): The public won't have access to the object.
5. Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.

---

**No access:** The access group won't have access to data for the object.

6. Click **Close**.

### Delete metadata objects

#### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

#### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

#### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

---

## Manage data sets and data entry forms

### About data sets and data entry forms

All data entry in DHIS2 is organised in data sets. A data set is a collection of data elements grouped together for data entry and data export between instances of DHIS2. To use a data set to collect data for a specific organisation unit, you must assign the organisation unit to the data set. Once you have assigned the data set to an organisation unit, that data set is available in the **Data entry** app. Only the organisation units that you have assigned the data set to can use the data set for data entry.

A category combination can link to both data elements and data sets. If you use a category combination for a data set, the category combinations is applicable for the whole form. This means that you can use categories to capture information which is common to an entire form, for example the name of the a project or grant. When a data set is linked to a category combination, those categories will be displayed as drop-down boxes in the **Data entry** app. Data captured in the form will then be linked to the selected category options from those drop-down boxes. For information about how to create categories and category combinations, see section "Manage data elements and categories". Make sure that you set the type of categories and category combinations to "Attribute".

An scenario for when categories are useful is when you need to capture a data entry form for a implementing partner organisation and a project. In that case:

1. Create category options and categories for all partner organisations and projects and link them in a new category combination.
2. Assign the category combination to the data set (form) for which you need to capture this information.

When opening this data set in data entry module, the partner organisation and project categories will automatically be rendered as drop-down boxes, allowing you to select a specific implementing partner organisation and project before continuing to do data entry.

You create and edit data sets in the **Maintenance** app. Here you define, for example, which data elements you want to include in the data set and the data collection frequency.

You enter data in the **Data entry** app. The **Data entry** app uses data entry forms to display the data sets. There are three types of data entry forms:

#### *Data entry form types*

| Data entry form type | Description   |
|----------------------|---|
| Default form         | <p>Once you have assigned a data set to an organisation unit, a default form is created automatically. The default form is then available in the <b>Data entry</b> app for the organisation units you have assigned it to.</p> <p>A default form consist of a list of the data elements belonging to the data set together with a column for inputting the values. If your data set contains data elements with a non-default category combination, for example age groups or gender, additional columns are automatically created in the default form based on the different categories.</p> <p>If you use more than one category combination you get multiple columns in the default form with different column headings for the options.</p> |
| Section form         | <p>If the default form doesn't meet your needs, you can modify it to create a section form. Section forms give you more flexibility when it comes to using tabular forms.</p> <p>In a section form you can, for example, create multiple tables with subheadings and disable (grey out) cells in a table.</p> <p>When you have added a section form to a data set, the section form is available in the <b>Data entry</b> app.</p>  |
| Custom form          | <p>If the form you want to design is too complicated for default or section forms, you can create a custom form. A custom form takes more time to create than a section form, but you have full control over the design.</p> <p>You can, for example, mimic an existing paper aggregation form with a custom form. This makes data entry easier, and should reduce the number incorrectly entered data elements.</p> <p>When you have added a custom form to a data set, the custom form is available in the <b>Data entry</b> app.</p>   |

### Note

If a data set has both a section form and a custom form, the system displays the custom form during data entry. Users who enter data can't select which form they want to use. In web-based data entry the order of display preference is:

1. Custom form (if it exists)
2. Section form (if it exists)
3. Default form

Mobile devices do not support custom forms. In mobile-based data entry the order of display preference is:

1. Section form (if it exists)
2. Default form

In the **Maintenance** app, you manage the following data set objects:

***Data set objects in the Maintenance app***

| Object type  | Available functions  |
|--------------|--|
| Data set     | <p>Create, assign to organisation units, edit, share, delete, show details and translate</p> <p>Edit compulsory data elements</p> <p>Add and remove multiple data sets to organisation units at once</p> |
| Section form | Create, edit and manage grey fields  |
| Section      | Change display order, delete and translate   |
| Custom form  | Create, edit and script  |

**Workflow**

You need to have data elements and categories to create data sets and data entry forms.

1. Create a data set.
2. Assign the data set to organisation units.

A default form is created automatically.

3. Create a section form or a custom form.

Now you can register data in the **Data entry** app.



## Create or edit a data set

The screenshot shows the DHIS2 'Data Set' creation form. The form is titled 'Data Set' and includes a lock icon with the text 'This object will be created with public edit and view rights'. The form fields are: Name (\*), Short name, Code, Description, Expiry days (set to 0), and Open future periods for data entry (set to 0). The interface shows a navigation menu with 'Data Set' selected, and a search bar at the top.

1. Open the **Maintenance** app and click **Data set > Data set**.
2. Click the add button.
3. In the **Name** field, type the precise name of the data set.
4. In the **Short name** field, define a short name for the data set.

Typically, the short name is an abbreviation of the full data set name. This attribute is often used to display the name of the data set where space is limited.

5. (Optional) In the **Code** field, assign a code.
6. In the **Description** field, type a description of the data set.
7. Enter the number of **Expiry days**.

The number of expiry days controls for how long it should be possible to enter data in the **Data entry** app for this data set. Expiry days refer to the number of days after the end date of the selected data entry period where the data entry form should be open for entry. After the number of days has expired, the data set will be locked for further entry.

You can set manual exceptions to this using the lock exception functionality in the **Data Administration** app.

**Note**

To allow data entry into all possible historical time periods, set the number of expiry days to zero.

- 
8. If you want it to be possible to enter data for future periods, type the number of periods in the **Open future periods for data entry** field.

The value is the number of future periods which are available for data entry.

For a monthly data set a value of 2 allows you to enter data for 2 months in advance. This is useful for, by example, population, target and planning data.

9. In the **Days after period to qualify for timely submission** field, type the number of days in which data can be entered to be considered reported on time.

To verify the number of timely reports submitted, go to **Reports > Reporting rate summary**.

10. Select a **Period type**.

The period type defines the frequency of reporting for the particular data set. The frequency can for example be daily, quarterly or yearly.

11. Select a **Category combination** to assign it to the data set.

#### Tip

Click **Add new** to create category combinations that you're missing. In the form that opens, create the category combinations you need. When you're done, click **Refresh values**.

12. In the **Complete notification recipients** list, select a user group that should receive a message when the data set is marked as complete in the **Data Entry** app.

The message is delivered through the DHIS2 messaging system.

13. If you want the user who entered the data to receive a message when the data set is marked as complete in the **Data entry** app, select **Send notification to completing user**.

The message is delivered through the DHIS2 messaging system.

14. If applicable, select, a **Data approval workflow**.

15. If you want it to be possible to use the data set within the Java mobile DHIS2 application, select **Enable for Java mobile client**.

16. If you want it to be mandatory to fill all values for a data element in data entry if one or more values have been filled, select **All fields for data elements required**.

This means that if you enter one data value for a data element in an entry field (that is for a category option combination), then you must enter data for all fields belonging to that data element (that is all category option combinations).

17. If you want it to be possible to mark a data entry form as complete only if the validation of that form is successful, select **Complete allowed only if validation passes**.

If you select this option, you can't mark the form as complete if validation fails.

18. If you want it to be mandatory that any missing values require a comment to justify their absence, select **Missing values requires comment on complete**.

19. (Optional) Assign one or multiple **Legends**.

20. If applicable, select **Skip offline**.
-

---

This option controls whether this data entry form should be downloaded and saved in the user's web browser. Normally you shouldn't select **Skip offline**. This is the default setting. If you have big forms which are rarely used you can consider selecting this option to speed up initial loading in the data entry module.

21. If applicable, select **Data element decoration**

If you select this option, descriptions of data elements render in call-outs in downloaded data sets in offline mode in the **Data entry** app.

22. If applicable, select **Render sections as tabs**.

This option is only applicable for section forms. The option allows you to render each section as a tab horizontally above the data set. This is useful for long data sets as it allows appropriate sections to be selected quickly without going through the entire form.

23. If applicable, select **Render vertically**.

This option is only applicable for section forms.

24. Select data elements and assign them.

You can override the category combination for each selected data set by clicking on the gear icon above the list of selected data elements. This allows you to utilize a specific category combination (disaggregation) within the current data set instead of the category combination associated directly with the data element itself.

25. Select indicators and assign them.

26. In the organisation unit tree, select the organisation units you want to assign the data set to.

**Tip**

- Click **Organisation unit level** to select all organisation units that belong to a certain organisation level.
- Click **Organisation unit group** to select all organisation units that belong to a certain organisation unit group.

27. Click **Save**.

You can now use the data set in the **Data Entry** app for the organisation units that you have assigned to and for periods according to the selected frequency (period type).

### Create or edit Data set Notification

1. Open the **Maintenance** app and click **Data set > Data set notification**.
2. Click the add button.

## What to send?

The screenshot shows the 'Data set notifications' configuration page in DHIS2. The page has a breadcrumb trail: 'Data set notifications'. There are three tabs: 'What to send?', 'When to send it?', and 'Who to send it?'. The 'What to send?' tab is active. Below the tabs, there is a warning icon and text: 'This object will be created with public edit and view rights'. The form has three main sections: 'Name (\*)', 'Code', and 'Data sets'. The 'Data sets' section has a search bar and a list of available data sets on the left, and a list of selected data sets on the right. The 'Message template' section has two text areas: 'Subject template' and 'Message template', and a list of template variables on the right. The form has 'SAVE' and 'CANCEL' buttons at the bottom.

1. In the **Name** field, type the precise name of the data set notification.
2. (Optional) In the **Code** field, assign a code.
3. Enter **Data sets**.

These data sets will be associated to this notification. In case any of them is completed for a certain period and organisation unit, notification will be generated by the system.

### Note

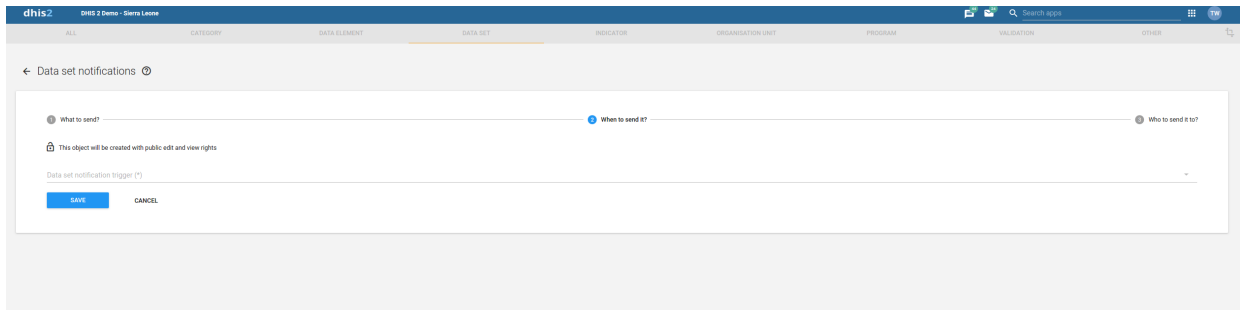
Nothing will happen if no data set is selected

4. In **Message template** section there are two parameters.
  - **Subject template** subject of the notification sent in notification. It can have values from the list of variables available on the right side.
  - **Message template** actual message sent in notification. It can have values from the list of variables available on the right side.

### Note

Subject is only relevant in case of Email and internal DHIS2 messages. It is ignored in case of SMS.

**When to send?**

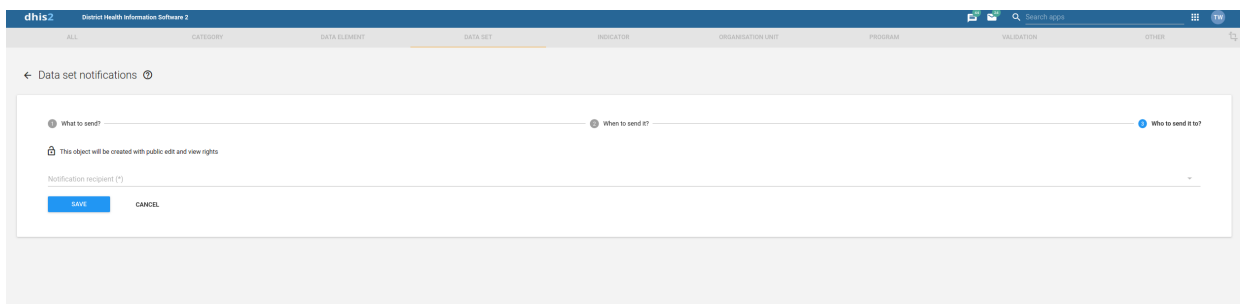


**1. Data set notification trigger** field determine when to send notification.

- **Data Set Completion** will trigger notification as soon as data set is completed.
- **Schedule Days** will schedule notification based on number days relative to scheduled date. Schedule date will be decided by Period associated with Data set.
  - **Send notification as** provides two different types of notifications
    - **Collective summary** send notification in summary mood
    - **Single notification** sends notification in single mood

**Note**  
**Send notification as** option is only available in case of scheduled notification. This option is set to default which is **Single notification** in case of completion notification

**Who to send?**



**1. Notification recipient** field determine recipients of the notification.

- **Organisation Unit contact** will send notification to contact assigned to organisation unit which the data has been collected from.
- **UserGroup** will send notification to all the member of the selected UserGroup.

**Note**  
 An internal DHIS2 message will be sent in case if recipient is UserGroup. Moreover user will also receive SMS/EMAIL if phone number and email

---

address exist for that user and SMS/EMAIL notifications are enabled in SystemSettings

### Override data elements' category combinations in a data set

You can override which category combination to use for a data element within the context of a data set. This means that a data element can use different category combinations within different data sets. This is useful when you want to reuse a data element since you don't have to replicate the data element to allow multiple category combinations.

If different regions within your organisation unit hierarchy use different disaggregations, or if the disaggregations change over time, you can represent this by creating different data sets with the appropriate category combinations.

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to modify.
3. Click the options menu and select **Edit**.
4. Go to the data elements section and click the spanner icon.
5. Select new category combinations and click **Close**.
6. Click **Save**.

### Edit compulsory data elements in a data set

You can add or remove data elements which will be marked as compulsory during data entry.

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to edit.
3. Click the options menu and select **Edit compulsory data elements**.
4. Assign the compulsory data elements.
5. Click **Save**.

### Download default data forms in PDF format

You can download a default data form in PDF format for offline data entry.

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the object you want to download.
3. Click the options menu and select **Get PDF for data entry**.

### Manage section forms

#### Create a section form

Section forms are separated automatically by data element category combinations, which produce a spreadsheet like data entry form for each section.

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to create a section form for.

- Click the options menu and select **Manage sections**.
- 3.
  4. Click the add button.
  5. (Optional) In the **Name** field, type the name of the section.
  6. (Optional) In the **Description** field, type a description of the section.
  7. (Optional) To display totals for rows in the section form during data entry, select **Show row totals**.
  8. (Optional) To display totals for columns in the section form during data entry, select **Show column totals**.
  9. Assign data elements to the section:
    1. (Optional) Select a **Category combination filter**.

**Note**

You can only use one category combination per section.

| Option      | Description  |
|-------------|--|
| None        | Displays all data elements that don't have a category combination. |
| <No filter> | Displays all data elements.  |

2. Select data elements and assign them.
10. (Optional) Sort the data elements within the section by using the up and down arrows to the left of the assigned data elements field.
11. Click **Save**.
12. Repeat add section steps for each section you want to have in your section form.

In the **Data Entry** app you can now use the section form. The section form appears automatically when sections are available for the selected data set. Data sets which have section forms will automatically display the section form.

Note how each data element category has been separated into a separate section, and a data entry table has been automatically generated by the system. Use of section forms in combination with data element categories can drastically reduce the amount of time which is required to create data entry forms for data sets.

|                   |                      |                      |
|-------------------|----------------------|----------------------|
| Obstructed Labour | <input type="text"/> | <input type="text"/> |
| Sepsis            | <input type="text"/> | <input type="text"/> |

| PAC Services                  |                      | Amani Family Medical Clinic - January 2011<br>TB cases detected - (Children <14yrs, Female) |
|-------------------------------|----------------------|---|
| Manual Vacuum Aspiration      | <input type="text"/> | <input type="text"/>  |
| Dilation and Curettage        | <input type="text"/> | <input type="text"/>  |
| Family planning uptake at PAC | <input type="text"/> | <input type="text"/>  |

| TB Control                     |                      |                      |                      |                      |
|--------------------------------|----------------------|----------------------|----------------------|----------------------|
|                                | Children <14yrs      |                      | Adult >14yrs         |                      |
|                                | Female               | Male                 | Female               | Male                 |
| TB cases detected              | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Smear positive TB              | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Smear negative TB              | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Extra-Pulmonary TB patients    | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Re-treatment TB patients       | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| TB patients tested for HIV     | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| TB patients HIV+ve             | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| TB HIV patient on CPT          | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| TB Defaulters                  | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| TB patient completed treatment | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| TB deaths                      | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

| VCT                     |                      |                      |                      |                      |
|-------------------------|----------------------|----------------------|----------------------|----------------------|
|                         | 15-24yrs             |                      | >25yrs               |                      |
|                         | Female               | Male                 | Female               | Male                 |
| VCT clients Counselling | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| VCT clients Tested      | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| VCT clients HIV+ve      | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

**Edit a section form**

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to edit the section form for.
3. Click the options menu and select **Manage sections**.
4. In the list, find the section you want to edit.
5. Click the options menu and select **Edit**.
6. Edit the section and click **Save**.
7. Repeat edit section steps for each section you want to edit.

**Manage grey fields in a section form**

You can disable data elements and category options for data entry. That means it won't be possible to enter data into these fields during data entry.



### Manage grey fields: Immunization

Category combination  
Location and age group ▼

| Data element             | Fixed                               |         |                                     |         | Outreach                            |         |                                     |         |
|--------------------------|-------------------------------------|---------|-------------------------------------|---------|-------------------------------------|---------|-------------------------------------|---------|
|                          | <1y                                 | >1y     | <1y                                 | >1y     | <1y                                 | >1y     | <1y                                 | >1y     |
| OPV1 doses given         | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| BCG doses given          | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| Fully Immunized child    | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| OPV3 doses given         | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| OPV0 doses given         | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| PCV2 doses given         | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| Penta3 doses given       | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| Yellow Fever doses given | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| PCV3 doses given         | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| PCV1 doses given         | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| LLITN given at Penta3    | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| Measles doses given      | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| OPV2 doses given         | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| Penta1 doses given       | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |
| Penta2 doses given       | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled | <input checked="" type="checkbox"/> | Enabled |

CANCEL
SAVE

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to edit the section form for.
3. Click the options menu and select **Manage sections**.
4. In the list, find the section you want to edit.
5. Click the options menu and select **Manage grey fields**.
6. Select which fields you want to disable.

#### Note

If you've sections that contain data elements assigned to multiple category combinations, switch between the category combinations to view all fields.

7. Click **Save**.

#### Change section display order in a section form

You can control in which order sections are displayed in a section form.

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to edit the section form for.

Click the options menu and select **Manage sections**.

- 3.
4. In the list, find the section you want to move.
5. Click the options menu and select **Move up** or **Move down**.

If the section you want to move is the first or last section in the list, you'll only see one of the move options.

#### **Delete a section in a section form**

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to edit the section form for.
3. Click the options menu and select **Manage sections**.
4. In the list, find the section you want to delete.
5. Click the options menu and select **Delete**.

#### **Translate a section in a section form**

1. Open the **Maintenance** app and click **Data set > Data set**.
2. In the list, find the data set you want to edit the section form for.
3. Click the options menu and select **Translate**.
4. Select a locale.
5. Enter the required information.
6. Click **Close**.

#### **Manage custom forms**

##### **Create a custom form**

You design custom forms in a built-in WYSIWYG HTML editor. If you select **Source**, you can paste HTML code directly in the editing area. For a complete guide on how to use the editor, refer to <http://docs.ckeditor.com/>.

dhIS2 DHIS 2 Demo - Sierra Leone Search apps JT

ALL DATA ELEMENTS DATA SET INDICATORS ORGANISATION UNITS OTHER

ART monthly summary data entry form

Filter elements

▼ Data elements: 284

ART clients with new adverse clinical event Female, <15y  
 ART clients with new adverse clinical event Female, >15-24y  
 ART clients with new adverse clinical event Female, >25-49y  
 ART clients with new adverse clinical event Male, <15y  
 ART clients with new adverse clinical event Male, 15-24y  
 ART clients with new adverse clinical event Male, 25-49y  
 ART defaulters Female, <15y  
 ART defaulters Female, 15-24y  
 ART defaulters Female, 25-49y  
 ART defaulters Male, <15y  
 ART defaulters Male, 15-24y  
 ART defaulters Male, 25-49y  
 ART defaulters Male, >49y  
 ART enrollment stage 1 Female, <15y  
 ART enrollment stage 1 Female, 15-24y  
 ART enrollment stage 1 Female, >25-49y  
 ART enrollment stage 1 Male, <15y  
 ART enrollment stage 1 Male, 15-24y  
 ART enrollment stage 1 Male, 25-49y  
 ART enrollment stage 1 Male, >49y  
 ART enrollment stage 2 Female, <15y  
 ART enrollment stage 2 Female, 15-24y  
 ART enrollment stage 2 Female, 25-49y  
 ART enrollment stage 2 Female, >49y  
 ART enrollment stage 2 Male, <15y  
 ART enrollment stage 2 Male, 15-24y  
 ART enrollment stage 2 Male, 25-49y  
 ART enrollment stage 2 Male, >49y  
 ART enrollment stage 3 Female, <15y  
 ART enrollment stage 3 Female, 15-24y  
 ART enrollment stage 3 Female, 25-49y  
 ART enrollment stage 3 Female, >49y  
 ART enrollment stage 3 Male, <15y  
 ART enrollment stage 3 Male, 15-24y  
 ART enrollment stage 3 Male, 25-49y  
 ART enrollment stage 3 Male, >49y  
 ART enrollment stage 4 Female, <15y  
 ART enrollment stage 4 Female, 15-24y  
 ART enrollment stage 4 Female, 25-49y  
 ART enrollment stage 4 Female, >49y  
 ART enrollment stage 4 Male, <15y  
 ART enrollment stage 4 Male, 15-24y  
 ART enrollment stage 4 Male, 25-49y  
 ART enrollment stage 4 Male, >49y  
 ART entry point: No diagnostic testing Female, <15y  
 ART entry point: No diagnostic testing Female, 15-24y

HEALTH SECTOR RESPONSE GROUP (ARG/MOHS)

ART CLINICAL CARE FORM - MONTHLY DATA COLLECTION/SUMMARY FORM

| Clinical Care/ART Indicators     | MALE         |              |              |              | FEMALE       |              |              |              |
|----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                                  | <15          | 15-24        | 25-49        | >49          | <15          | 15-24        | 25-49        | >49          |
| STAGING                          |              |              |              |              |              |              |              |              |
| STAGE I                          | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] |
| STAGE II                         | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] |
| STAGE III                        | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] |
| STAGE IV                         | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] | [ ART enro ] |
| ENROLLMENT                       |              |              |              |              |              |              |              |              |
| DIAGNOSTIC TESTING               | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| WALK IN                          | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| PMTCT                            | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| TB                               | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| ENTRY POINTS                     |              |              |              |              |              |              |              |              |
| OLD PATIENTS                     | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| OTHER                            | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| TRANSFER IN                      | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| TRANSFER OUT                     | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] | [ ART entr ] |
| # Started OI prophylaxis         | [ ART new ]  | [ ART No s ] | [ ART No s ] | [ ART No s ] | [ ART No s ] | [ ART No s ] | [ ART No s ] | [ ART No s ] |
| # of new clients started on ARVs | [ ART new ]  | [ ART new ]  | [ ART new ]  | [ ART new ]  | [ ART new ]  | [ ART new ]  | [ ART new ]  | [ ART new ]  |

Form display style  
Normal

SAVE CANCEL DELETE

To create a custom form:

1. Open the **Maintenance** app and click **Data set**.
2. In the list, find the data set you want to add a custom form to.
3. Click the options menu and select **Design data entry form**.
4. In the editing area, create the custom form.
  - Double-click on a object in the left-hand list to insert it in the form.
  - If you already have the HTML code for your form, click **Source** and paste the code.
5. Select a **Form display style**.
6. Click **Save**.

### Scripting in custom forms

In custom data entry form you can use JavaScript to create dynamic behaviour and customizations. As an example, you can hide form sections based on specific user input for data elements, or show specific information when a form loads.

### Events

The DHIS2 data entry module provides a range of events which you can register for and use to perform actions at certain times. The events are registered on the document element. The jQuery event object and the data set identifier are always the first two arguments provided to the callback functions. The table below provides an overview of the events and when they are triggered.

**Data entry events**

| Key                              | Description  | Arguments  |
|----------------------------------|--|--|
| dhis2.de.event.formLoaded        | Triggered after the data entry form is rendered, but before data values are set in entry fields. | Event   Data set ID                                      |
| dhis2.de.event.dataValuesLoaded  | Triggered after data values are set in entry fields.   | Event   Data set ID                                      |
| dhis2.de.event.formReady         | Triggered when the data entry form is completely rendered and loaded with all elements.          | Event   Data set ID                                      |
| dhis2.de.event.dataValueSaved    | Triggered when a data value is saved successfully.   | Event   Data set ID   Data value object                  |
| dhis2.de.event.completed         | Triggered when a data set is successfully marked as complete.                                    | Event   Data set ID   Complete registration object       |
| dhis2.de.event.uncompleted       | Triggered when a data set is successfully marked as incomplete.                                  | Event   Data set ID                                      |
| dhis2.de.event.validationSuccess | Triggered when validation is done and there were no violations.                                  | Event   Data set ID                                      |
| dhis2.de.event.validationError   | Triggered when validation is done and there were one or more violations.                         | Event   Data set ID                                      |
| dhis2.ou.event.orgUnitSelected   | Triggered when one or more organisation units are selected in the org unit web tree.             | Event   Org unit IDs   Org unit names   Sub org unit IDs |

To register for an event:

```
<script type="text/javascript">

dhis2.util.on( 'dhis2.de.event.formReady', function( event, ds ) {
  console.log( 'The form with id: ' + ds + ' is loaded!' );
} );

dhis2.util.on( 'dhis2.de.event.dataValueSaved', function( event, ds, dv ) {
  console.log( 'Data value: ' + dv.value + ' was saved with data element: ' + dv.de );
} );

dhis2.util.on( 'dhis2.de.event.completed', function( event, ds, cr ) {
  console.log( 'Form was completed for org unit: ' + cr.ou );
} );
```

```
</script>
```

### Note

Be careful to only use "namespaced" events like the ones in the example above and not general ones like "click" as the `dhis2.util.on` method will deregister the event first.

If your function only applies to certain data sets you can use the supplied data set identifier and shortcut your function for unwanted data sets like this:

```
dhis2.de.on( 'dhis2.de.event.validationSuccess', function( event, ds ) {
  if ( $.inArray( ds, ['utX0iGbEj14', 'Re7qzHETHSC'] ) == -1 ) {
    return false;
  }
  console.log( 'Form with id: ' + ds + ' validated successfully!' );
} );
```

The identifiers of the input fields in the data entry form is on the format described below. This format can be used to select the input fields in your script and perform actions on them:

```
<dataelementid>-<optioncomboid>-val
```

Since the data set identifier is provided for all events a feasible alternative is to utilize the "files" Web API resource and keep your callback functions in a single file, where you let the JavaScript code take action based on which data set is currently loaded.

### Functions

The DHIS2 data entry module contains JavaScript API functions which can be accessed from custom data entry forms.

**dhis2.de.api.getSelections:** This function returns a JavaScript object which contains properties for all dimensions with corresponding values for the identifiers of the selected options. It contains properties for "ds" (data set), "pe" (period), "ou" (organisation unit) and identifiers for all data set categories.

An example response looks like this:

```
{
+ ds: "lyLU2wR22tC",
+ pe: "201605",
+ ou: "g8upMTyEZGZ",
+ LFsZ8v5v7rq: "CW81uF03hvV",
+ yY2bQYqNt0o: "yMj2MnmNI8L"
+}
```

Example JavaScript usage of this function:

```
var sel = dhis2.de.api.getSelections();
+var orgUnit = sel["ou"];
+var partner = sel["LFsZ8v5v7rq"];
```

## Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.
  - **No access** (only applicable to **Public access**): The public won't have access to the object.
5. Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.
  - **No access**: The access group won't have access to data for the object.
6. Click **Close**.

## Delete metadata objects

### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

**Warning**

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

**Display details of metadata objects**

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

**Translate metadata objects**

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

**Tip**

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

**Tip**

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

**Manage indicators****About indicators**

An indicator is a formula that can consist of multiple data elements, constants, organisation unit group counts and mathematical operators. The indicator consist typically of a numerator and denominator. You use indicators to calculate coverage rates, incidence and other values that are a result of data element values that have been entered into the system. Calculated totals do not have a denominator.

**Note**

You never enter indicator values directly in DHIS2, you calculate them.

An indicator formula can consist of mathematical operators, for example plus and minus; functions (see below); and of the following elements:

#### Indicator elements

| Indicator element | Type      | Description  |
|-------------------|-----------|--|
| Constant          | Component | <p>Constants are numerical values which remain the same for all indicator calculations. This is useful in order to have a single place to change values that might change over time.</p> <p>Constants are applied AFTER data element values have been aggregated.</p>  |
| Data elements     | Component | Data elements are substituted by the data value captured for the data element.   |
| Days              | Operator  | <p>"Days" is special operator that always provides the number of days for a given indicator calculation.</p> <p>For example: if you want to calculate the "Percentage of time vaccine refrigerator was non-functional", you could define the numerator as:</p> <p>("Days-"Number of days vaccine refrigerator was available"/"Days"</p> <p>If the fridge was available 25 days in June, the indicator would be calculated as:</p> <p><math>(30-25/25)*100 = 17 \%</math></p> <p>If you want to calculate the total for Quarter 1, the number of days ("Days") would be:</p> <p><math>31+28+31 = 90</math></p> <p>The "Days" parameter will always be the number of days in the period of interest.</p> |



| Indicator element        | Type      | Description   |
|--------------------------|-----------|---|
| Organisation unit counts | Component | <p>You can use organisation unit groups in formulas. They will be replaced by the number of organisation units in the group. During aggregation, the organisation units in the group will be intersected with the part of the organisation unit hierarchy being requested.</p> <p>This lets you use the number of public facilities in a specific district in indicators. This is useful for example when you create facility infrastructure surveys and reports.</p> |
| Programs                 | Component | <p>Click <b>Programs</b> and select a program to view all data elements, attributes and indicators related to a specific program.</p> <p>The program components you include in your formula will have a program tag assigned to them.</p>   |

You can use the following functions in an indicator formula:

#### *Indicator functions*

| Indicator Function | Arguments                             | Description  |
|--------------------|---------------------------------------|--|
| if                 | (boolean-expr, true-expr, false-expr) | Evaluates the boolean expression and if true returns the true expression value, if false returns the false expression value. The arguments must follow the rules for any indicator expression. |
| isNull             | (element)                             | Returns true if the element value is missing (null), otherwise false.  |
| isNotNull          | (element)                             | Returns true if the element value is not missing (not null), otherwise false.  |

| Indicator Function | Arguments                       | Description   |
|--------------------|---------------------------------|---|
| firstNonNull       | (element [, element ...])       | Returns the value of the first element that is not missing (not null). Can be provided any number of arguments. Any argument may also be a numeric or string literal, which will be returned if all the previous objects have missing values. |
| greatest           | (expression [, expression ...]) | Returns the greatest (highest) value of the expressions given. Can be provided any number of arguments.   |
| least              | (expression [, expression ...]) | Returns the least (lowest) value of the expressions given. Can be provided any number of arguments.   |

In the **Maintenance** app, you manage the following indicator objects:

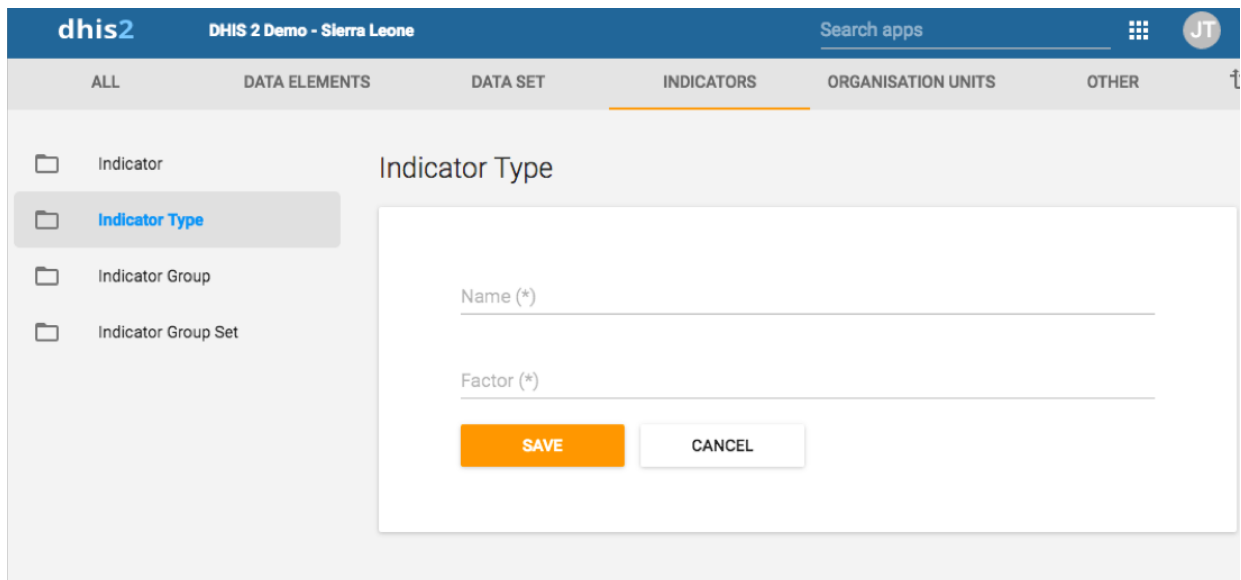
***Indicator objects in the Maintenance app***

| Object type         | Available functions  |
|---------------------|--|
| Indicator           | Create, edit, clone, share, delete, show details and translate |
| Indicator type      | Create, edit, clone, delete, show details and translate        |
| Indicator group     | Create, edit, clone, share, delete, show details and translate |
| Indicator group set | Create, edit, clone, share, delete, show details and translate |

**Workflow**

1. Create indicator types.
2. Create indicators.
3. Create indicator groups.
4. Create indicator group sets.

## Create or edit an indicator type



The screenshot shows the DHIS2 interface for creating or editing an indicator type. The top navigation bar includes the DHIS2 logo, the title 'DHIS 2 Demo - Sierra Leone', a search bar, and a user profile icon 'JT'. Below the navigation bar, there are tabs for 'ALL', 'DATA ELEMENTS', 'DATA SET', 'INDICATORS', 'ORGANISATION UNITS', and 'OTHER'. The 'INDICATORS' tab is selected. On the left, a sidebar menu shows 'Indicator', 'Indicator Type' (highlighted), 'Indicator Group', and 'Indicator Group Set'. The main content area is titled 'Indicator Type' and contains a form with two input fields: 'Name (\*)' and 'Factor (\*)'. Below the fields are two buttons: 'SAVE' (orange) and 'CANCEL' (white).

Indicator types define a factor that is applied during aggregation. Indicator values that are calculated during a data mart export or report table generation process will appear properly formatted, and will therefore not require an additional multiplier (for example 100 in the case of percent) for the values to appear correctly formatted.

### Note

As of version 2.4 of DHIS2, the "Calculated data element" object has been deprecated. Instead, you can create a calculated data element by creating an indicator type with a factor of "1" and by setting the "Number" option to "Yes". The effect of setting the "Number" option to "Yes" will be that the indicator will effectively not have a denominator. You will therefore only be able to define a numerator, which will serve as the formula of the calculated data element.

1. Open the **Maintenance** app and click **Indicator > Indicator type**.
2. Click the add button.
3. In the **Name** field, type the name of the indicator type, for example "Per cent", "Per thousand", "Per ten thousand".
4. Type a **Factor**.

The factor is the numeric factor that will be multiplied by the indicator formula during the calculation of the indicator.

5. Click **Save**.

## Create or edit an indicator

The screenshot shows the 'Create or edit an indicator' form in DHIS2. The form is titled 'Indicator' and is located in the 'Maintenance' app. The form fields are as follows:

- Name (\*):** ANC 2 Coverage
- Short name (\*):** ANC 2 Coverage
- Code:** IN\_52491
- Description:** Total 2nd ANC visits (Fixed and outreach) by expected number of pregnant women.
- Annualized:**
- Decimals in data output:** (dropdown menu)
- Indicator type (\*):** Per cent
- Legends:** (dropdown menu)
- Search available/selected items:** A search bar is present above a list of available items. The selected item is 'ANC Coverage'.
- Buttons:** 'ASSIGN ALL 20' and 'REMOVE ALL 1' buttons are visible.
- URL:** (empty field)
- Category option combination for aggregate data export:** (empty field)
- Attribute option combination for aggregate data export:** (empty field)

1. Open the **Maintenance** app and click **Indicator > Indicator**.
2. Click the add button.
3. In the **Name** field, type the full name of the indicator, for example "Incidence of confirmed malaria cases per 1000 population".
4. In the **Short name** field, type an abbreviated name of the indicator, for example "Inc conf. malaria per 1000 pop".

The short name must be less than or equal to 25 characters, including spaces.

5. (Optional) In the **Code** field, assign a code.

In many countries indicators are assigned a code.

---

(Optional) In the **Color** field, assign a color to represent the indicator.

6.

7. (Optional) In the **Icon** field, assign an icon to illustrate the meaning of the indicator.

8. In the **Description** field, type a brief, informative description of the indicator and how it is calculated.

9. If you want to apply an annualization factor during the calculation of the indicator, select **Annualized**.

Typically, an annualized indicator's numerator is multiplied by a factor of 12, and the denominator is for instance a yearly population figure. This allows for monthly coverage values to be calculated with yearly population figures.

10. Select the number of **Decimals in data output**.

11. Select an **Indicator type**.

This field determines a factor that will automatically be applied during the calculation of the indicator. Possible choices are determined by the indicator types. For example, a "Percent" indicator will automatically be multiplied by a factor of 100 when exported to the data mart, so that it will display as a percentage.

12. (Optional) Assign one or multiple **Legends**.

13. In the **URL** field, enter a link, for example a link to an indicator registry, where a full metadata description of the indicator can be made available.

14. (Optional) Enter a **Category option combination for aggregate data export..**

You use this setting to map aggregated data exported as raw data to another server. Typically you do this type of data exchange mapping when you want to create anonymous aggregated data from patient data recorded in programs (event data).

15. (Optional) Enter an **Attribute option combination for aggregate data export..**

You use this setting to map aggregated data exported as raw data to another server. Typically you do this type of data exchange mapping when you want to create anonymous aggregated data from patient data recorded in programs (event data).

16. If applicable, enter custom attributes values, for example **Classification** or **Collection method**.

**Note**

You create custom attributes in the **Maintenance** app: **Other > > Attributes**.

17. Click **Edit numerator**.

1. Type a clear description of the numerator.

2. Define the numerator by double-clicking components in the right-hand field. The components then appears as part of the formula in the left-hand field. Add mathematical operators by double-clicking the icons below the left-hand field.

You formula must be mathematically valid. This includes correct use of parentheses when necessary.

3. Click **Done** to save all changes to the numerator.

Click **Edit denominator**.

18.

1. Type a clear description of the denominator.
2. Define the denominator by double-clicking components in the right-hand field. The components then appears as part of the formula in the left-hand field. Add mathematical operators by double-clicking the icons below the left-hand field.

Your formula must be mathematically valid. This includes correct use of parentheses when necessary.

3. Click **Done** to save all changes to the denominator.

19. If applicable, select compulsory indicator group sets, for example **Human resources**.

#### Note

You'll only see indicator group sets in this form if you've created them and set them to **Compulsory**.

You create indicator group sets in the **Maintenance** app: **Indicator > Indicator group set**.

20. Click **Save**.

### Create or edit an indicator group

1. Open the **Maintenance** app and click **Indicator > Indicator group**.
2. Click the add button.

3. Type a name.
4. Select indicators and assign them.
5. Click **Save**.

### Create or edit an indicator group set

The screenshot shows the 'Indicator Group Set' configuration interface in DHIS2. The top navigation bar includes 'dhis2', 'DHIS 2 Demo - Sierra Leone', a search bar, and a user profile 'JT'. The main navigation tabs are 'ALL', 'DATA ELEMENTS', 'DATA SET', 'INDICATORS' (selected), 'ORGANISATION UNITS', and 'OTHER'. The left sidebar shows a tree view with 'Indicator Group Set' selected. The main form area has the following elements:

- A lock icon and text: "This object will be created with public edit and view rights".
- A text input field for 'Name (\*)'.
- A text input field for 'Description'.
- A checkbox labeled 'Compulsory'.
- A section titled 'Indicator Groups' with a search bar 'Search available/selected items'.
- A list of 15 indicator groups: ANC, Commodities, Deliveries, Diarrhoea, Facility infrastructure, HIV, Immunization, Malaria, Nutrition, PMTCT, and Reproductive Health.
- Navigation arrows (right and left) between the list and an empty selection box.
- Buttons: 'ASSIGN ALL 15 ->' (blue), 'REMOVE ALL' (grey), 'SAVE' (orange), and 'CANCEL' (white).

Indicator group sets create combined groups of similar indicators. For example, you might have a group of indicators called "Malaria" and "Leishmaniasis". Both of these groups could be combined into a group set called "Vector-borne diseases". Indicator groups sets are used during analysis of data to combine similar themes of indicators.

1. Open the **Maintenance** app and click **Indicators > Indicator group**.
2. Click the add button.
3. Fill in the form:
  1. **Name**
  2. **Description**
  3. **Compulsory**
4. Select indicator groups and assign them.

---

Available indicator groups are displayed in the left panel. Indicator groups that are currently members of the indicator group set are displayed in the right hand panel.

5. Click **Save**.

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

### Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

#### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.
  - **No access** (only applicable to **Public access**): The public won't have access to the object.
5. Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.
  - **No access**: The access group won't have access to data for the object.
6. Click **Close**.

### Delete metadata objects

#### Note



You can only delete a data element and other data element objects if no data is associated to the data element itself.

### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

### Manage organisation units

In this section you will learn how to:

- Create a new organisation unit and build up the organisation unit hierarchy
- Create organisation unit groups, group sets, and assign organisation units to them

---

• Modify the organisation unit hierarchy

### About organisation units

The organisation unit hierarchy defines the organisation structure of DHIS2, for example how health facilities, administrative areas and other geographical areas are arranged with respect to each other. It is the "where" dimension of DHIS2, similar to how periods represent the "when" dimension.

The organisation unit hierarchy is built up by parent-child relations. In DHIS2, each of these nodes is an organisation unit. A country might for example have eight provinces, and each province might have a number of districts as children. Normally, the lowest levels consist of facilities where data is collected. Data collecting facilities can also be located at higher levels, for example national or provincial hospitals. Therefore, you can create skewed organisation trees in DHIS2.

- You can only have one organisation hierarchy at the same time.
- You can have any number of levels in a hierarchy.

Typically national organisation hierarchies in public health have four to six levels.

- You can create additional classifications by using organisation groups and organisation group sets.

For example to create parallel administrative boundaries to the health care sector.

- It is recommended to use organisation unit groups to create a non-geographical hierarchy.
- An organisation unit can only be a member of a single organisation unit group within an organisation unit group set.
- An organisation unit group can be part of multiple organisation unit group sets.
- The organisation unit hierarchy is the main vehicle for data aggregation on the geographical dimension.
- When you close an organisation unit, you can't register or edit events to this organisation unit in the **Event Capture** and **Tracker Capture** apps.

#### Important

You can change the organisation unit hierarchy after you've created it, even organisation units that collect data. However, DHIS2 always uses the latest hierarchy for data aggregation. So if you change the hierarchy, you lose the temporal representation of the hierarchy across time.

District A is sub-divided into District B and District C. Facilities which belonged to District A are reassigned to District B and C. Any historical data, which you entered before the split occurred, is still registered as belonging to District B and C, not to the obsolete District A.

In the **Maintenance** app, you manage the following organisation unit objects:

#### *Organisation unit objects in the Maintenance app*

| Object type                 | Available functions  |
|-----------------------------|--|
| Organisation unit           | Create, edit, clone, delete, show details and translate        |
| Organisation unit group     | Create, edit, clone, share, delete, show details and translate |
| Organisation unit group set | Create, edit, clone, share, delete, show details and translate |
| Organisation unit level     | Edit and translate   |
| Hierarchy operations        | Move organisation units  |

### Workflow

The recommended workflow is:

1. Create organisation units.
2. Create organisation unit groups.
3. Create organisation unit group sets.

### Create or edit an organisation unit

The screenshot shows the DHIS2 interface for configuring an 'Organisation unit'. The breadcrumb trail is 'Organisation unit'. The form fields are as follows:

- Parent organisation unit: **Badjia**
- Name (\*): **Ngelehun CHC**
- Short name (\*): **Ngelehun CHC**
- Code: **OU\_559**
- Description: (empty)
- Opening date (\*): **1970-01-01**
- Closed date: (empty)

---

You add organisation units to the hierarchy one by one, either as a root unit or as a child of a selected organisation unit. You can only have one root unit.

1. Open the **Maintenance** app and click **Organisation unit > Organisation unit**.
2. Click the add button.
3. Select which organisation unit your new organisation unit will belong to:
  1. Click **Parent organisation unit**.
  2. In the organisation unit tree, locate the parent organisation unit and select it. Your selection is marked in yellow.

**Tip**

Click the arrows to expand the organisation unit tree.

3. Click **Select**.
4. Enter a **Name** of the organisation unit.

Each organisation unit must have an unique name.
5. Enter a **Short name** for the organisation unit.

Typically, the short name is an abbreviation of the full organisation unit name. This attribute is often used in reports to display the name of the organisation unit, where space is limited.
6. (Optional) Assign a **Code**.

In many countries organisation units are assigned a code.
7. (Optional) Type a **Description** of the organisation unit.
8. Select an **Opening date**.

The opening dates control which organisation units that existed at a point in time, for example when analysing historical data.
9. If applicable, select a **Closed date**.
10. In the **Comment** field, enter any additional information that you would like to add.
11. (Optional) In the **URL** field, enter a link to an external web site that has additional information about the organisation unit.
12. Enter contact information:
  - Contact person
  - Address
  - E-mail
  - Phone number
13. (Optional) Enter **Latitude** and **Longitude**.

You must have latitude and longitude values to create maps in the **Maps** app. Then your organisation units can be represented as points on a map, for example a health facility. Without this information, the **Maps** app will not work.

It might be more efficient to import coordinates later as a batch job for all organisation units using the **Import-Export** app. You also use the **Import-Export** app to create polygons. A polygon is an organisation unit that represent an administrative boundary.

14. If applicable, select **Data sets** and assign them.

**Note**

You control whether a user should be able to assign data sets to an organisation unit in the **System Settings** app:

Open the **System Settings** app, click **Access** and select **Allow assigning object to related objects during add or update**.

15. If applicable, select **Programs** and assign them.

**Note**

You control whether a user should be able to assign programs to an organisation unit in the **System Settings** app:

Open the **System Settings** app, click **Access** and select **Allow assigning object to related objects during add or update**.

16. If applicable, enter custom attributes values, for example **HR identifier**.

**Note**

You configure the custom attributes in the **Maintenance** app:

Open the **Maintenance** app and click **Other > Attribute**.

17. Click **Save**.

**Create or edit an organisation unit group**

Organisation unit groups allow you to classify related organisation units into a common theme. You can for example group all organisation units that are hospitals in an **Hospital** group.

1. Open the **Maintenance** app and click **Organisation unit > Organisation unit group**.

2. Click the add button.

3. Fill in the form:

1. **Name:** Provide a precise, unique and descriptive name for the organisation unit group.

2. **Short name:** The short name should be less than 25 characters. Typically, the short name is an abbreviation of the full organisation unit name. This attribute is used in certain places in DHIS2 where space is limited.

3. **Code**

- 
- Symbol:** Select a symbol which will be used to display the organisation unit (points only) when the layer is displayed in the **Maps** app.

4. In the organisation tree, click the organisation units you want to add to the organisation unit group.

You can locate an organisation unit in the tree by expanding the branches (click on the arrow symbol), or by searching for it by name.

The selected organisation units display in orange.

5. Click **Save**.

### Create or edit an organisation unit group set

Organisation unit group sets allows you to create additional classifications of organisation units. The group sets create new dimensions so that you can make a more detailed data analysis. You can easily filter, organise or aggregate data by groups within a group set.

- You can have any number of organisation unit group sets.
- The default organisation unit group sets are **Type** and **Ownership**.
- An organisation unit can only be a member of a single organisation unit group within an organisation unit group set.
- An organisation unit group can be part of multiple organisation unit group sets.
- You can define whether an organisation unit group set is compulsory or not, which will affect the completeness of the data. Compulsory means that all organisation units must be member of a group in that group set.

#### Note

In the **Data integrity** part of the **Data administration** app you can verify if you've accidentally assigned the same organisation unit to multiple groups within the same group set. In this app you also find information about organisation units that are not members of a compulsory organisation unit group set.

1. Open the **Maintenance** app and click **Organisation unit > Organisation unit group set**.
2. Click the add button.
3. Fill in:
  1. **Name:** Provide a precise name for the organisation unit group set.
  2. **Code**
  3. **Description:** Describe what the organisation unit group set measures or captures.
4. If you want all organisation units to be members of a group within the group set, select **Compulsory**.
5. (Optional) Select **Data dimension**.
6. (Optional) Select **Include subhierarchy in analytics**.

If you select this, a sub-organisation unit will inherit the organisation unit group property from its closest "parent" organisation unit. Any property on the sub-organisation unit will override the inherit value.

If an organisation unit have no associated organisation unit group, the organisation unit can inherit its closest parent's organisation unit group. If none of the parent organisation unit groups have an organisation unit group for a given org unit group set, the result will still be "blank", but if at least one parent has an organisation unit group, sub-organisation unit will inherit it.

include subhierarchy in analytics" is enabled, which means the org units inherit their closest parents org unit group IF the org unit is white (no org unit group associated with it).

#### 7. Select organisation unit groups and assign them.

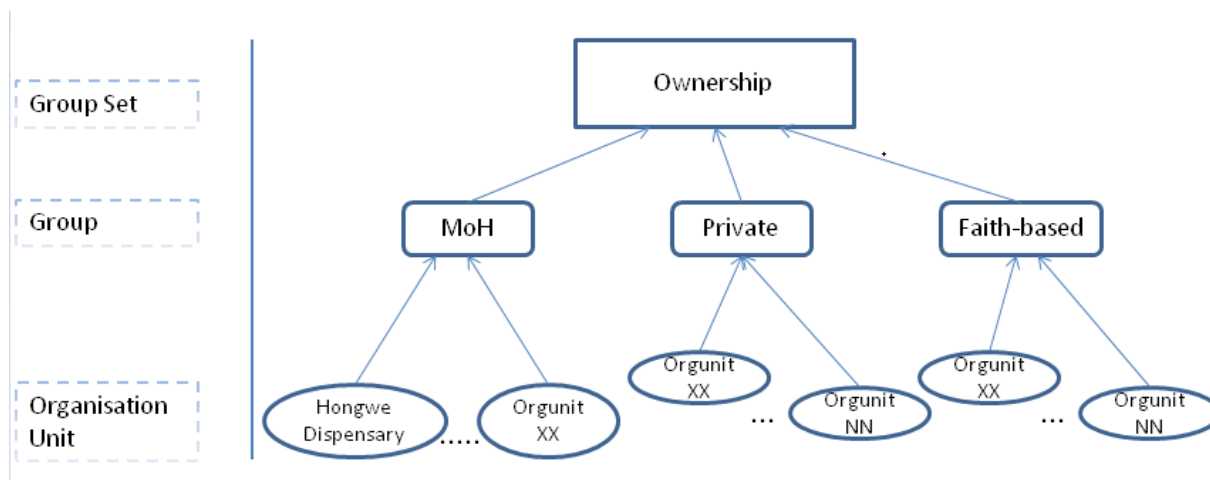
In the left-hand list, you find the available organisation unit groups. Use the arrows to move selected groups between the two lists.

If there are no organisation unit groups in the left-hand list, click **Add new**. In the form that opens, create the organisation units group you need. When you're done, click **Refresh values**.

#### Note

An organisation unit can only be a member of a single organisation unit group within an organisation unit group set.

#### 8. Click **Save**.



You want to analyse data based on the ownership of the facilities. All facilities have an owner so you need to make sure that all organisation units get this classification. To do that you can use the **Compulsory** option:

1. Create a group for each ownership type, for example "MoH", "Private" and "Faith-based".
2. Assign all facilities in the database to one of these groups.
3. Create an organisation unit group set called "Ownership" and select **Compulsory**.
4. Assign the organisation unit groups "MoH", "Private" and "Faith-based" to the "Ownership" organisation group set.

DHIS 2 Pivot Tables \* ANC: ANC by area last 12 months

Update Favorites Layout Options Download Embed

| Sierra Leone  |               |                |                      |                |                         |                |         |
|---------------|---------------|----------------|----------------------|----------------|-------------------------|----------------|---------|
| Period        | Area / Data   | ANC 1 Coverage | ANC 1-3 Dropout Rate | ANC 2 Coverage | ANC visit clinical prof | ANC 3 Coverage | Total   |
| January 2016  | Eastern Area  | 103.1          | 35.5                 | 92.5           | 47.5                    | 66.5           | 345.1   |
|               | Northern Area | 76.9           | 50.4                 | 60.8           | 20.7                    | 38.1           | 246.9   |
|               | Southern Area | 123.8          | 37.4                 | 105.5          | 207                     | 77.6           | 551.3   |
|               | Western Area  | 97.1           | 48.2                 | 76.4           | 23.4                    | 50.3           | 295.4   |
|               |               | 400.9          | 171.5                | 335.2          | 298.6                   | 232.5          | 1 438.7 |
| February 2016 | Eastern Area  | 89.1           | 26.6                 | 86.2           | 41.6                    | 65.3           | 308.8   |
|               | Northern Area | 87.3           | 41                   | 80.1           | 24.6                    | 51.5           | 284.5   |
|               | Southern Area | 127.7          | 40.8                 | 126.4          | 210.7                   | 75.6           | 581.2   |
|               | Western Area  | 94.9           | 42.2                 | 89.5           | 24.2                    | 54.9           | 305.7   |
|               |               | 399            | 150.6                | 382.2          | 301.1                   | 247.3          | 1 480.2 |
| March 2016    | Eastern Area  | 96.9           | 23.5                 | 92.3           | 49.5                    | 74.1           | 336.3   |
|               | Northern Area | 82.7           | 40.6                 | 73.9           | 24.9                    | 49.2           | 271.3   |
|               | Southern Area | 122.8          | 33.2                 | 115.2          | 239.9                   | 82             | 593.1   |
|               | Western Area  | 128.2          | 48.5                 | 99             | 31.4                    | 66             | 373.1   |
|               |               | 430.6          | 145.8                | 380.4          | 345.7                   | 271.3          | 1 573.8 |
| April 2016    | Eastern Area  | 91.9           | 30.3                 | 80.6           | 42.8                    | 64             | 309.6   |
|               | Northern Area | 81.9           | 34.4                 | 76.7           | 24.6                    | 53.7           | 271.3   |
|               | Southern Area | 116.2          | 31.1                 | 117.7          | 214.9                   | 80             | 559.9   |
|               | Western Area  | 91.4           | 47.7                 | 90.8           | 24.1                    | 47.8           | 301.8   |
|               |               | 381.4          | 143.5                | 365.8          | 306.4                   | 245.5          | 1 442.6 |
| May 2016      | Eastern Area  | 117.2          | 33.6                 | 100.6          | 56.2                    | 77.8           | 385.4   |
|               | Northern Area | 111.3          | 49.9                 | 84.4           | 30.2                    | 55.7           | 331.5   |
|               | Southern Area | 146.8          | 40.3                 | 134.9          | 256.5                   | 87.6           | 666.1   |
|               | Western Area  | 190.8          | 60                   | 129.6          | 41.8                    | 76.3           | 498.5   |
|               |               | 566.1          | 183.8                | 449.5          | 384.7                   | 297.4          | 1 881.5 |
| June 2016     | Eastern Area  | 112.6          | 29.1                 | 109.6          | 55.4                    | 79.8           | 386.5   |
|               | Northern Area | 95.4           | 42.3                 | 81.2           | 27                      | 55             | 300.9   |
|               | Southern Area | 137.4          | 33.3                 | 158.7          | 261.6                   | 91.7           | 682.7   |



Group you organisation unit in two ways and aggregate data on these two parallel hierarchies

Use to aggregate data (only in analytics apps)

An additional setting to the organisation unit group set, creates a dynamic "membership" to a organisation unit group set.

You don't change the organisation unit hierarchy

Scalable and dynamic

Dynamic inclusion of hierarchy

Dynamic additional classification

### Assign names to organisation unit levels

When you add children to an organisation unit, DHIS2 automatically creates a new organisation unit level if necessary. The system also assigns a generic name to this level, for example "Level 5". You can replace the generic name with a contextual name, for example "Country", "Province",

"District" or "Health Facility". DHIS2 uses the contextual names anywhere levels are referred to, for example in the **Maps** app.

1. Open the **Maintenance** app and click **Organisation unit > Organisation unit level**.

The loading time of the list depends on the depth of the organisation unit hierarchy tree.

2. For the organisation unit levels you want to modify, type a name.
3. Select the number of offline levels.

#### Note

You configure the default value in the **System Settings** app:

Open the **System Settings** app, click **General** and select a level in the **Max offline organisation unit levels** list.

4. Click **Save**.

### Move organisation units within a hierarchy

You can move organisation units within in the hierarchy by changing the parent of a selected organisation unit.

1. Open the **Maintenance** app and click **Organisation unit > Hierarchy operations**.
2. In the left-hand hierarchy tree, select the organisation unit(s) you want to move.

#### Note

If the selected organisation unit is has sub-organisation units, all of them move to the new parent organisation unit.

3. In the right-hand hierarchy tree, select which organisation unit you want to move the selected organisation unit(s) to.
4. Click **Move x organisation units**, where x stands for the number of organisation units you have selected.

Your changes are immediately reflected in the left-hand side hierarchy tree.

### Close an organisation unit

When you close an organisation unit, you can't register or edit events to this organisation unit in the **Event Capture** and **Tracker Capture** apps.

1. Open the **Maintenance** app and click **Organisation unit > Organisation unit**.
2. In the object list, click the options menu and select **Edit**.
3. Select a **Closed date**.
4. Click **Save**.

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.

- In the object list, click the options menu and select **Clone**.
- 2.
3. Modify the options you want.
4. Click **Save**.

### Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

#### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.
  - **No access** (only applicable to **Public access**): The public won't have access to the object.
5. Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.
  - **No access**: The access group won't have access to data for the object.
6. Click **Close**.

### Delete metadata objects

#### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

#### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database

---

before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

#### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

## [Work in progress] Manage validation rules

### About validation rules

A validation rule is based on an expression. The expression defines a relationship between data element values. The expression forms a condition with certain logical criteria.

The expression consists of:

- A left side
- A right side
- An operator

A validation rule asserting that the total number of vaccines given to infants is less than or equal to the total number of infants.

---

In the **Maintenance** app, you manage the following validation rule objects:

| Object type             | What you can do   |
|-------------------------|---|
| Validation rule         | Create, edit, clone, delete, show details, and translate        |
| Validation rule group   | Create, edit, clone, delete, share, show details, and translate |
| Validation notification | Create, edit, clone, delete, show details, and translate        |

### About sliding windows

You can use sliding windows to group data *across multiple periods* as opposed to selecting data for a *single period*. Sliding windows have a size, that is to say, the number of days to cover, a starting point and an end point. The example below shows disease surveillance data:

- The data in the orange section, selects data based on the current period. There is a threshold, which is calculated once for each week or period, and this is shown in the "Result" section.
- The data in the blue section is the sliding window. It selects data from the past 7 days. The "Result" shows the total number of confirmed cases of a disease.
- The validation rule makes sure users are notified when the total number of cases breaks the threshold for the period.

| Period (weekly)  | Week 1        | Week 2                | Week 3            |
|------------------|---------------|-----------------------|-------------------|
| Period threshold | 10            | 9                     | 8                 |
| Days             | 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14 15 | 16 17 18 19 20 21 |
| Number of cases  | 1 0 1 2 0 3 1 | 1 1 2 0 4 2 2 1       | 5 3 2 3 2 1       |
| Result           | 8 < 10        |                       |                   |

### Different behaviour of validation rules

| With sliding windows  | Without sliding windows                     |
|---|---|
| Used only for event data.                                       | Used for event data and aggregate data.     |
| Data selection is based on a fixed number of days (periodType). | Data selection is always based on a period. |

| With sliding windows   | Without sliding windows  |
|--|--|
| The position of the sliding window is always <i>relative</i> to the period being compared. | Data is always selected for the <i>same period</i> as the period being compared. |

See also: How to use sliding windows when you're [Creating or editing a validation rule](#).

### About validation rule groups

A validation rule group allows you to group related validation rules. When you run a [validation rule analysis](#), you can choose to run all of the validation rules in your system, or just the validation rules in one group.

### About validation notifications

You can configure a validation rule analysis to automatically send notifications about validation errors to selected user groups. These messages are called *validation notifications*. They are sent via the internal DHIS2 messaging system.

You can send validation rule notifications as individual messages or as message summaries. This is useful, for example, if you want to send individual messages for high-priority disease outbreaks, and summaries for low-priority routine data validation errors.

### Create or edit a validation rule

1. Open the **Maintenance** app and click **Validation > Validation rule**.

2. Click the add button.

3. Type a **Name**.

The name must be unique among the validation rules.

4. (Optional) In the **Code** field, assign a code.

5. (Optional) Type a **Description**.

6. Select an **Importance**: **High**, **Medium** or **Low**.

7. Select a **Period type**.

8. Select an **Operator**: **Compulsory pair**, **Equal to**, **Exclusive pair**, **Greater than**, **Greater than or equal to** or **Not equal to**.

The **Compulsory pair** operator allows to require that data values must be entered for a form for both left and right sides of the expression, or for neither side. This means that you can require that if one field in a form is filled, then one or more other fields must also be filled.

The **Exclusive pair** allows to assert that if any value exist on the left side then there should be no values on the right side (or vice versa). This means that data elements which compose the rule on either side should be mutually exclusive from each other, for a given time period / organisation unit /attribute option combo.

9. Create the left side of the expression:

1. Click **Left side**.

- Select **Sliding window** if you want to view data relative to the period you are
2. comparing. See also [About validation rules](#).
  3. Select a **Missing value strategy**. This selection sets how the system evaluates a validation rule if data is missing.

| Option                         | Description  |
|--------------------------------|--|
| Skip if any value is missing   | <p>The validation rule will be skipped if any of the values which compose the expression are missing. This is the default option.</p> <p>Always select this option you use the <b>Exclusive pair</b> or <b>Compulsory pair</b> operator.</p> |
| Skip if all values are missing | <p>The validation rule will be skipped only if all of the operands which compose it are missing.</p>   |
| Never skip                     | <p>The validation rule will never be skipped in case of missing data, and all missing operands will be treated effectively as a zero.</p>  |

4. Type a **Description**.
5. Build an expression based on the available data elements, program objects, organisation units, counts and constants.

In the right pane, double-click the data objects you want to include in the expression. Combine with the mathematical operators located below the left pane.

6. Click **Save**.

10. Create the right side of the expression:

1. Click **Right side**.
2. Select a **Missing value strategy**. This selection sets how the system evaluates a validation rule if data is missing.

| Option                       | Description  |
|------------------------------|--|
| Skip if any value is missing | <p>The validation rule will be skipped if any of the values which compose the expression are missing. This is the default option.</p> <p>Always select this option you use the <b>Exclusive pair</b> or <b>Compulsory pair</b> operator.</p> |

| Option                         | Description  |
|--------------------------------|--|
| Skip if all values are missing | The validation rule will be skipped only if all of the operands which compose it are missing.                                      |
| Never skip                     | The validation rule will never be skipped in case of missing data, and all missing operands will be treated effectively as a zero. |

3. Select **Sliding window** if you want to view data relative to the period you are comparing. See also [About validation rules](#).

4. Type a **Description**.

5. Build an expression based on the available data elements, program objects, organisation units, counts and constants.

In the right pane, double-click the data objects you want to include in the expression. Combine with the mathematical operators located below the left pane.

6. Click **Save**.

11. (Optional) Choose which **Organisation unit levels** this rule should be evaluated for. Leaving this empty will cause the validation rule to be evaluated at all levels.

12. (Optional) Click **Skip this rule during form validation** to avoid triggering this rule while doing data entry

13. Click **Save**.

### Create or edit a validation rule group

1. Open the **Maintenance** app and click **Validation > Validation rule group**.

2. Click the add button.

3. Type a **Name**.

4. (Optional) In the **Code** field, assign a code.

5. (Optional) Type a **Description**.

6. Double-click the **Validation rules** you want to assign to the group.

7. Click **Save**.

### Create or edit a validation notification

1. Open the **Maintenance** app and click **Validation > Validation notification**.

2. Click the add button.

3. Type a **Name**.

4. (Optional) In the **Code** field, assign a code.



- 
- Select **Validation rules**.
  - 5.
  6. Select **Recipient user groups**.
  7. (Optional) Select **Notify users in hierarchy only**.

If you select this option, the system will filter the recipient users. (The system derives the recipient users from the recipient user groups.) The filter is based on which organisation unit the recipient user belongs to. The users linked to organisation units which are ancestors of the organisation unit where the violation took place will receive validation notifications. The system will ignore other users and these users won't receive validation notifications.

8. Create the message template:

1. Create the **Subject template**.

Double-click the parameters in the **Template variables** field to add them to your subject.

2. Create the **Message template**.

Double-click the parameter names in the **Template variables** field to add them to your message.

9. Click **Save**.

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

### Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

#### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.

- 
4. Change sharing settings for the access groups you want to modify.
    - **Can edit and view:** The access group can view and edit the object.
    - **Can view only:** The access group can view the object.
    - **No access** (only applicable to **Public access**): The public won't have access to the object.
  5. Change data sharing settings for the access groups you want to modify.
    - **Can capture data:** The access group can view and capture data for the object.
    - **Can view data:** The access group can view data for the object.
    - **No access:** The access group won't have access to data for the object.
  6. Click **Close**.

### Delete metadata objects

#### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

#### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
-

- In the object list, click the options menu and select **Translate**.
- 2.

### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

## Manage attributes

### About attributes

You can use metadata attributes to add additional information to metadata objects. In addition to the standard attributes for each of these objects it may be useful to store information for additional attributes, for example the collection method for a data element.

The screenshot shows the 'Attribute' configuration page in the DHIS2 Maintenance app. The page has a blue header with 'dhis2' and 'DHIS 2 Demo - Sierra Leone'. Below the header is a navigation bar with tabs: ALL, DATA ELEMENTS, DATA SET, INDICATORS, ORGANISATION UNITS, and OTHER. The 'Attribute' tab is selected. On the left, there is a sidebar with a folder icon and three items: Constant, Attribute (highlighted in blue), and Option set. The main content area is titled 'Attribute' and contains the following form fields:

- Name (\*)
- Code
- Value type (\*)
- Option set

Below the form fields are several checkboxes for attribute types:

- Mandatory
- Unique
- Data element
- Data element group
- Indicator
- Indicator group
- Data set
- Organisation unit
- Organisation unit group

In the **Maintenance** app, you manage the following attribute objects:

### *Attribute objects in the Maintenance app*

| Object type | Available functions                                     |
|-------------|---|
| Attribute   | Create, edit, clone, delete, show details and translate |

### Create or edit an attribute

1. Open the **Maintenance** app and click **Attribute**.
2. Click the add button.
3. In the **Name** field, type the name of the attribute.

Each attribute must have a unique name

4. (Optional) In the **Code** field, assign a code.
5. Select a **Value type**.

If the value supplied for the attribute does not match the value type you will get a warning.

6. Select an **Option set**.

7. Select the options you want, for example:

- Select **Mandatory** if you want an object to always have the dynamic attribute.
- Select **Unique** if you want the system to enforce that values are unique for a specific object type.

8. Click **Save**.

The dynamic attribute is now available for the objects you assigned it to.

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

### Delete metadata objects

#### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

#### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database

---

before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

#### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

### Manage constants

#### About constants

Constants are static values which can be made available to users for use in data elements and indicators. Some indicators, such as "Couple year protection rate" depend on constants which usually do not change over time.

The screenshot shows the DHIS2 interface for creating or editing a constant. The top navigation bar includes 'dhis2', 'DHIS 2 Demo - Sierra Leone', a search bar, and a user profile icon 'JT'. Below the navigation bar are tabs for 'ALL', 'DATA ELEMENTS', 'DATA SET', 'INDICATORS', 'ORGANISATION UNITS', and 'OTHER'. The 'OTHER' tab is selected, and a sidebar on the left shows a folder structure with 'Constant' selected. The main content area is titled 'Constant' and contains a form with the following fields: 'Name (\*)', 'Short name', 'Code', 'Description', and 'Value (\*)'. At the bottom of the form are two buttons: 'SAVE' (orange) and 'CANCEL' (white).

In the **Maintenance** app, you manage the following constant objects:

#### *Constant objects in the Maintenance app*

| Object type | Available functions  |
|-------------|--|
| Constant    | Create, edit, clone, share, delete, show details and translate |

#### **Create or edit a constant**

1. Open the **Maintenance** app and click **Other** > **Constant**.
2. Click the add button.
3. In the **Name** field, type the name of the constant.
4. (Optional) In the **Short name** field, type an abbreviated name of the constant.
5. (Optional) In the **Code** field, assign a code.
6. In the **Description** field, type a brief, informative description of the constant.
7. In the **Value** field, define the constant's value.
8. Click **Save**.

The constant is now available for use.

#### **Clone metadata objects**

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.

- In the object list, click the options menu and select **Clone**.
- 2.
3. Modify the options you want.
4. Click **Save**.

### Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

#### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.
  - **No access** (only applicable to **Public access**): The public won't have access to the object.
5. Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.
  - **No access**: The access group won't have access to data for the object.
6. Click **Close**.

### Delete metadata objects

#### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

#### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database

---

before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

#### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

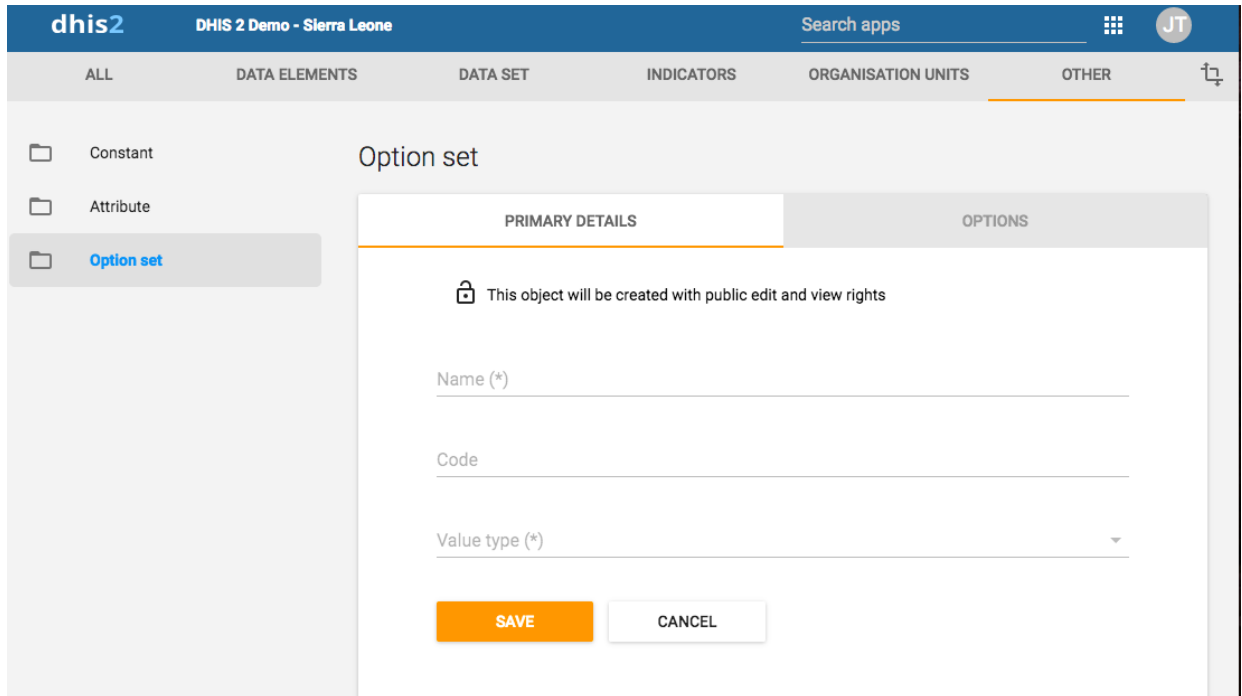
### Manage option sets

#### About option sets

Option sets provide a pre-defined drop-down (enumerated) list for use in DHIS2. You can define any kind of options.

An option set called "Delivery type" would have the options: "Normal", "Breach", "Caesarian" and "Assisted".





**Option set objects in the Maintenance app**

| Object type      | Available functions  |
|------------------|--|
| Option set       | Create, edit, clone, share, delete, show details and translate |
| Option group     | Create, edit, clone, share, delete, show details and translate |
| Option group set | Create, edit, clone, share, delete, show details and translate |

**Create or edit an option set**

**Important**  
 Option sets must have a code as well as a name. You can change the names but you can't change the codes. Both names and codes of all options must be unique, even across different option sets.

1. Open the **Maintenance** app and click **Other > Option set**.
2. Click the add button.
3. In the **Primary details** tab, define the option set:
  1. In the **Name** field, type the name of the constant.
  2. In the **Code** field, assign a code.

- 
3. Select a **Value type**.
  4. Click **Save**.
4. For each option you need, perform the following tasks:
1. Click the **Options** tab.
  2. Click the add button.
  3. Type a **Name** and a **Code**. Optionally also select a **Color** and an **Icon** which will be used for this option in the data capture apps.
  4. Sort the options by name, code/value or manually.
  5. Click **Save**.

### Create or edit an option group

You can group and classify **options** within an **option set** by using **option groups**. This way you can create a subset of options in an option set. The main purpose of this is to be able to filter huge option sets into smaller, related parts.

Options that are grouped can be hidden or shown together in tracker and event capture through program rules.

#### Note

You cannot change the **Option set** selected in an **Option group** once it has been created.

1. Open the **Maintenance** app and click **Other > Option group**.
2. Click the add button.
3. Fill in the form:
  1. **Name**
  2. **Short name**
  3. **Code**
  4. **Option set**
4. Once an **Option set** is selected, you can assign the **Options** you want to group.
5. Click **Save**.

### Create or edit an option group set

**Option group sets** allows you to categorise multiple **option groups** into a set. The main purpose of the option group set is to add more dimensionality to your captured data for analysis.

#### Note

You cannot change the **Option set** selected in an **Option group set** once it has been created.

1. Open the **Maintenance** app and click **Other > Option group set**.
2. Click the add button.

---

Fill in the form:

3.
  1. **Name**
  2. **Code**
  3. **Description**
  4. **Option set**
  
  5. **Data dimension**

If you select **Data dimension**, the group set will be available to the analytics as another dimension, in addition to the standard dimensions of “Period” and “Organisation unit”.

4. Select option groups and assign them.

Available option groups are displayed in the left panel. Option groups that are currently members of the option group set are displayed in the right hand panel.

5. Click **Save**.

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

### Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

#### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.

---

**No access** (only applicable to **Public access**): The public won't have access to the object.

5. Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.
  - **No access**: The access group won't have access to data for the object.
6. Click **Close**.

### Delete metadata objects

#### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

#### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

#### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

## Manage legends

### About legends

You can create, edit, clone, delete, show details and translate legends to make the maps you're setting up for your users meaningful. You create maps in the **Maps** app.

#### Note

Continuous legends must consist of legend items that end and start with the same value, for example: 0-50 and 50-80. Do not set legend items like this: 0-50 and 51-80. This will create gaps in your legend.

### Create or edit a legend

#### Note

It is not allowed to have gaps in a legend.  
It is not allowed to have overlapping legend items.

1. Open the **Maintenance** app and click **Other > Legend**.
2. Click the add button.
3. In the **Name** field, type the legend name.
4. (Optional) In the **Code** field, assign a code.
5. Create the legend items you want to have in your legend:
  1. Select **Start value** and **End value**.
  2. Select **Number of legend items**.
  3. Select a color scheme.
  4. Click **Create legend items**.

#### Tip

Click the options menu to edit or delete a legend item.

6. (Optional) Add more legend items:
  1. Click the add button.
  2. Enter a name and select a start value, an end value and a color.
  3. Click **OK**.

(Optional) Change the color scales.

7.

1. Click the colour scale to view a list of color scale options, and select a color scale.
2. To customize a color scale, click the add button. In the **Edit legend item** dialog, click the color scale button and hand-pick colors, or enter your color values.

8. Click **Save**.

| Legend item | Start value | End value |
|-------------|-------------|-----------|
| Low bad     | 0           | 50        |
| Medium      | 50          | 80        |
| High good   | 80          | 100       |
| Too high    | 100         | 1000      |

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

### Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

#### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.
  - **No access** (only applicable to **Public access**): The public won't have access to the object.

---

Change data sharing settings for the access groups you want to modify.

5.
  - **Can capture data:** The access group can view and capture data for the object.
  - **Can view data:** The access group can view data for the object.
  - **No access:** The access group won't have access to data for the object.
6. Click **Close**.

### Delete metadata objects

#### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

#### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

#### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

- 
- Select a locale.
  - 3.
  4. Type a **Name**, **Short name** and **Description**.
  5. Click **Save**.

### Assign a legend to indicator or data element

You can assign a legend to an indicator or a data element in the **Maintenance** app, either when you create the object or edit it. When you then select the indicator or data element in the **Maps** app, the system automatically selects the assigned legend.

#### See also

- [Using the GIS app](#)

## Manage predictors

### About predictors

A predictor tells DHIS2 how to generate a data value based on data values from past periods and/or the period of the data value. It defines which past periods to sample, and how to combine the data to produce a predicted value. A predictor always generates an aggregate data value, but the past data values used to calculate the predicted value may come from aggregate data, event data, or both.

A simple use of predictors would be to copy a past period data value into a new period, for example into the next month, or into the same quarter in the next year. A more complex use of predictors would be for disease surveillance, to predict what value would be expected in a given week or month of the year, based on previous data values. A validation rule could then be used to see how the actual value compares with the expected (predicted) value.

You can specify the organisation unit level(s) for which a predictor will generate values. For example in disease surveillance you can use one predictor to give the expected value at each local facility, given the amount of variation you would expect at a single facility, while using a different predictor to estimate the value you would expect summed over all facilities in a district, given the (smaller) proportional variation that you would expect when adding up the values for all facilities in the district. You could also define additional predictors at any higher levels of the organisation unit hierarchy, where you might expect different proportions of variation. Alternatively, you can define a single predictor for all these levels and use the standard deviation function to determine what amounts of deviation were measured at each level.

In the **Maintenance** app, you manage the following predictor objects:

#### *Predictor objects in the Maintenance app*

| Object type | Available functions                                     |
|-------------|---|
| Predictor   | Create, edit, clone, delete, show details and translate |

### Sampling past periods

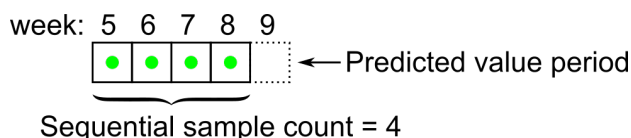
Predictors can generate data values for periods that are in the past, present, or future. These values are based on data from the predicted period, and/or sampled data from periods prior to the predicted period.



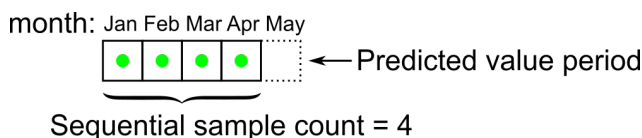
If you need data only from the same period in which the prediction is made, then you don't need to read this section. This section describes how to sample data from periods prior to the predicted period.

**Sequential sample count**

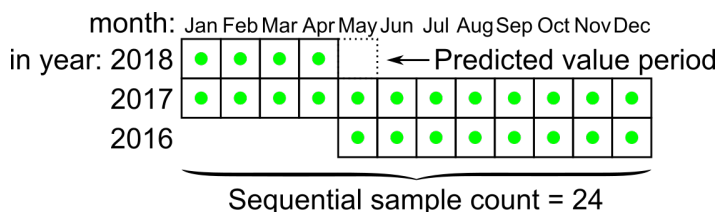
A predictor's *Sequential sample count* gives the number of immediate prior periods to sample. For example, if a predictor's period type is *Weekly* and the *Sequential sample count* is 4, this means to sample four prior weeks immediately preceding the predicted value week. So the predicted value for week 9 would use samples from weeks 5, 6, 7, and 8:



If a predictor's period type is *Monthly* and the *Sequential sample count* is 4, this means to sample four prior months immediately preceding the predicted value month. So the predicted value for May would use samples from weeks January, February, March, and April:



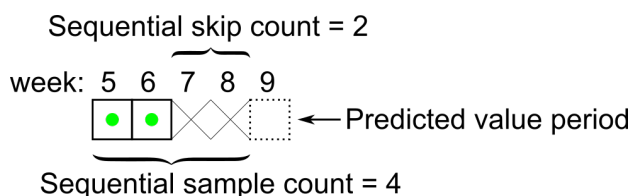
The *Sequential sample count* can be greater than the number of periods in a year. For example, if you want to sample the 24 months immediately preceding the predicted value month, set the *Sequential sample count* to 24:



**Sequential skip count**

A predictor's *Sequential skip count* tells how many periods should be skipped immediately prior to the predicted value period, within the *Sequential sample count*. This could be used, for instance, in outbreak detection to skip one or more immediately preceding samples that might in fact contain values from the beginning of an outbreak that you are trying to detect.

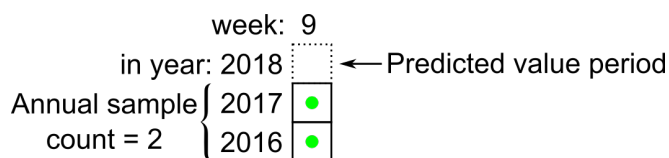
For example, if the *Sequential sample count* is 4, but the *Sequential skip count* is 2, then the two samples immediately preceding the predicted period will be skipped, resulting in only two periods being sampled:



**Annual sample count**

A predictor's *Annual sample count* gives the number of prior years for which samples should be collected at the same time of year. This could be used, for instance, for disease surveillance in

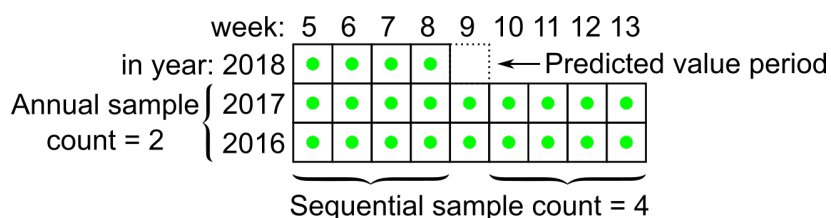
cases where the expected incidence of the disease varies during the year and can best be compared with the same relative period in previous years. For example, if the *Annual sample count* is 2 (and the *Sequential sample count* is zero), then samples would be collected from periods in the immediately preceding two years, at the same time of year.



**Sequential and annual sample counts together**

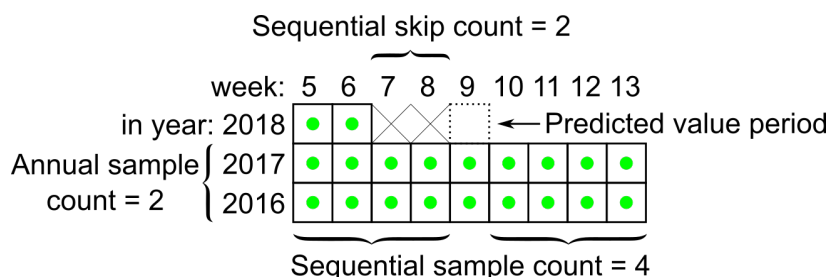
You can use the sequential and annual sample counts together to collect samples from a number of sequential periods over a number of past years. When you do this, samples will be collected in prior years during the period at the same time of year as the predicted value period, and also in previous years both before and after the same time of year, as determined by the *Sequential sample count* number.

For example, if the *Sequential sample count* is 4 and the *Annual sample count* is 2, samples will be collected from the 4 periods immediately preceding the predicted value period. In addition samples will be collected in the prior 2 years for the corresponding period, as well as 4 periods on either side:

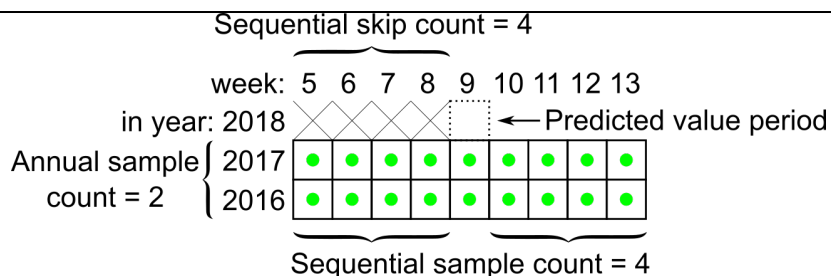


**Sequential, annual, and skip sample counts together**

You can use the *Sequential skip count* together with the sequential and annual sample counts. When you do this, the *Sequential skip count* tells how many periods to skip in the same year as the predicted value period. For example, if the *Sequential sample count* is 4 and the *Sequential skip count* is 2, then the two periods immediately preceding the predicted value period period will be skipped, but the two periods before that will be sampled:



If the *Sequential skip count* is equal to or greater than the *Sequential sample count*, then no samples will be collected for the year containing the predicted value period; only periods from past years will be sampled:

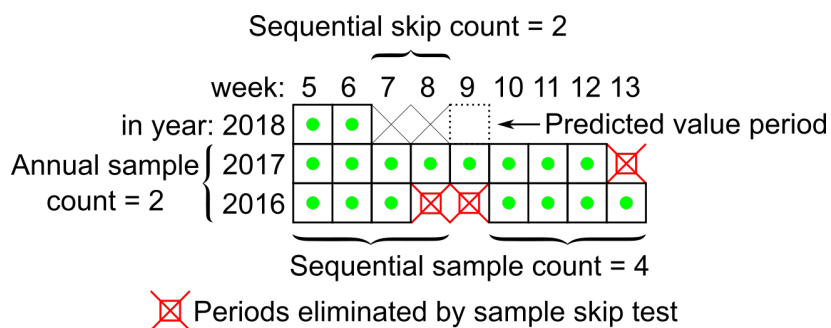


### Sample skip test

You can use the *Sample skip test* to skip samples from certain periods that would otherwise be included, based on the results of testing an expression within those periods. This could be used, for instance, in disease outbreak detection, where the sample skip test could identify previous disease outbreaks, to exclude those samples from the prediction of a non-outbreak baseline expected value.

The *Sample skip test* is an expression that should return a value of true or false, to indicate whether or not the period should be skipped. It can be an expression that tests any data values in the previous period. For example, it could test for a data value that was explicitly entered to indicate that a previous period should be skipped. Or it could compare a previously predicted value for a period with the actual value recorded for that period, to determine if that period should be skipped.

Any periods for which the *Sample skip test* is true will not be sampled. For example:



### Create or edit a predictor

1. Open the **Maintenance** app and click **Other > Predictor**.
2. Click the add button.
3. In the **Name** field, type the predictor name.
4. (Optional) In the **Code** field, assign a code.
5. (Optional) Type a **Description**.
6. Select an **Output data element**. Values generated by this predictor are stored as aggregate data associated with this data element and the predicted period.

The value is rounded according to the value type of the data element: If the value type is an integer type, the predicted value is rounded to the nearest integer. For all other value types, the number is rounded to four significant digits. (However if there are more than four digits to the left of the decimal place, they are not replaced with zeros.)

7. (Optional) Select an **Output category combo**. This dropdown will only show if the selected data element has categoryCombos attached to it. If this is the case, you can select which categoryCombo you would like to use.

Select a **Period type**.

- 8.
9. Assign one or more organisation unit levels. The output value will be assigned to an organisation unit at this level (or these levels). The input values will come from the organisation unit to which the output is assigned, or from any level lower under the output organisation unit.
10. Create a **Generator**. The generator is the expression that is used to calculate the predicted value.
  1. Type a **Description** of the generator expression.
  2. Select a **Missing value strategy**. This selection sets how the system evaluates a validation rule if data is missing.

| Option                         | Description   |
|--------------------------------|---|
| Skip if any value is missing   | The validation rule will be skipped if any of the values which compose the expression are missing. This is the default option.<br><br>Always select this option you use the <b>Exclusive pair</b> or <b>Compulsory pair</b> operator. |
| Skip if all values are missing | The validation rule will be skipped only if all of the values which compose it are missing.   |
| Never skip                     | The validation rule will never be skipped in case of missing data, and all missing values will be treated effectively as a zero.  |

3. Enter the generator expression. You can build the expression by selecting data elements for aggregate data, or program data elements, attributes or indicators. Organisation unit counts are not yet supported.

To use sampled, past period data, you should enclose any items you select in one of the following aggregate functions (note that these function names are case-sensitive):

| Aggregate function | Means                     |
|--------------------|---------------------------|
| avg(x)             | Average (mean) value of x |
| count(x)           | Count of the values of x  |
| max(x)             | Maximum value of x        |
| median(x)          | Median value of x         |
| min(x)             | Minimum value of x        |

| Aggregate function   | Means  |
|----------------------|--|
| percentileCont(p, x) | Continuous percentile of x, where p is the percentile as a floating point number between 0 and 1. For example, p = 0 will return the lowest value, p = 0.5 will return the median, p = 0.75 will return the 75 <sup>th</sup> percentile, p = 1 will return the highest value, etc. Continuous means that the value will be interpolated if necessary. For example, percentileCont( 0.5, #{FTRrcoaog83} ) will return 2.5 if the sampled values of data element FTRrcoaog83 are 1, 2, 3, and 4. |
| stddev(x)            | Standard deviation of x. This function is equivalent to stddevSamp. It's suggested that you use the function stddevSamp instead for greater clarity.   |
| stddevPop(x)         | Population standard deviation of x: $\sqrt{\text{sum}( (x - \text{avg}(x))^2 ) / n }$  |
| stddevSamp(x)        | Sample standard deviation of x: $\sqrt{\text{sum}( (x - \text{avg}(x))^2 ) / ( n - 1 ) }$ . Note that this value is not computed when there is only one sample.  |
| sum(x)               | Sum of the values of x   |

Any items inside an aggregate function will be evaluated for all sampled past periods, and then combined according to the formula inside the aggregate function. Any items outside an aggregate function will be evaluated for the period in which the prediction is being made.

You can build more complex expressions by clicking on (or typing) any of the elements below the expression field: ( ) \* / + - Days. Constant numbers may be added by typing them. The Days option inserts [days] into the expression which resolves to the number of days in the period from which the data came.

You can also use the following non-aggregating functions in your expression, either inside aggregate functions, or containing aggregate functions, or independent of aggregate functions:

| Function   | Means  |
|--|--|
| <code>if(test, valueIfTrue, valueIfFalse)</code>     | Evaluates <b>test</b> which is an expression that evaluates to a boolean value -- see <b>Boolean expression notes</b> below. If the test is <b>true</b> , returns the <b>valueIfTrue</b> expression. If it is <b>false</b> , returns the <b>valueIfFalse</b> expression. |
| <code>isNull(item)</code>                            | Returns the boolean value <b>true</b> if the <b>item</b> is null (missing), otherwise returns <b>false</b> . The <b>item</b> can be any selected item from the right (data element, program data element, etc.).   |
| <code>isNotNull(item)</code>                         | Returns <b>true</b> if the <b>item</b> value is not missing (not null), otherwise <b>false</b> .   |
| <code>firstNonNull(item [, item ...])</code>         | Returns the value of the first <b>item</b> that is not missing (not null). Can be provided any number of arguments. Any argument may also be a numeric or string literal, which will be returned if all the previous items have missing values.                          |
| <code>greatest(expression [, expression ...])</code> | Returns the greatest (highest) value of the expressions given. Can be provided any number of arguments.  |
| <code>least(expression [, expression ...])</code>    | Returns the least (lowest) value of the expressions given. Can be provided any number of arguments.  |

**Boolean expression notes:** A boolean expression must evaluate to **true** or **false**. The following operators may be used to compare two values resulting in a boolean expression: `<`, `>`, `!=`, `==`, `>=`, and `<=`. The following operators may be used to combine two boolean expressions: `&&` (logical and), and `||` (logical or). The unary operator `!` may be used to negate a boolean expression.

Generator expression examples:

| Generator expression                        | Means   |
|---|---|
| <code>sum(#{FTRrcoag83.tMwM3ZBd7BN})</code> | Sum of the sampled values of data element FTRrcoag83 and category option combination (disaggregation) tMwM3ZBd7BN |

| Generator expression   | Means   |
|--|---|
| $\text{avg}(\#\{\text{FTRrcoaog83}\}) + 2 * \text{stddevSamp}(\#\{\text{FTRrcoaog83}\})$                 | Average of the sampled values of of data element FTRrcoaog83 (sum of all disaggregations) plus twice its sample standard deviation  |
| $\text{sum}(\#\{\text{FTRrcoaog83}\}) / \text{sum}([\text{days}])$                                       | Sum of all sampled values of data element FTRrcoaog83 (sum of all disaggregations) divided by the number of days in all sample periods (resulting in the overall average daily value)   |
| $\text{sum}(\#\{\text{FTRrcoaog83}\}) + \#\{\text{T7OyqQpUpNd}\}$  | Sum of all sampled values of data element FTRrcoaog83 plus the value of data element T7OyqQpUpNd in the period being predicted for  |
| $1.2 * \#\{\text{T7OyqQpUpNd}\}$   | 1.2 times the value of data element T7OyqQpUpNd, in the period being predicted for  |
| $\text{if}(\text{isNull}(\#\{\text{T7OyqQpUpNd}\}), 0, 1)$   | If the data element T7OyqQpUpNd is null in the period being predicted, then 0, otherwise 1.   |
| $\text{percentileCont}(0.5, \#\{\text{T7OyqQpUpNd}\})$   | Continuous 50 <sup>th</sup> percentile of the sampled values for data element T7OyqQpUpNd. Note that this is the same as $\text{median}(\#\{\text{T7OyqQpUpNd}\})$  |
| $\text{if}(\text{count}(\#\{\text{T7OyqQpUpNd}\}) == 1, 0, \text{stddevSamp}(\#\{\text{T7OyqQpUpNd}\}))$ | If there is one sample value present for data element T7OyqQpUpNd, then 0, otherwise the sample standard deviation of these sample values. (Note that if no samples are present then the <code>stddevSamp</code> returns no value, so no value is predicted.) |

11. (Optional) Create a **Sample skip test**. The sample skip test tells which previous periods if any to exclude from the sample.

1. Type a **Description** of the skip test.
2. Enter the sample skip test expression. You can build the expression by selecting data elements for aggregate data, or program data elements, attributes or indicators. Organisation unit counts are not yet supported. As with the generator function, you may click on (or type) any of the elements below the expression field: ( ) \* / + - Days.

The non-aggregating functions described above may also be used in skip tests.

The expression must evaluate to a boolean value of **true** or **false**. See **Boolean expression notes** above.

Skip test expression examples:

| Skip test expression   | Means  |
|--|--|
| <code>#{FTRrcoaog83} &gt; #{M62VHgYT2n0}</code>                              | The value of data element FTRrcoaog83 (sum of all disaggregations) is greater than the value of data element M62VHgYT2n0 (sum of all disaggregations)  |
| <code>#{uF1DLnZNIWe} &gt; 0</code>   | The value of data element uF1DLnZNIWe (sum of all disaggregations) is greater than the zero  |
| <code>#{FTRrcoaog83} &gt; #{M62VHgYT2n0}   <br/>#{uF1DLnZNIWe} &gt; 0</code> | The value of data element FTRrcoaog83 (sum of all disaggregations) is greater than the value of data element M62VHgYT2n0 (sum of all disaggregations) or the value of data element uF1DLnZNIWe (sum of all disaggregations) is greater than the zero |

12. Enter a **Sequential sample count** value.

This is for how many sequential periods the calculation should go back in time to sample data for the calculations.

13. Enter an **Annual sample count** value.

This is for how many years the calculation should go back in time to sample data for the calculations.

14. (Optional) Enter a **Sequential skip count** value.

This is how many sequential periods, immediately preceding the predicted value period, should be skipped before sampling the data.

15. Click **Save**.

### Create or edit a predictor group

1. Open the **Maintenance** app and click **Other > Predictor group**.
2. Click the add button.
3. Type a **Name**. This field needs to be unique.
4. (Optional) In the **Code** field, assign a code. This field needs to be unique.
5. (Optional) Type a **Description**.
6. Double-click the **Predictors** you want to assign to the group.
7. Click **Save**.



---

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

### Delete metadata objects

**Note**

You can only delete a data element and other data element objects if no data is associated to the data element itself.

**Warning**

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

**Tip**

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

**Tip**

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

## Manage push reports

### About push reports

Push reports allows you to increase awareness and usage of data analysis by sending reports with charts, tables and maps directly to users e-mail addresses.

- A push report gets its content from existing dashboards.
- A push report lists the dashboard items in the same order as on the dashboard.
- A push report can only contain dashboard items with charts, maps or tables.
- You create the push report and its schedule in the **Maintenance** app.
- The **Title** and **Message** parameters you set up in the **Maintenance** app, are included in each report. The **Name** you give the report is not included in the report. Instead, the name is used to identify the push analysis object in the system. This way a report can be named one thing, and the title of the report can be another.
- When you run a push report job, the system compiles a list of recipients from the user groups you've selected. The system then generates a report for each member of the selected user groups. Each of the dashboard items are generated specifically for each user. This means that the data included in the report reflects the data the user has access to. All users could therefore get the same report (if all the data is "static") or custom reports (if all the data is "dynamic"), or a combination of the two.
- Push reports are sent by e-mail to the recipients, not through the internal DHIS2 messaging system. If a user doesn't have a valid e-mail, or if the job fails, no e-mails are sent. In this case, the problem is logged on the server.

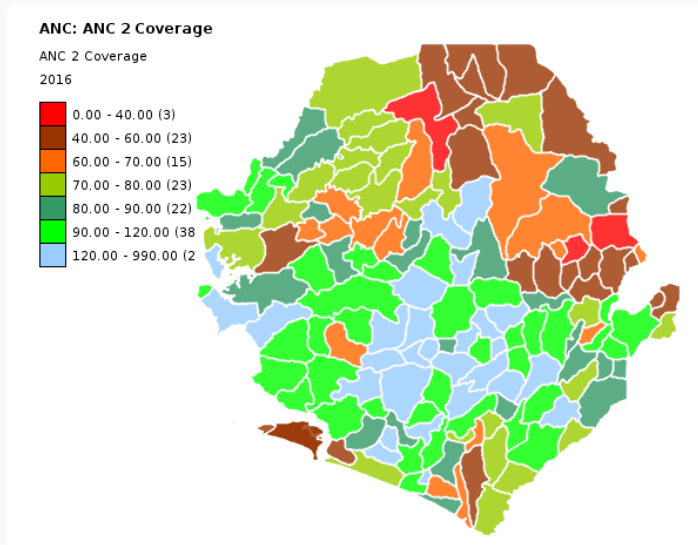
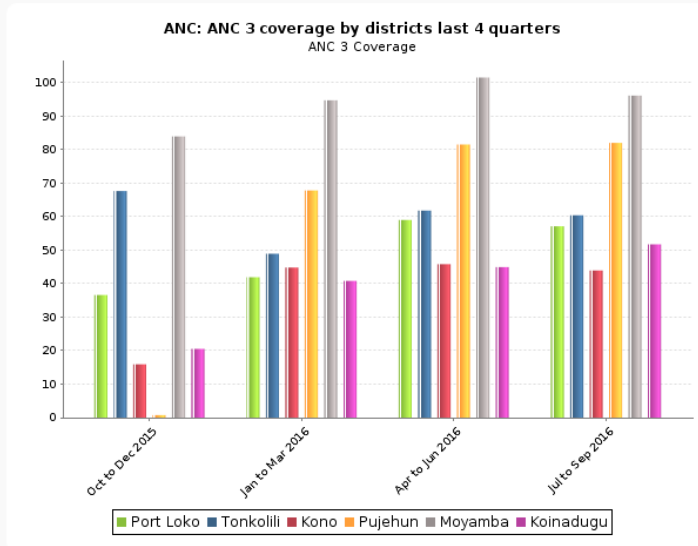
#### Note

The data generated in the push reports is public so verify that you don't include any sensitive data.

# Antenatal Care Report

October 05, 2016

Greetings colleagues. Here is your monthly update for our antenatal care program.



In the **Maintenance** app, you manage the following push reports objects:

**Push reports objects in the Maintenance app**

| Object type   | Available functions   |
|---------------|---|
| Push analysis | Create, edit, clone, delete, show details, translate, preview and run |

---

### Create or edit a push report

1. Open the **Maintenance** app and click **Other > Push analysis**.
2. Click the add button.
3. In the **Name** field, type the name of the scheduled report.

This name is not included in the report e-mail. Instead, the name is used to identify the push analysis object in the system.

4. (Optional) In the **Code** field, assign a code.
5. Add a report **Title**.

This title is included in the report e-mail.

6. (Optional) Add a **Message**.

This message is included in the report e-mail.

7. Select a **Dashboard** to base the report on.
8. Select and assign the user groups you want to send the report to.
9. Select a **Scheduling frequency: Daily, Weekly or Monthly**.

#### Note

If you schedule a push report to "Monthly" and "31", the scheduled report job will not run if the month has less than 31 days.

10. (Optional) Select **Enable** to activate the push report job.  
The job won't run until you activate it.
11. Click **Save**.

### Preview push reports

1. Open the **Maintenance** app and click **Other > Push analysis**.
2. In the push report list, locate the push report you want to preview.
3. Click the options menu and select **Preview**.

A preview of the push report opens in a new window.

### Run push report jobs

1. Open the **Maintenance** app and click **Other > Push analysis**.
2. In the push report list, locate the push report you want to run.
3. Click the options menu and select **Run now**.

The push report job runs immediately.

---

### Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

### Delete metadata objects

**Note**

You can only delete a data element and other data element objects if no data is associated to the data element itself.

**Warning**

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

**Tip**

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

**Tip**

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

## Manage external map layers

### About external map layers

You can customize GIS by including map layers from various sources and combine them with your own data in DHIS2. DHIS2 supports common map service formats such as Web Map Service (WMS), Tile Map Service (TMS) and XYZ tiles.

### Create or edit an external map layer

#### Note

DHIS2 only supports the Web Mercator projection ([EPSG:3857](#)) so make sure that the external service supports this projection.

### External map layer objects in the Maintenance app

| Object type        | Available functions                                     |
|--------------------|---|
| External map layer | Create, edit, clone, delete, show details and translate |

1. Open the **Maintenance** app and click **Other** > **External map layer**.
2. Click the add button.
3. In the **Name** field, type a name that describes the content of the external map layer.  
This is the name you'll see in the **Maps** app.
4. (Optional) In the **Code** field, assign a code.
5. Select a **Map service** format.

DHIS2 supports three common map service formats:

- Web Map Service (WMS)

**Image format:** PNG format allows layers to be transparent, JPG format offers better compression and is often faster to load.

**Layers:** A WMS can contain several individual layers, and you can specify which you want to include (comma separated). Refer to the WMS GetCapabilities document to see the available layers.

- Tile Map Service (TMS)
- XYZ tiles (can also be used for WMTS)

---

Enter the **URL** to the map service.

6.

**Note**

XYZ and TMS URLs must contain placeholders {}, for example: `http://{s}.tile.osm.org/{z}/{x}/{y}.png`.

7. (Optional) Enter **Source** of the map layers. The field can contain HTML tags if you want to link to the source.

When you use an external map service it is important to highlight where the data comes from.

8. Select a **Placement**:

- **Bottom - basemap**: For the Maps app, this makes the external map layer selectable as the base map (i.e. as an alternative to the DHIS2 base maps).
- **Top - overlay**: For the Maps app, this allows the external map to be added from the Add Layer selection and placed anywhere above the base map.

9. (Optional) Add a legend.

You can add a legend in two ways:

- Select a predefined **Legend** to describe the colors of the map layer.

**Tip**

Click **Add new** to create legends that you're missing. In the form that opens, create the legends you need. When you're done, click **Refresh values**.

- Enter a link to an external image legend in **Legend image URL**.

These are often provided for WMS. See under LegendURL in the WMS GetCapabilities document.

10. Click **Save**.

**Clone metadata objects**

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

**Delete metadata objects****Note**

You can only delete a data element and other data element objects if no data is associated to the data element itself.

**Warning**

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

**Display details of metadata objects**

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

**Translate metadata objects**

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

**Tip**

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

**Tip**

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

**Manage SQL Views**

The SQL View functionality of DHIS2 will store the SQL view definition internally, and then materialize the view when requested.

Database administrators must be careful about creating database views directly in the DHIS2 database. For instance, when the resource tables are generated, all of them will first be dropped and then re-created. If any SQL views depend on these tables, an integrity violation exception will be thrown and the process will be aborted.



The SQL views are dropped in reverse alphabetical order based on their names in DHIS2, and created in regular alphabetical order. This allows you to have dependencies between SQL views, given that views only depend on other views which come earlier in the alphabetical order. For instance, "ViewB" can safely depend on "ViewA". Otherwise, having views depending on other view result in an integrity violation error.

### Creating a new SQL view

To create a new SQL view, click **Apps > Maintenance > Other > SQL View** and click the Add + button.

← SQL View ⓘ

Name (\*)  
Facility Overview

Description  
Overview of facilities

Cache strategy  
Respect system setting

SQL type  
View

SQL query (\*)  
select ou.name, ou.uid, ou.code, ou.coordinates, oustr.level, gsstr."Facility Type" as factype, gsstr."Facility Ownership" as facownership, (select name from organisationunit where organisationunitid=oustr.idlevel2) as chiefdom, (select name from organisationunit where organisationunitid=oustr.idlevel3) as district from \_orgunitstructure as oustr join organisationunit as ou on oustr.organisationunitid=ou.organisationunitid join \_organisationunitgroupsetstructure as gsstr on ou.organisationunitid=gsstr.organisationunitid where oustr.level >= 4 order by chiefdom, district, factype, facownership, ou.name limit 300;

SAVE CANCEL

The "Name" attribute of the SQL view will be used to determine the name of the table that DHIS2 will create when the view is materialized by the user. The "Description" attribute allows one to provide some descriptive text about what the SQL view actually does. Finally, the "SQL query" should contain the SQL view definition. Only SQL "SELECT" statements are allowed and certain sensitive tables (i.e. user information) are not accessible. Press "Save" to store the SQL view definition.

### SQL View management

In order to utilize the SQL views, simply click the view and from the context menu, choose "Execute query". Once the process is completed, you will be informed that a table has been created. The name of the table will be provided, and is composed from the "Description" attribute provided in the SQL view definition. Once the view has been generated, you can view it by clicking the view again, and selecting "Show SQL View".

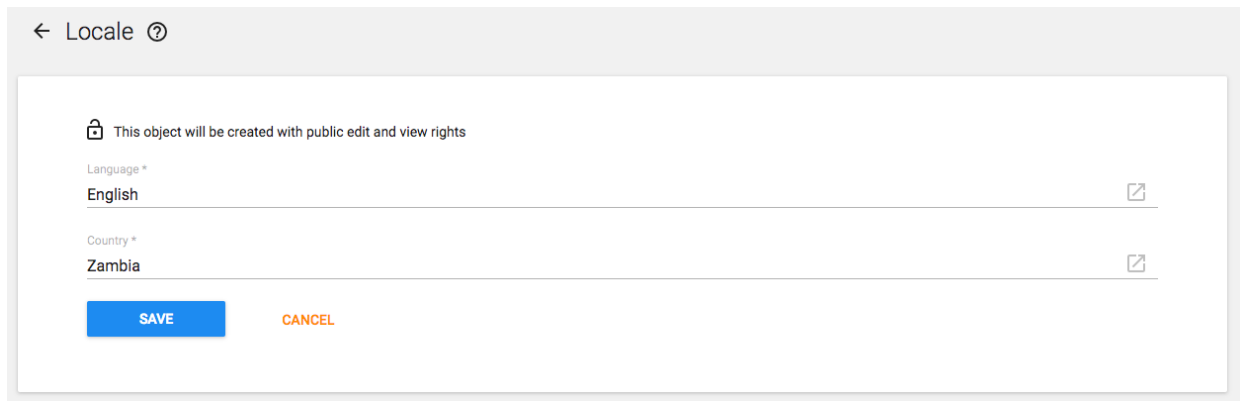
#### Tip

If you have a view which depends on another view, you should be careful about how the views are named. When analytics is run on the DHIS2 server, all views must be dropped, and are recreated. When analytics starts, the views are dropped in alphabetical order, and then recreated in reverse alphabetical order. Thus, if view A depends on view B, it must appear before view B in alphabetical order. If it appears after

view B in alphabetical order, analytics may fail, as the view with dependencies will not be dropped in the correct order.

## Manage Locales

It is possible to create custom locales in DHIS2. In addition to the locales available through the system, you might want to add a custom locale such as "English" and "Zambia" to the system. This would allow you to translate metadata objects to local languages, or to account for slight variants between countries which use a common metadata definition.



The locale is composed of a language along with a country. Select the desired values and press "Add". This custom locale will now be available as one of the translation locales in the system.

## Edit multiple object groups at once

The **Metadata group editor** in the **Maintenance** app allows you to edit multiple object groups at the same time. You can edit the following objects types:

### *Object types in the Metadata group editor*

| Object type           | Available functions   |
|-----------------------|---|
| Category option       |   |
| Category option group |   |
| Data element          | Add one data element to multiple data element groups<br><br>Remove one data element from multiple data element groups |
| Data element group    | Add multiple data elements to one data element group<br><br>Remove multiple data elements from one data element group |

| Object type     | Available functions   |
|-----------------|---|
| Indicator       | Add one indicator to multiple indicator groups<br><br>Remove one indicator from multiple indicator groups |
| Indicator group | Add multiple indicators to one indicator group<br><br>Remove multiple indicators from one indicator group |

### Edit multiple objects in an object group

1. Open the **Maintenance** app and click **Metadata group editor**.
2. Click **Manage items in group**.
3. Select an object group type, for example **Indicator groups**.
4. Select an object group, for example **HIV**.
5. In the left-hand list, select the object(s) you want to add to the object group and click the right arrow.
6. In the right-hand list, select the object(s) you want to remove from the object group and click the left arrow.

### Edit an object in multiple object groups

1. Open the **Maintenance** app and click **Metadata group editor**.
2. Click **Manage groups for item**.
3. Select an object type, for example **Indicators**.
4. Select an object, for example **ANC LLITN coverage**.
5. In the left-hand list, select the objects group(s) you want to add the object to and click the right arrow.
6. In the right-hand list, select the object group(s) you want to remove the object from and click the left arrow.

## Configure programs in the Maintenance app

### About programs

Traditionally, public health information systems have been reporting aggregated data of service provision across its health programs. This does not allow you to trace the people provided with these services. In DHIS2, you can define your own programs with stages. These programs are an essential part of the "tracker" functionality which lets you track individual records. You can also track other 'entities' such as wells or insurances. You can create two types of programs:

#### Program types

| Program type    | Description   | Examples of use   |
|-----------------|---|---|
| Event program   | <p>Single event <i>without</i> registration program (anonymous program or SEWoR)</p> <p>Anonymous, individual events are tracked through the health system. No person or entity is attached to these individual transactions.</p> <p>Has only one program stage.</p>                        | <p>To record health cases without registering any information into the system.</p> <p>To record survey data or surveillance line-listing.</p> |
| Tracker program | <p>Single event <i>with</i> registration program (SEWR)</p> <p>An entity (person, commodity, etc.) is tracked through each individual transaction with the health system</p> <p>Has only one program stage.</p> <p>A tracked entity instance (TEI) can only enroll in the program once.</p> | <p>To record birth certificate and death certificate.</p>   |
|                 | <p>Multi events <i>with</i> registration program (MEWR)</p> <p>An entity (person, commodity, etc.) is tracked through each individual transaction with the health system</p> <p>Has multiple program stages.</p>  | <p>Mother Health Program with stages as ANC Visit (2-4+), Delivery, PNC Visit.</p>  |

To create a program, you must first configure several types of metadata objects. You create these metadata objects in the **Maintenance app**.

++++

**Program metadata objects in the Maintenance app**

| Object type           | Description   | Available functions  |
|-----------------------|---|--|
| Event program         | A program to record single event without registration   | Create, edit, share, delete, show details and translate        |
| Tracker program       | A program to record single or multiple events with registration   | Create, edit, share, delete, show details and translate        |
| Program indicator     | An expression based on data elements and attributes of tracked entities which you use to calculate values based on a formula.         | Create, edit, clone, share, delete, show details and translate |
| Program rule          | Allows you to create and control dynamic behaviour of the user interface in the <b>Tracker Capture</b> and <b>Event Capture</b> apps. | Create, edit, clone, delete, show details and translate        |
| Program rule variable | Variables you use to create program rule expressions.   | Create, edit, clone, delete, show details and translate        |
| Relationship type     | Defines the relationship between tracked entity A and tracked entity B, for example mother and child.                                 | Create, edit, clone, share, delete, show details and translate |

| Object type              | Description   | Available functions   |
|--------------------------|---|---|
| Tracked entity type      | <p>Types of entities which can be tracked through the system. Can be anything from persons to commodities, for example a medicine or a person.</p> <p>A program must have one tracked entity. To enrol a tracked entity instance into a program, the tracked entity of an entity and tracked entity of a program must be the same.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin: 10px 0;"> <p><b>Note</b></p> <p>A program must be specified with only one tracked entity. Only tracked entity as same as the tracked entity of program can enroll into that program.</p> </div> | Create, edit, clone, share, delete, show details and translate                        |
| Tracked entity attribute | <p>Used to register extra information for a tracked entity.</p> <p>Can be shared between programs.</p>  | Create, edit, clone, share, delete, show details and translate                        |
| Program                  | A program consist of program stages.  | Create, edit, share, delete, assign to organisation units, show details and translate |
| Program stage            | A program stage defines which actions should be taken at each stage.  | Create, edit, share, change sort order, delete, show details and translate            |
| Program indicator group  | A group of program indicators   | Create, edit, clone, share, delete, show details and translate                        |
| Validation rule          | A validation rule is based on an expression which defines a relationship between data element values.   | Create, edit, clone, share, delete, show details and translate                        |

| Object type                | Description  | Available functions     |
|----------------------------|--|-------------------------|
| Program notification       | Automated message reminder<br><br>Set reminders to be automatically sent to enrolled tracked entity instances before scheduled appointments and after missed visits. | Create, edit and delete |
| Program stage notification | Automated message reminder<br><br>Set reminders to be automatically sent whenever a program stage is completed, or before or after the due date.                     | Create, edit and delete |

## Configure event programs in the Maintenance app

### About event programs

Single event *without* registration programs are called event programs. You configure them in the **Maintenance** app. Event programs can have three types of data entry forms:

#### *Types of data entry forms for event programs*

| Form type | Description   |
|-----------|---|
| Basic     | Lists all data elements which belong to the program. You can change the order of the data elements.                                 |
| Section   | A section groups data elements. You can then arrange the order of the sections to create the desired layout of the data entry form. |
| Custom    | Defines the data entry form as HTML page.   |

#### Note

- Custom forms takes precedence over section forms if both are present.
- If no custom or section form are defined, the basic form will be used.
- The Android apps only supports section forms.

You can create *program notifications* for event programs. The notifications are sent either via the internal DHIS2 messaging system, via e-mail or via text messages (SMS). You can use program notifications to, for example, send an automatic reminder to a tracked entity 10 days before a

scheduled appointment. You use the program's tracked entity attributes (for example first name) and program parameters (for example enrollment date) to create a notification template. In the **Parameters** field, you'll find a list of available tracked entity attributes and program parameters.

### Workflow: Create an event program

1. Enter the event program details.
2. Assign data elements.
3. Create data entry form(s): **Basic**, **Section** or **Custom**.
4. Assign the program to organisation unit(s).
5. Create program notification(s).

### Create or edit an event program

#### Enter event program details

1. Open the **Maintenance** app and click **Program > Program**.
2. Click the add button and select **Event Program** in the popup menu.
3. Enter program details, then click next.

| Field                       | Description  |
|-----------------------------|--|
| <b>Name</b>                 | The name of the program.   |
| <b>Color</b>                | Color used for this program in the data capture apps.  |
| <b>Icon</b>                 | Icon used for this program in the data capture apps.   |
| <b>Short name</b>           | A short name of the program. The short name is used as the default chart or table title in the analytics apps.   |
| <b>Description</b>          | A detailed description of the program.   |
| <b>Version</b>              | The version of the program. This is used for example when people collect data offline in an Android implementation. When they go online and synchronize their metadata, they should get the latest version of the program. |
| <b>Category combination</b> | The category combination you want to use. The default setting is <b>None</b> .   |



| Field   | Description  |
|---|--|
| <b>Data approval workflow</b>                       | The data approval workflow you want to use. The default setting is <b>No value</b> .   |
| <b>Completed events expiry date</b>                 | <p>Defines the number of days for which you can edit a completed event. This means that when an event is completed and the specified number of expiry days has passed, the event is locked.</p> <p>If you set "Completed events expiry days" to 10", an event is locked ten days after the completion date. After this date you can no longer edit the event.</p>  |
| <b>Expiry period type</b><br><br><b>Expiry days</b> | <p>The expiry days defines for how many days after the end of the previous period, an event can be edited. The period type is defined by the expiry period type. This means that when the specified number of expiry days has passed since the end date of the previous period, the events from that period are locked.</p> <p>If you set the expiry type to "Monthly" and the expiry days to "10" and the month is October, then you can't add or edit an event to October after the 10<sup>th</sup> of November.</p>   |
| <b>Block entry form after completed</b>             | <p>Select checkbox to block the entry form after completion of the event of this program.</p> <p>This means that the data in the entry form can't be changed until you reset the status to incomplete.</p>   |
| <b>Feature type</b>                                 | <p>Sets whether the program is going to capture a geographical feature type or not.</p> <p>4. <b>None</b> Nothing is captured.</p> <p>5. <b>Polygon</b> An area is captured. For single event programs the area will be the area representing the event being captured. For tracker programs, the area will represent the area of the enrollment.</p> <p>6. <b>Point</b> A point/coordinate is captured. For single event programs the point will be representing the event being captured. For tracker programs, the point will represent the enrollment.</p> |

| Field                             | Description   |
|-----------------------------------|---|
| <b>Validation strategy</b>        | <p>Sets the server and client side validation requirement. &gt; Data type validations is always performed regardless of the validation strategy. An integer field is never stored containing text, for example.</p> <p>7. <b>On complete</b> This option will enforce required field and error messages to be fixed when completing the event, but the event can be saved to the server without passing these validation requirements.</p> <ul style="list-style-type: none"> <li>◦ For legacy reasons, this is always the validation strategy for tracker programs, where each data value in the event is stored to the server while entering data.</li> </ul> <p>8. <b>On update and insert</b> This option will enforce required field validation when saving the event to the server regardless of the completion status. When using this option no events can be stored without passing validations.</p> |
| <b>Pre-generate event UID</b>     | Select checkbox to pre-generate unique event id numbers.  |
| <b>Description of report date</b> | <p>Type a description of the report date.</p> <p>This description is displayed in the case entry form.</p>  |

9. Click next.

### Assign data elements

1. Click **Assign data elements**.
2. In the list of available items, double-click the data elements you want to assign to the event program.
3. (Optional) For each data element, add additional settings:

| Setting                         | Description  |
|---------------------------------|--|
| <b>Compulsory</b>               | The value of this data element must be filled into data entry form before you can complete the event.                |
| <b>Allow provided elsewhere</b> | Specify if the value of this data element comes from other facility, not in the facility where this data is entered. |

| Setting                    | Description   |
|----------------------------|---|
| <b>Display in reports</b>  | Displays the value of this data element into the single event without registration data entry function.   |
| <b>Date in future</b>      | Will allow user to select a date in future for date data elements.  |
| <b>Mobile render type</b>  | Can be used to select different render types for mobile devices. Available options vary depending on the data element's value type. For example, for a numerical value you may select "Default", "Value", "Slider", "Linear scale", and "Spinner".  |
| <b>Desktop render type</b> | WARNING: NOT IMPLEMENTED YET.<br><br>Can be used to select different render types for desktop (i.e. the web interface). Available options vary depending on the data element's value type. For example, for a numerical value you may select "Default", "Value", "Slider", "Linear scale", and "Spinner". |

4. Click next.

### Create data entry forms

The data entry forms decide how the data elements will be displayed to the user in the **Event Capture** app.

1. Click **Create data entry form**.
2. Click **Basic**, **Section** or **Custom**.
3. To create a **Basic** data entry form: Drag and drop the data elements in the order you want.
4. To create a **Section** data entry form:
  1. Click the add button and enter a section's name, description and render type for desktop and mobile.
  2. Click the section so it's highlighted by a black line.
  3. Add data elements by clicking the plus sign next to the data elements' names.
  4. Repeat above steps until you've all the sections you need.
  5. Change the section order: click the options menu, then drag the section to the place you want.

- To create a **Custom** data entry from: Use the WYSIWYG editor to create a completely
5. customized form. If you select **Source**, you can paste HTML code directly in the editing area. You can also insert images for example flags or logos.
  6. Click next.

### Access

Access options decide who can capture data for the program or view/edit the program's metadata. A program can be shared to organisation units, and in addition, the main program and any program stages' access options can be configured through the **Sharing dialog**. Access options are available in the **Access** tab.

Assign organization units:

1. In the organisation tree, double-click the organisation units you want to add to the program to.

You can locate an organisation unit in the tree by expanding the branches (click on the arrow symbol), or by searching for it by name. The selected organisation units display in orange.

Change roles and access:

1. Scroll down to the **Roles and access** section.

The first row shows the main program's access options, and each subsequent row shows the options of one program stage. Program stages with a warning icon (exclamation mark) contain access options that deviate from the main program, meaning they are accessed by a different combination of users.

2. Click on either of the rows and the **Sharing dialog** will show.
3. Modify the access options accordingly. See documentation on the sharing dialog for details.
4. Click the **Apply** button.
5. Repeat the process for each program/program stage. You can also copy all access options from the main program to your child programs:

1. Select the program stages you want to have similar access options as the main program by toggling the checkboxes on the right hand side of the program stages. You can also choose to **Select all** program stages, **Deselect all** program stages or **Select similar** stages, in terms of access options, to that of the main program. Similar stages are toggled by default.

2. Click **Apply to selected stages**

### Create program notifications

1. Create the message you want to send:
    1. Click **What to send?**.
    2. Enter a **Name**.
    3. Create the **Subject template**: Double-click the parameters in the **Template variables** field to add them to your subject.
-

**Note**

The subject is not included in text messages.

4. Create the **Message template**: Double-click the parameter names in the **Template variables** list to add them to your message.

Dear A{w75KJ2mc4zz}, You're now enrolled in V{program\_name}.

2. Define *when* you want to send the message:

1. Click **When to send it?**.
2. Select a **Notification trigger**.

| Notification trigger      | Description  |
|---------------------------|--|
| Program stage completion  | The program stage notification is sent when the program stage is completed   |
| Days scheduled (due date) | The program stage notification is sent XX number of days before or after the due date<br><br>You need to enter the number of days before or after the scheduled date that the notification will be send. |

3. Define *who* you want to send the message to:

1. Click **Who to send it to?**.
2. Select a **Notification recipient**.

| Notification recipient    | Description  |
|---------------------------|--|
| Tracked entity instance   | Receives program notifications via e-mail or text message.<br><br>To receive a program notification, the recipient must have an e-mail address or a phone number attribute.                                      |
| Organisation unit contact | Receives program notifications via e-mail or text message.<br><br>To receive a program notification, the receiving organisation unit must have a registered contact person with e-mail address and phone number. |

| Notification recipient     | Description   |
|----------------------------|---|
| Users at organisation unit | All users registered to the selected organisation unit receive program notifications via the internal DHIS2 messaging system. |
| User group                 | All members of the selected user group receive the program notifications via the internal DHIS2 messaging system              |
| Program                    | TBA   |

3. Click **Save**.

4. Repeat above steps to create all the program notifications you need.

5. Click **Save**.

**Note**

You configure when the program notifications are sent in the **Data Administration** app > **Scheduling** > **Program notifications scheduler**.

- Click **Run now** to send the program notifications immediately.
- Select a time and click **Start** to schedule the program notifications to be send at a specific time.

**Reference information: Program notification parameters**

*Program notification parameters to use in program notifications*

| Notification type | Variable name              | Variable code                 |
|-------------------|----------------------------|-------------------------------|
| Program           | Current date               | V{current_date}               |
|                   | Days since enrollment date | V{days_since_enrollment_date} |
|                   | Enrollment date            | V{enrollment_date}            |
|                   | Incident date              | V{incident_date}              |

| Notification type | Variable name          | Variable code          |
|-------------------|------------------------|------------------------|
|                   | Organisation unit name | V{org_unit_name}       |
|                   | Program name           | V{program_name}        |
| Program stage     | Current date           | V{current_date}        |
|                   | Days since due date    | V{days_since_due_date} |
|                   | Days until due date    | V{days_until_due_date} |
|                   | Due date               | V{due_date}            |
|                   | Organisation unit name | V{org_unit_name}       |
|                   | Program name           | V{program_name}        |
|                   | Program stage name     | V{program_stage_name}  |

## Configure tracker programs in the Maintenance app

### About Tracker programs

Single or multiple event programs *with* registration are called Tracker programs. A program must be specified with only one tracked entity. Only tracked entities that are the same as the tracked entity of program can enroll into that program. A program needs several types of metadata that you create in the **Maintenance** apps.

### Workflow: Create a tracker program

1. Enter the tracker program details.
2. Enter enrollment details.
3. Assign attributes and create **section** or **custom** registration form.

- Create program stages.
- 4.
  5. Configure access, and assign to organisation units.
  6. Create program and program stage notification(s).

### Create or edit a Tracker program

1. Open the **Maintenance** app and click **Program > Program**.
2. Click the add button and select **Tracker Program** in the popup menu.

### Enter program details

| Field   | Description  |
|---|--|
| <b>Name</b>                                     | The name of the program.   |
| <b>Color</b>                                    | Color used for this program in Tracker capture.  |
| <b>Icon</b>                                     | Icon used for this program in Tracker capture  |
| <b>Short name</b>                               | A short name of the program. The short name is used as the default chart or table title in the analytics apps.   |
| <b>Description</b>                              | A detailed description of the program.   |
| <b>Version</b>                                  | The version of the program. This is used for example when people collect data offline in an Android implementation. When they go online and synchronize their metadata, they should get the latest version of the program. |
| <b>Tracked Entity Type</b>                      | The tracked entity type you want to use. A program can only have one type of tracked entity.   |
| <b>Category combination</b>                     | The category combination you want to use. The default setting is <b>None</b> .   |
| <b>Display front page list</b>                  | Select checkbox to display a list of Tracked Entity Instances in Tracker Capture. If not selected, the Search will be displayed.   |
| <b>First stage appears on registration page</b> | Select checkbox to display the first program stage together with the registration (enrollment).  |
| <b>Access level</b>                             | Choose the access level of the program.  |



| Field  | Description   |
|--|---|
| <p><b>Completed events expiry days</b></p>                                   | <p>Defines the number of days for which you can edit a completed event. This means that when an event is completed and the specified number of expiry days has passed, the event is locked.</p> <p>If you set "Completed events expiry days" to 10", an event is locked ten days after the completion date. After this date you can no longer edit the event.</p>   |
| <p><b>Expiry period type</b></p> <p><b>Expiry days</b></p>                   | <p>The expiry days defines for how many days after the end of the previous period, an event can be edited. The period type is defined by the expiry period type. This means that when the specified number of expiry days has passed since the end date of the previous period, the events from that period are locked.</p> <p>If you set the expiry type to "Monthly" and the expiry days to "10" and the month is October, then you can't add or edit an event to October after the 10th of November.</p> |
| <p><b>Minimum number of attributes required to search</b></p>                | <p>Specify the number of tracked entity attributes that needs to be filled in to search for Tracked Entities in the Program.</p>  |
| <p><b>Maximum number of tracked entity instances to return in search</b></p> | <p>Specify the maximum number of tracked entity instances that should be returned in a search. Enter 0 for no limit.</p>  |

**Enter enrollment details**

| Field                                       | Description  |
|---|--|
| <p><b>Allow future enrollment dates</b></p> | <p>Select checkbox if you want to allow tracked entity instances to be enrolled in the program on a future date.</p> |
| <p><b>Allow future incident dates</b></p>   | <p>Select checkbox if you want to allow the incident date in the program to be on a future date.</p>                 |

| Field  | Description   |
|--|---|
| <b>Only enroll once (per tracked entity instance lifetime)</b> | Select checkbox if you want a tracked entity to be able to enroll only once in a program. This setting is useful for example in child vaccination or post-mortem examination programs where it wouldn't make sense to enroll a tracked entity more than once.   |
| <b>Show incident date</b>                                      | This setting allows you to show or hide the incident date field when a tracked entity enroll in the program.  |
| <b>Description of incident date</b>                            | <p>Type a description of the incident date</p> <p>For example:</p> <p>In an immunization program for child under 1 year old, the incident date is the child's birthday.</p> <p>In a maternal program, the incident date is the date of last menstrual period.</p>   |
| <b>Type a description of the enrollment date</b>               | The date when the tracked entity is enrolled into the program   |
| <b>Ignore overdue events</b>                                   | When a tracked entity enrolls into the program, the events corresponding to the program stages are created. If you select this checkbox, the system will not generate overdue events.   |
| <b>Feature type</b>  | <p>Sets whether the program is going to capture a geographical feature type or not.</p> <ul style="list-style-type: none"> <li>• <b>None:</b> Nothing is captured.</li> <li>• <b>Polygon:</b> An area is captured. For single event programs the area will be the area representing the event being captured. For tracker programs, the area will represent the area of the enrollment.</li> <li>• <b>Point:</b> A point/coordinate is captured. For single event programs the point will be representing the event being captured. For tracker programs, the point will represent the enrollment.</li> </ul> |
| <b>Related program</b>   | Choose a Tracker program which is related to the program you are creating, for example an ANC and a Child program.  |

**Assign tracked entity attributes.**

1. In the list of **Available program tracked entity attributes**, double-click the attributes you want to assign to the program.
2. (Optional) For each assigned attribute, add additional settings:

| Setting                    | Description  |
|----------------------------|--|
| <b>Display in list</b>     | Displays the value of this attribute in the list of tracked entity instances in Tracker capture.   |
| <b>Mandatory</b>           | The value of this attribute must be filled into data entry form before you can complete the event.   |
| <b>Date in future</b>      | Will allow user to select a date in future for date attributes.  |
| <b>Mobile render type</b>  | Can be used to select different render types for mobile devices. Available options vary depending on the attribute's value type. For example, for a numerical value you may select "Default", "Value", "Slider", "Linear scale", and "Spinner".  |
| <b>Desktop render type</b> | WARNING: NOT IMPLEMENTED YET.<br><br>Can be used to select different render types for desktop (i.e. the web interface). Available options vary depending on the attribute's value type. For example, for a numerical value you may select "Default", "Value", "Slider", "Linear scale", and "Spinner". |

## 3. Create registration form

The registration form defines how the attributes will be displayed to the user in consuming apps, such as Android and Tracker Capture.

1. Click **Create registration form**.
2. Click **Section** or **Custom**.
3. To create a **Section** form:
  1. Click the add button and enter a section's name, description and render type for desktop and mobile.
  2. Click the section so it is highlighted by a black border.
  3. Add data elements by clicking the plus sign next to the name of the data elements you wish to add.

4. Repeat above steps until you have all the sections you need. To change the section order: click the options menu, then drag the section to the place you want.
4. To create a **Custom** registration form: Use the WYSIWYG editor to create a completely customized form. If you select Source, you can paste HTML code directly in the editing area. You can also insert images for example flags or logos.
5. Click add stage.

**Create program stages**

A program consist of program stages. A program stage defines which actions should be taken at each stage.

**Note**  
Changes to a program stage is not saved until you save the program.

1. Click the plus sign to create a program stage.
2. Enter program stage details: 1. Enter a **Name**. 2. (Optional) select a **Color** and an **Icon** that will be used by the data capture apps to identify this program stage. 3. Enter a **Description**. 4. In the **Scheduled days from start** field, enter the minimum number of days to wait for starting the program stage.
3. Enter repeatable program stage details.
  1. Specify if the program stage is **Repeatable** or not.
  2. Select a **Period type**.
  3. Clear **Display generate event box after completed** if you don't want to display *Create new event box* to create new event for a repeatable stage after you click *Complete* for an event of the stage in data entry form. This field is selected by default.
  4. Enter **Standard interval days**. The number of days to repeat the repeatable program stage.
  5. (Optional) Select a **Default next scheduled date**. This will show a list of assigned data elements of type **date**. If an element is selected, the Tracker client will use this as the default starting date. The data element can be used by program rules to dynamically schedule intervals between events.
4. Enter form details

| Option                                       | Action   |
|--|--|
| <b>Auto-generate event</b>                   | Clear check box to prevent creating an event of this program stage automatically when a entity is enrolled in the program. |
| <b>Open data entry form after enrollment</b> | Select check box to automatically open the event of this stage as soon as the entity has enrolled into the program.        |

| Option   | Action   |
|--|--|
| <p><b>Report date to use</b></p>                                   | <p>If you have selected the <b>Open data entry form after enrollment</b> check box, also select a <b>Report date to use: Date of incident</b> or <b>Date of enrollment</b>.</p> <p>This is the date used as report date for an event that has been opened automatically.</p> <p>If the <b>Report date to use</b> is selected as one of those two ('incident date'/enrollment date'), in Dashboard, the 'Report date' of the event will be set as one of those two.</p> |
| <p><b>User assignment of events</b></p>                            | <p>Select check box to enable user assignment of the program stage.</p> <p>This means that in Tracker capture there will be a list of users to which the event can be assigned.</p>  |
| <p><b>Block entry form after completed</b></p>                     | <p>Select check box to block the entry form after completion of the event of this stage.</p> <p>This means that the data in the entry form can't be changed until you reset the status to incomplete.</p>  |
| <p><b>Ask user to complete program when stage is completed</b></p> | <p>Select check box to trigger a pop-up which asks the user if he/she wants to create the event of next stage.</p>   |
| <p><b>Ask user to create new event when stage is complete</b></p>  | <p>Select check box to trigger a pop-up which asks the users if he/she wants to create a new event of this stage when an event of this stage is completed.</p> <p>This property is active only if you have selected <b>Repeatable</b>.</p>   |
| <p><b>Generate events by enrollment date</b></p>                   | <p>Check on it for auto-generating due dates of events from program-stages of this program based on the enrollment date. If it is not checked, the due dates are generated based on incident date.</p>   |
| <p><b>Hide due dates</b></p>                                       | <p>Select checkbox to hide due dates for events.</p>   |

| Option                            | Action  |
|-----------------------------------|---|
| <b>Feature type</b>               | <p>Sets whether the program is going to capture a geographical feature type or not.</p> <ul style="list-style-type: none"> <li>• <b>None:</b> Nothing is captured.</li> <li>• <b>Polygon:</b> An area is captured. For single event programs the area will be the area representing the event being captured. For tracker programs, the area will represent the area of the enrollment.</li> <li>• <b>Point:</b> A point/coordinate is captured. For single event programs the point will be representing the event being captured. For tracker programs, the point will represent the enrollment.</li> </ul> |
| <b>Pre-generate event UID</b>     | Select check box to pre-generate unique event id numbers.   |
| <b>Description of report date</b> | <p>Type a description of the report date.</p> <p>This description is displayed in the data entry form.</p>  |
| <b>Description of due date</b>    | Type a description of the due date.   |

1. Assign data elements to program stage:

1. In the list of **Available data elements**, double-click the data elements you want to assign to the program stage.
2. For each assigned data element, review the properties. You can select:

| Option                          | Action   |
|---------------------------------|--|
| <b>Compulsory</b>               | The value of this data element must be filled into data entry form before completing the event.                      |
| <b>Allow provided elsewhere</b> | Specify if the value of this data element comes from other facility, not in the facility where this data is entered. |
| <b>Display in reports</b>       | Display the value of this data element into the single event without registration data entry function.               |
| <b>Date in future</b>           | Allow to select a date in future for date data elements.   |

| Option                      | Action  |
|-----------------------------|---|
| <b>Skip synchronization</b> | Allow data element to be skipped when running data synchronization jobs.  |
| <b>Mobile render type</b>   | Can be used to select different render types for mobile devices. Available options vary depending on the attribute's value type. For example, for a numerical value you may select "Default", "Value", "Slider", "Linear scale", and "Spinner".   |
| <b>Desktop render type</b>  | <p>WARNING: NOT IMPLEMENTED YET.</p> <p>Can be used to select different render types for desktop (i.e. the web interface). Available options vary depending on the attribute's value type. For example, for a numerical value you may select "Default", "Value", "Slider", "Linear scale", and "Spinner".</p> |

### 1. Create data entry forms for program stage

The data entry forms decide how the data elements will be displayed to the user in the **Tracker Capture** app.

1. Click **Create data entry form**.
2. Click **Basic**, **Section** or **Custom**.
3. To create a **Basic** data entry form: Drag and drop the data elements in the order you want.
4. To create a **Section** data entry form:
  1. Click the add button and enter a section's name, description and render type for desktop and mobile.
  2. Click the section so it's highlighted by a black border.
  3. Add data elements by clicking the plus sign next to the data elements' names.
  4. Repeat above steps until you've all the sections you need.
  5. Change the section order: click the options menu, then drag the section to the place you want.
5. To create a **Custom** data entry form: Use the WYSIWYG editor to create a completely customized form. If you select **Source**, you can paste HTML code directly in the editing area. You can also insert images for example flags or logos.
6. Click add stage.

---

## Access

Access options decide who can capture data for the program or view/edit the program's metadata. A program can be shared to organisation units, and in addition, the main program and any program stages' access options can be configured through the **Sharing dialog**. Access options are available in the **Access** tab.

Assign organization units:

1. In the organisation tree, double-click the organisation units you want to add to the program to.

You can locate an organisation unit in the tree by expanding the branches (click on the arrow symbol), or by searching for it by name. The selected organisation units display in orange.

Change roles and access:

1. Scroll down to the **Roles and access** section.

The first row shows the main program's access options, and each subsequent row shows the options of one program stage. Program stages with a warning icon (exclamation mark) contain access options that deviate from the main program, meaning they are accessed by a different combination of users.

2. Click on either of the rows and the **Sharing dialog** will show.
3. Modify the access options accordingly. See documentation on the sharing dialog for details.
4. Click the **Apply** button.
5. Repeat the process for each program/program stage. You can also copy all access options from the main program to your child programs:

1. Select the program stages you want to have similar access options as the main program by toggling the checkboxes on the right hand side of the program stages. You can also choose to **Select all** program stages, **Deselect all** program stages or **Select similar** stages, in terms of access options, to that of the main program. Similar stages are toggled by default.

2. Click **Apply to selected stages**

## Create program notifications

You can create program notifications for programs with registration and their program stages. The notifications are sent either via the internal DHIS2 messaging system, via e-mail or via text messages (SMS). You can use program notifications to, for example, send an automatic reminder to a tracked entity 10 days before a scheduled appointment. You use the program's tracked entity attributes (for example first name) and program parameters (for example enrollment date) to create a notification template.

1. Open the **Maintenance** app and click **Program and then notifications**.

A list of existing program notifications for the selected program opens. If the program doesn't have any program notifications, the list is empty.

2. Click on add button and select **Program notification**.





### Program notification

1 What to send?

2 When to send it?

- Program completion
- Program enrollment
- Days scheduled (incident date)
- Days scheduled (enrollment date)
- Program rule

3

### Program notification

1 What to send?

2 When to send it?

3 Who to send it to?

- Tracked entity instance
- Organisation unit contact
- Users at Organisation Unit
- User Group
- Program attribute

3. Enter a **Name**.

4. Create the **Subject template**.

Double-click the parameters in the **Parameters** field to add them to your subject.

**Note**

The subject is not included in text messages.

5. Create the **Message template**.

Double-click the parameter names in the **Parameters** field to add them to your message.

Dear A{w75KJ2mc4zz}, You're now enrolled in V{program\_name}.

6. In the **When-to-send it** field, select what should trigger the notification.

| Trigger                          | Description  | Note  |
|----------------------------------|--|---|
| Program enrollment               | The program notification is sent when the TEI enrolls in the program.                  | -   |
| Program completion               | The program notification is sent when the program of TEI is completed                  | -   |
| Days scheduled (incident date)   | The program notification is sent XX number of days before or after the incident date   | You need to enter the number of days before or after the scheduled date that the notification will be send. |
| Days scheduled (enrollment date) | The program notification is sent XX number of days before or after the enrollment date | You need to enter the number of days before or after the scheduled date that the notification will be send. |
| Program Rule                     | Notification will be triggered as a result of program rule exeuction.                  | Program rule with ProgramRuleActionType.SENDMESSAGE need to be in place to make this trigger successful.    |

7. In the **Who-to-send-it** field, select who should receive the program notification.

| Recipient type            | Description  | Note   |
|---------------------------|--|--|
| Tracked entity instance   | Receives program notifications via e-mail or text message. | To receive a program notification, the recipient must have an e-mail address or a phone number attribute.                                      |
| Organisation unit contact | Receives program notifications via e-mail or text message. | To receive a program notification, the receiving organisation unit must have a registered contact person with e-mail address and phone number. |

| Recipient type              | Description   | Note  |
|-----------------------------|---|---|
| Users at organisation unit: | All users registered to the selected organisation unit receive program notifications via the internal DHIS2 messaging system. | -   |
| User group                  | All members of the selected user group receive the program notifications via the internal DHIS2 messaging system              | -   |
| Limit To Hierarchy          | Send notification only to those users who belong to any of the organisation unit in the hierarchy.                            | This option is only available when User Group is selected as recipient.                           |
| Parent OrgUnit Only         | Send notification only to those users who belong to parent organisation unit.   | This option is only available when User Group is selected as recipient.                           |
| Program Attribute           | TrackedEntityAttribute can also be selected as recipient.   | This parameter will only be effective if TrackedEntityAttribute value type is PHONE_NUMBER/EMAIL. |

8. Click **Save**.

### Create a program stage notification

## Program stage notification

Immunization visit reminder

#### 1 What to send?

Program stage

Birth

Name (\*)

Immunization visit reminder

Message template

Subject template

Immunization visit reminder

Template variables

Birth certificate

MCH Apgar comment

MCH Apgar Score

MCH ARV at birth

MCH BCG dose

MCH Infant Feeding

Message template (\*)

Dear A{w75KJ2mc4zz}. This to remind you that you have an upcoming visit in V{days\_until\_due\_date} days for your second immunization visit at V{program\_stage\_name} health facility. Please ensure to bring your immunization card with you.

#### 2 When to send it?

CANCEL

DONE

### Program stage notification

Immunization visit reminder

#### 1 What to send?

Program stage

Birth

Name (\*)

Immunization visit reminder

#### Message template

Subject template

Immunization visit reminder

Template variables

Birth certificate

MCH Apgar comment

MCH Apgar Score

MCH ARV at birth

MCH BCG dose

MCH Infant Feeding

Message template (\*)

Dear A{w75KJ2mc4zz}. This to remind you that you have an upcoming visit in V{days\_until\_due\_date} days for your second immunization visit at V{program\_stage\_name} health facility. Please ensure to bring your immunization card with you.

#### 2 When to send it?

CANCEL

DONE

## Program stage notification

Immunization visit reminder

**1 What to send?**

Program stage  
Birth

Name (\*)  
Immunization visit reminder

Message template

|   |   |
|---|---|
| <p>Subject template<br/>Immunization visit reminder</p> <p>Message template (*)<br/>Dear A{w75KJ2mc4zz}. This to remind you that you have an upcoming visit in V{days_until_due_date} days for your second immunization visit at V{program_stage_name} health facility. Please ensure to bring your immunization card with you.</p> | <p>Template variables</p> <ul style="list-style-type: none"> <li>Birth certificate</li> <li>MCH Apgar comment</li> <li>MCH Apgar Score</li> <li>MCH ARV at birth</li> <li>MCH BCG dose</li> <li>MCH Infant Feeding</li> </ul> |
|---|---|

**2 When to send it?**

CANCEL DONE

1. Open the **Maintenance** app and click **Program and then notifications**.

A list of existing program stage notifications for the selected program stage opens. If the program stage doesn't have any program stage notifications, the list is empty.

2. Click on add button and select **Program stage notification**.
3. Click **Add new**.
4. Enter a **Name**.
5. Create the **Subject template**.

Double-click the parameter names in the **Parameters** field to add them to your subject.

### Note

The subject is not included in text messages.

6. Create the **Message template**.

Double-click the parameter names in the **Parameters** field to add them to your message.

Dear A{w75KJ2mc4zz}, please come to your appointment the V{due\_date}.

7. In the **When-to-send-it** field, select what should trigger the notification.

| Trigger                   | Description   | Note  |
|---------------------------|---|---|
| Program stage completion  | The program stage notification is sent when the program stage is completed            | -   |
| Days scheduled (due date) | The program stage notification is sent XX number of days before or after the due date | You need to enter the number of days before or after the scheduled date that the notification will be send. |
| Program Rule              | Notification will be triggered as a result of program rule execution.                 | Program rule with ProgramRuleActionType.SENDMESSAGE need to be in place to make this trigger successful.    |

8. In the **Recipients** field, select who should receive the program stage notification. You can select:

| Recipient type              | Description   | Note   |
|-----------------------------|---|--|
| Tracked entity instance     | Receives program notifications via e-mail or text message.  | To receive a program stage notification, the recipient must have an e-mail address or a phone number attribute.  |
| Organisation unit contact   | Receives program notifications via e-mail or text message.  | To receive a program stage notification, the receiving organisation unit must have a registered contact person with e-mail address and phone number.<br><br>The system selects the same organisation unit as where the event took place. |
| Users at organisation unit: | All users registered to the selected organisation unit receive program notifications via the internal DHIS2 messaging system. | -  |

| Recipient type      | Description  | Note   |
|---------------------|--|--|
| User group          | All members of the selected user group receive the program notifications via the internal DHIS2 messaging system | -  |
| Limit To Hierarchy  | Send notification only to those users who belong to any of the organisation unit in the hierarchy.               | -  |
| Parent OrgUnit Only | Send notification only to those users who belong to parent organisation unit.                                    | -  |
| Data Element        | Data Element associated with ProgramStage can be selected as recipient.  | Data Element will only be effective if DataElement has value type PHONE_NUMBER /EMAIL. |

9. Click **Save**.

**Reference information: Program notification parameters**

*Program notification parameters to use in program notifications*

| Notification type | Variable name              | Variable code                 |
|-------------------|----------------------------|-------------------------------|
| Program           | Current date               | V{current_date}               |
|                   | Days since enrollment date | V{days_since_enrollment_date} |
|                   | Enrollment date            | V{enrollment_date}            |
|                   | Incident date              | V{incident_date}              |
|                   | Organisation unit name     | V{org_unit_name}              |



| Notification type | Variable name          | Variable code          |
|-------------------|------------------------|------------------------|
|                   | Program name           | V{program_name}        |
| Program stage     | Current date           | V{current_date}        |
|                   | Days since due date    | V{days_since_due_date} |
|                   | Days until due date    | V{days_until_due_date} |
|                   | Due date               | V{due_date}            |
|                   | Organisation unit name | V{org_unit_name}       |
|                   | Program name           | V{program_name}        |
|                   | Program stage name     | V{program_stage_name}  |

## Configure program indicators

### About program indicators

Program indicators are expressions based on data elements and attributes of tracked entities which can be used to calculate values based on a formula. Program indicators consist of an aggregation type, an analytics type, an expression and a filter.

Program indicators are evaluated based on the assigned aggregation type, expression and filter. The order of evaluation is:

1. The *filter* will filter the events which become part of the evaluation/aggregation routine.
2. The *expression* will be evaluated per event.
3. All evaluated expression values will be *aggregated* according to the aggregation type of the program indicator.

### Program indicator components

| Program rule component | Description   |
|------------------------|---|
| Aggregation type       | <p>The aggregation type determines how the program indicator will be aggregated. The following aggregation types are available:</p> <ul style="list-style-type: none"> <li>• Average</li> <li>• Average (number)</li> <li>• Average (number, disaggregation)</li> <li>• Average (sum in organisation unit hierarchy)</li> <li>• Average (sum of numbers)</li> <li>• Average (sum of numbers, disaggregation)</li> <li>• Average (Yes/No)</li> <li>• Count</li> <li>• Custom</li> </ul> <p>The "custom" aggregation type allows you to specify the aggregation type in-line in the expression. All other aggregation types are applied to the entire expression.</p> <p>Using the "custom" aggregation type might lead to an exception of the order of evaluation described above where individual parts of the expression can be evaluated and aggregated, as opposed to the entire expression being evaluated prior to aggregation.</p> <ul style="list-style-type: none"> <li>• Default</li> <li>• Max</li> <li>• Min</li> <li>• None</li> <li>• Standard deviation</li> <li>• Sum</li> <li>• Variance</li> </ul> |

| Program rule component | Description  |
|------------------------|--|
| Analytics type         | <p>The available analytics types are <i>event</i> and <i>enrollment</i>.</p> <p>The analytics type defines whether the program indicator is calculated based on events or program enrollments. This has an impact on what type of calculations can be made.</p> <ul style="list-style-type: none"><li>• Events implies a data source where each event exists as an independent row. This is suitable for performing aggregations such as counts and sums.</li><li>• Enrollments implies a data source where all events for a single enrollment is combined on the same row. This allows for calculations which can compare event data from various program stages within a program enrollment.</li></ul> |

## Analytics period boundaries

Defines the boundaries for the program indicator calculation. The boundaries determine which events or enrollments gets included in aggregations, always relative to the aggregate reporting period start and end. When creating the program indicator, the default boundaries will get preselected based on analytics type.

- For analytics type *event*, the default boundaries will be configured to encapsulate any events with an event date after the reporting period starts and before the reporting period ends.
- For analytics type *enrollment*, the default boundaries will encapsulate all enrollments with an enrollment date after the reporting date starts and before the reporting period ends. In addition, the default enrollment program indicator evaluates the newest event for all program stages regardless of date.

It is possible to change the upper and lower boundaries to include a longer or shorter period relative to the reporting period, or delete one of the boundaries - in effect returning all data before or after a certain period. It is also possible to add more constraints, for example to make an enrollment program indicator only include event data up to a given point in time.

- Boundary target: Can be *incident date*, *event date*, *enrollment date* or *custom*. Designates what is being constrained by the boundary.

*custom* is used make boundary that target either a date data element, tracked entity attribute or the presence of an event in a program stage. This is done with a custom expression on the form:

- Data element of type date:  
#{programStageUid.dataElementUid}.

```
#{A03MvHHogjR.a3kGcGDCuk6}
```

- Tracked entity attribute of type date:  
#{attributeUid}.

```
A{GPKGfbmArby}
```

- Presence of one event in a specific program stage:

```
PS_EVENTDATE:programStageUid.
```

| Program rule component | Description   |
|------------------------|---|
| <p>Expression</p>      | <p>The expression defines how the indicator is being calculated. The expression can contain references to various entities which will be substituted with a related values when the indicator is calculated:</p> <ul style="list-style-type: none"> <li>• <b>Data elements:</b> Will be substituted with the value of the data element for the time period and organisation unit for which the calculation is done. Refers to both program stage and data element.</li> <li>• <b>Attributes:</b> Will be substituted with the value of the attribute for the person / tracked entity for which the calculation is done.</li> <li>• <b>Variables:</b> Will be substituted with special values linked to the program, including incident date and date of enrollment for the person, current date and count of values in the expression for the time period and organisation unit for which the calculation is done.</li> <li>• <b>Constants:</b> Will be substituted with the value of the constant.</li> </ul> <p>The expression is a mathematical expression and can also contain operators.</p> <p>For single event programs and tracker programs with analytics type <i>event</i>, the expression will be evaluated <i>per event</i>, then aggregated according to its aggregation type.</p> <p>For tracker programs with analytics type <i>enrollment</i>, the expression will be evaluated <i>per enrollment</i>, then aggregated according to its aggregation type.</p> |

| Program rule component | Description  |
|------------------------|--|
| Filter                 | <p>The filter is applied to events and filters the data source used for the calculation of the indicator. I.e. the filter is applied to the set of events before the indicator expression is being evaluated. The filter must evaluate to either true or false. It filter is applied to each individual event. If the filter evaluates to true then the event is included later in the expression evaluation, if not it is ignored. The filter can, in a similar way as expressions, contain references to data elements, attributes and constants.</p> <p>The program indicator filter can in addition use logical operators. These operators can be used to form logical expressions which ultimately evaluate to either true or false. For example you can assert that multiple data elements must be a specific value, or that specific attributes must have numerical values less or greater than a constant.</p> |

In the **Maintenance** app, you manage the following program indicator objects:

| Object type             | Available functions  |
|-------------------------|--|
| Program indicator       | Create, edit, clone, share, delete, show details and translate |
| Program indicator group | Create, edit, clone, share, delete, show details and translate |

### Create or edit a program indicator

#### Note

A program indicator belongs to exactly one program.

1. Open the **Maintenance** app and click **Indicator > Program indicator**.
2. Click the add button.
3. Select a **Program** and enter:
  - **Name**
  - **Short name**
  - **Code**
  - **Color**

---

**Icon**

◦

◦ **Description**

4. Select number of **Decimals in data output**.
5. Select an **Aggregation type**.
6. Select a if you want to **Display in form**.
7. Assign one or multiple **\*\*Legend\*\***s.
8. (Optional) Enter a **Category option combination for aggregate data export**.
9. (Optional) Enter an **Attribute option combination for aggregate data export**.
10. Create the expression.
  1. Click **Edit expression**.
  2. Create the expression based on mathematical operators and the attributes, variables and constants listed to the right.
11. Create the filter.
  1. Click **Edit filter**.
  2. Create the expression based on mathematical operators and the attributes, variables and constants listed to the right.
12. Click **Save**.

**Create or edit a program indicator group**

1. Open the **Maintenance** app and click **Indicator > Program indicator group**.
2. Click the add button.
3. Enter **Name** and **Code**.
4. In the list of available program indicators, double-click the program indicators you want to assign to your group.
5. Click **Save**.

**Reference information: Expression and filter examples per value type**

The table below shows examples of how to write expressions and filters for different data element and attribute value types:

***Expression and filter examples per value type***

| Value types   | Example syntax  |
|---|---|
| Integer<br>Negative integer<br>Positive or zero integer<br>Positive integer<br>Number<br>Percentage | Numeric fields, can be used for aggregation as an expression, or in filters:<br><br><pre>#{mCXR7u4kNBW.K0A4BauXJD1} &gt;= 3</pre>   |
| Yes/No<br>Yes only  | Boolean fields. Yes is translated to numeric 1, No to numeric 0. Can be used for aggregation as an expression, or in filters:<br><br><pre>#{mCXR7u4kNBW.Popa3BauXJss} == 1</pre>  |
| Text<br>Long text<br>Phone number<br>Email  | Text fields. Can be checked for equality in filters:<br><br><pre>#{mCXR7u4kNBW.L8K4BauIKsl} == 'LiteralValue'</pre>   |
| Date<br>Age   | Date fields. Most useful when combined with a d2:daysBetween function, which produces a number that can be aggregated as an expression or used in filters:<br><br><pre>d2:daysBetween(#{mCXR7u4kNBW.JKJKBausssl},V{enrollm ent_date}) &gt; 100</pre> Can also directly be checked for equality in filters:<br><br><pre>#{mCXR7u4kNBW.JKJKBausssl} == '2011-10-28'</pre> |

**Reference information: Functions, variables and operators to use in program indicator expressions and filters**

An expression that includes both attributes, data elements and constants looks like this:

```
(A{GPKGfbmArby} + #{mCXR7u4kNBW.NFkjsNiQ9PH}) * C{bCqvFPR02Im}
```

An expression which uses the custom aggregation type and hence can use inline aggregation types looks like this:



```
(sum({mCXR7u4kNBW.K0A4BauXJD1} * {mCXR7u4kNBW.NFkjsNiQ9PH}) / sum({mCXR7u4kNBW.NFkjsNiQ9PH})) * 100
```

Note how the "sum" aggregation operator is used inside the expression itself.

### Functions to use in a program indicator expression or filter

The program indicator expression and filter support a range of functions. The functions can be applied to data elements and attributes:

#### *Functions to use in a program indicator expression or filter*

| Function              | Arguments            | Description  |
|-----------------------|----------------------|--|
| d2:hasValue           | (object)             | Returns true if the data element/attribute has a value. Can be used in filters to distinguish between the number 0 and no value, and to distinguish between explicit "No" and no selection for a Yes/No field.   |
| d2:minutes<br>Between | (datetime, datetime) | Produces the number of minutes between two data elements/attributes of type "date and time". The static datetime format is 'yyyy-MM-dd hh:mm'. Any of the arguments can be replaced with PS_EVENTDATE:(programStageUid) to compare the latest event date from a given program stage. |
| d2:daysBet<br>ween    | (date, date)         | Produces the number of days between two data elements/attributes of type date. The static date format is 'yyyy-MM-dd'. Any of the arguments can be replaced with PS_EVENTDATE:(programStageUid) to compare the latest event date from a given program stage.                         |
| d2:weeksB<br>etween   | (date, date)         | Produces the number of full weeks between two data elements/attributes of type date. The static date format is 'yyyy-MM-dd'. Any of the arguments can be replaced with PS_EVENTDATE:(programStageUid) to compare the latest event date from a given program stage.                   |
| d2:monthsB<br>etween  | (date, date)         | Produces the number of full months between two data elements/attributes of type date. The static date format is 'yyyy-MM-dd'. Any of the arguments can be replaced with PS_EVENTDATE:(programStageUid) to compare the latest event date from a given program stage.                  |
| d2:yearsBet<br>ween   | (date, date)         | Produces the number of full years between two data elements/attributes of type date. The static date format is 'yyyy-MM-dd'. Any of the arguments can be replaced with PS_EVENTDATE:(programStageUid) to compare the latest event date from a given program stage.                   |

| Function             | Arguments                             | Description  |
|----------------------|---------------------------------------|--|
| d2:condition         | (boolean-expr, true-expr, false-expr) | Evaluates the boolean expression and if true returns the true expression value, if false returns the false expression value. The conditional expression must be quoted. The true-expr and false-expr arguments must follow the rules of any program indicator expression (including functions).  |
| d2:zing              | (expression)                          | Returns zero if the expression is negative, otherwise returns the expression value. The expression must follow the rules of any program indicator expression (including functions).  |
| d2:oizp              | (expression)                          | Returns one if the expression is zero or positive, otherwise returns zero. The expression must follow the rules of any program indicator expression (including functions).   |
| d2:zpvc              | (object, [,object ...])               | Returns the number of numeric zero and positive values among the given object arguments. Can be provided any number of arguments.  |
| d2:relationshipCount | ([relationshipTypeUid])               | Produces the number of relationships of the given type that is connected to the enrollment or event. When no type is given, all types are counted.   |
| d2:count             | (dataElement)                         | Useful only for enrollment program indicators. Counts the number of data values that has been collected for the given program stage and data element in the course of the enrollment. The argument data element is supplied with the #{programStage.dataElement} syntax.   |
| d2:countIfValue      | (dataElement, value)                  | Useful only for enrollment program indicators. Counts the number of data values that matches the given literal value for the given program stage and data element in the course of the enrollment. The argument data element is supplied with the #{programStage.dataElement} syntax. The value can be a hard coded text or number, for example 'No_anemia' if only the values containing this text should be counted. |

| Function            | Arguments                             | Description   |
|---------------------|---------------------------------------|---|
| d2:countIfCondition | (dataElement, condition)              | Useful only for enrollment program indicators. Counts the number of data values that matches the given condition criteria for the given program stage and data element in the course of the enrollment. The argument data element is supplied with the <code>{programStage.dataElement}</code> syntax. The condition is supplied as a expression in single quotes, for example '<10' if only the values less than 10 should be counted. |
| if                  | (boolean-expr, true-expr, false-expr) | Evaluates the boolean expression and if true returns the true expression value, if false returns the false expression value. This is identical to the d2:condition function except that the boolean-expr is not quoted.   |
| isNull              | (object)                              | Returns true if the object value is missing (null), otherwise false.  |
| isNotNull           | (object)                              | Returns true if the object value is not missing (not null), otherwise false.  |
| firstNonNull        | (object [, object ...])               | Returns the value of the first object that is not missing (not null). Can be provided any number of arguments. Any argument may also be a numeric or string literal, which will be returned if all the previous objects have missing values.  |
| greatest            | (expression [, expression ...])       | Returns the greatest (highest) value of the expressions given. Can be provided any number of arguments. Each expression must follow the rules of any program indicator expression (including functions).  |
| least               | (expression [, expression ...])       | Returns the least (lowest) value of the expressions given. Can be provided any number of arguments. Each expression must follow the rules of any program indicator expression (including functions).  |

A filter that uses the "hasValue" function looks like this:

```
d2:hasValue({mCXR7u4kNBW.NFkjsNiQ9PH})
```

A filter that uses the "relationshipCount(relationshipTypeUid)" function looks like this:

```
d2:relationshipCount('KLkjshoQ90U')
```

An expression that uses the "zing" and "oizp" functions looks like this:

```
d2:zing(A{GPKGfbmArby}) + d2:oizp({mCXR7u4kNBW.NFkjsNiQ9PH})
```

An expression that uses the "daysBetween" function looks like this:

```
d2:daysBetween({mCXR7u4kNBW.k8ja2Aif1Ae}, '2015-06-01')
```

An expression that uses the "yearBetween" function to compare the latest event of the program stage 'mCXR7u4kNBW' to the enrollment date looks like this:

```
d2:daysBetween(V{enrollment_date},PS_EVENTDATE:mCXR7u4kNBW)
```

An expression that uses the "condition" function looks like this:

```
d2:condition(' {mCXR7u4kNBW.NFkjsNiQ9PH} > 100',150,50)
```

An expression that uses the "countIfValue" function to only count the number of times the value 10 has been collected looks like this:

```
d2:countIfValue({mCXR7u4kNBW.NFkjsNiQ9PH},10)
```

An expression that uses the "zpv" function looks like this:

```
d2:zpv(A{GPKGfbmArby}),{mCXR7u4kNBW.NFkjsNiQ9PH},4,-1)
```

An expression that uses the "if" and "isNull" functions looks like this:

```
if(isNull(A{GPKGfbmArby}),10,20)
```

An expression that uses the "firstNonNull" function looks like this:

```
firstNonNull(A{GPKGfbmArby}),{mCXR7u4kNBW.NFkjsNiQ9PH},44)
```

An expression that uses the "greatest" function looks like this:

```
greatest({mCXR7u4kNBW.k8ja2Aif1Ae},{mCXR7u4kNBW.NFkjsNiQ9PH},1)
```

### **Variables to use in a program indicator expression or filter**

The program indicator expression and filter support a range of variables:

#### ***Variables to use in a program indicator expression or filter***

| Variable             | Description   |
|----------------------|---|
| event_date           | The date of when the event or the last event in the enrollment took place.  |
| creation_date        | The date of when an event or enrollment was created in the system.  |
| due_date             | The date of when an event is due.   |
| sync_date            | The date of when the event or enrollment was last synchronized with the Android app.  |
| incident_date        | The date of the incidence of the event.   |
| enrollment_date      | The date of when the tracked entity instance was enrolled in the program.   |
| enrollment_status    | <p>Can be used to include or exclude enrollments in certain statuses.</p> <p>When calculating the haemoglobin improvement/deterioration throughout a pregnancy, it might make sense to only consider completed enrollments. If non-completed enrollments is not filtered out, these will represent half-finished ANC followups, where the final improvement/deterioration is not yet established.</p> |
| current_date         | The current date.   |
| value_count          | The number of non-null values in the expression part of the event.  |
| zero_pos_value_count | The number of numeric positive values in the expression part of the event.  |
| event_count          | The count of events (useful in combination with filters).   |
| enrollment_count     | The count of enrollments (useful in combination with filters). Aggregation type for the program indicator must be COUNT.  |
| tei_count            | The count of tracked entity instances (useful in combination with filters). Aggregation type for the program indicator must be COUNT.   |
| org_unit_count       | The count of organisation units (useful in combination with filters). Aggregation type for the program indicator must be COUNT.   |
| program_stage_name   | <p>Can be used in filters for including only certain program stages in a filter for tracker programs. Uses the name of the program stage:</p> <pre>V{program_stage_name} == 'ANC first visit'</pre>   |

| Variable               | Description  |
|------------------------|--|
| program_stage_id       | Can be used in filters for including only certain program stages in a filter for tracker programs. Uses the unique identifier of the program stage:<br><br><pre>V{program_stage_id} == 'YPSSfbmAtt1'</pre> |
| analytics_period_start | Can be used in filters or expressions for comparing any date to the first date in each reporting period.<br><br><pre>d2:daysBetween(#{WZbXY0S00LP.w4ky6EkVahL}, V{analytics_period_start})</pre>           |
| analytics_period_end   | Can be used in filters or expressions for comparing any date to the last inclusive date in each reporting period.  |

A filter that uses the "Analytics period end" variable to only include women who has an LMP that would be in the first trimester:

```
d2:daysBetween(#{WZbXY0S00LP.w4ky6EkVahL}, V{analytics_period_end}) <= 84
```

An expression that uses the "value count" variable looks like this:

```
(#{A03MvHHogjR.a3kGcGDCuk6} + #{A03MvHHogjR.wQLfBvPrXqq}) / V{value_count}
```

An expression that uses the "event\_date" and "incident\_date" variables looks like this:

```
d2:daysBetween(V{incident_date},V{event_date})
```

### Operators to use in a program indicator filter

#### *Operators to use in a program indicator filter*

| Operator | Description  |
|----------|--------------|
| and      | Logical AND  |
| or       | Logical OR   |
| ==       | Equal to     |
| !=       | Not equal to |

| Operator | Description              |
|----------|--------------------------|
| <        | Less than                |
| <=       | Less than or equal to    |
| >        | Greater than             |
| >=       | Greater than or equal to |

These operators can be used to form logical expressions which ultimately evaluate to either true or false. For example you can assert that multiple data elements must be a specific value, or that specific attributes must have numerical values less or greater than a constant.

A filter that uses both attributes and data elements looks like this:

```
A{cejWy0fXge6} == 'Female' and #{A03MvHHogjR.a3kGcGDCuk6} <= 2
```

#### Tip

DHIS2 is using the JEXL library for evaluating expressions which supports additional syntax beyond what is covered in this documentation. See the reference at the [project home page](#) to learn how you can create more sophisticated expressions

## Configure program rules

### About program rules

Program rules allows you to create and control dynamic behaviour of the user interface in the **Tracker Capture** and **Event Capture** apps. During data entry, the program rules expressions are evaluated each time the user interface is displayed, and each time a data element is changed. Most types of actions will take effect immediately when the user enters values in the **Tracker Capture** and **Event Capture** apps.

#### Program rule components

| Program rule component | Description  |
|------------------------|--|
| Program rule action    | Each program rule contains one or multiple actions. These are the behaviours that are triggered in the user interface when the expression is true. Actions will be applied at once if the expression is true, and will be reverted if the expression is no longer true. There are several types of actions and you can have several actions in one program rule. |

| Program rule component  | Description  |
|-------------------------|--|
| Program rule expression | <p>Each program rule has a single expression that determines whether the program rule actions should be triggered, if the expression evaluates to true. If the expression is true the program rule is in effect and the actions will be executed. If the expression is false, the program rule is no longer in effect and the actions will no longer be applied.</p> <p>You create the expression with standard mathematical operators, custom functions, user-defined static values and program rule variables. The program rule variables represent attribute and data element values which will be evaluated as part of the expression.</p> |
| Program rule variable   | <p>Program rule variables lets you include data values and attribute values in program rule expressions. Typically, you'll have to create one or several program rule variables before creating a program rule. This is because program rules expressions usually contain at least one data element or attribute value to be meaningful.</p> <p>The program rule variables are shared between all rules in your program. When you create multiple program rules for the same program, these rules will share the same library of program rule variables.</p>   |

In the **Maintenance** app, you manage the following program rule objects:

| Object type           | Available functions  |
|-----------------------|--|
| Program rule          | Create, edit, clone, delete, show details and translate        |
| Program rule variable | Create, edit, clone, share, delete, show details and translate |

### Workflow

1. In the **Maintenance** app, create program rule variable(s) if needed.
2. In the **Maintenance** app, create the program rule:
  1. Enter the program rule details.
  2. Create the program rule expression.
  3. Define the program rule actions.



- 
3. In the **Tracker Capture** or **Event Capture** apps, verify that the program rule behaves as expected.

### Create or edit a program rule variable

1. Open the **Maintenance** app and click **Program > Program rule variable**.
2. Click the add button.
3. Select a **Program** and enter a **Name**.
4. Select if you want to **Use code for option set**.

This option is only effective when the data element or tracked entity attribute is connected to an option set. If you don't select this option, the program rule variable will be populated with the option set's name. If you select the option, the program rule variable will be populated with the option set's code instead.

5. Select a **Source type** and enter the required information.

Depending on the source type, you'll have to select, for example, a **Program stage**, **Data element** or **Tracked entity attribute**.

The source types determine how the program rule variable is populated with a value.

| Source type  | Description   |
|--|---|
| <p><b>Data element from the newest event for a program stage</b></p> | <p>This source type works the same way as <b>Data element from the newest event in the current program</b>, except that it only evaluates values from one program stage.</p> <p>This source type can be useful in program rules where the same data element is used in several program stages, and a rule needs to evaluate the newest data value from within one specific stage.</p> |

| Source type   | Description   |
|---|---|
| <p><b>Data element from the newest event in the current program</b></p> | <p>This source type is used when a program rule variable needs to reflect the newest known value of a data element, regardless of what event the user currently has open.</p> <p>This source type is populated slightly differently in <b>Tracker Capture</b> and <b>Event Capture</b> apps:</p> <p><b>Tracker Capture:</b> the program rule variable will be populated with the newest data value collected for the given data element within the enrollment.</p> <p><b>Event Capture:</b> the program rule variable will be populated with the newest data value found within the 10 newest events in the same organisation unit.</p> <p>The newest data value is determined with event date.</p> |
| <p><b>Data element in current event</b></p>                             | <p>Program rule variables with this source type will contain the data value from the same event that the user currently has open.</p> <p>This is the most commonly used source type, especially for skip logic (hide actions) and warning/error rules.</p>  |

| Source type                                    | Description   |
|--|---|
| <p><b>Data element from previous event</b></p> | <p>Program rule variables with this source type will contain the value from a specified data element from a previous event. Only older events is evaluated, not including the event that the user currently has open.</p> <p>This source type is commonly used when a data element only should be collected once during an enrollment, and should be hidden in subsequent events.</p> <p>Another use case is making rules for validating input where there is an expected progression from one event to the next - a rule can evaluate whether the previous value is higher/lower and give a warning if an unexpected value is entered.</p> <p>This source type is populated slightly differently in <b>Tracker Capture</b> and <b>Event Capture</b> apps:</p> <p><b>Tracker Capture:</b> the program rule variable will be populated with the newest data value collected for the given data element within the enrollment - but only evaluating the events that comes before the current event date.</p> <p><b>Event Capture:</b> the program rule variable will be populated with the newest data value collected within the 10 events preceding the current event date - not including the current event.</p> <p>The newest data value is determined with event date.</p> |

| Source type                            | Description   |
|--|---|
| <p><b>Calculated value</b></p>         | <p>Program rule variable with this source type is not connected directly to any form data - but will be populated as a result of some other program rules <b>ASSIGN</b> action.</p> <p>This variable will be used for making preliminary calculations, having a <b>ASSIGN</b> program rule action and assigning a value, this value can be used by other program rules - potentially making the expressions simpler and more maintainable.</p> <p>These variables will not be persisted and will stay in memory only during the execution of the set of program rules. Any program rule that assigns a data value to a preliminary calculated value would normally also have a <b>priority</b> assigned - to make sure that the preliminary calculation is done before the rule that consumes the calculated value.</p> |
| <p><b>Tracked entity attribute</b></p> | <p>Populates the program rule variable with a specified tracked entity attribute for the current enrollment.</p> <p>Use this is the source type to create program rules that evaluate data values entered during registration.</p> <p>This source type is also useful when you create program rules that compare data in events to data entered during registration.</p> <p>This source type is only used for tracker programs (programs with registration).</p>  |

6. Click **Save**.

### Create or edit a program rule

**Note**

A program rule belongs to exactly one program.

1. Open the **Maintenance** app and click **Program > Program rule**.
2. Click the add button.
3. Enter the program rule details. These fields are not shown to the end user, they are only meant for the program administrator.

- **Program**

**Trigger rule only for program stage**

- If a program stage is selected, the program rule will only run for the selected program stage, as opposed to being run for every program stage in the program.

- **Name**

- **Description**

- **Priority**

Let's say you have 16 program rules in your program. You configure the program rules with the following priority settings:

- Priority 1 for program rule A
- Priority 2 for program rules B - K
- No priority for program rules L - P

Result: the system runs the program rules in the following order:

1. Program rule A
2. Program rules B - K (you can't find out or configure in which order the system runs these program rules)
3. Program rules L - P.

4. Click **Enter program rule expression** and create the program rule expression with the help of variables, functions and operators.

5. Click **Define program rule actions** and create the actions executed when the expression is true.

1. Click the add button, select an **Action** and enter the required information.

Depending on the action type, you'll have to perform different types of settings. For some action types, you must also enter free text or create expressions.

| Action type | Required settings | Description |
|-------------|-------------------|-------------|
|             |                   |             |

| Action type         | Required settings   | Description  |
|---------------------|---|--|
| <b>Assign value</b> | <b>Data element to assign value to</b><br><br><b>Program rule variable to assign value to</b><br><br><b>Expression to evaluate and assign</b> | <p>Used to help the user calculate and fill out fields in the data entry form. The idea is that the user shouldn't have to fill in values that the system can calculate, for example BMI.</p> <p>When a field is assigned a value, the user sees the value but the user can't edit it.</p> <p>Example from Immunization stock card i Zambia: The data element for vaccine stock outgoing balance is calculated based on the data element for incoming stock balance minus the data elements for consumption and wastage.</p> <p>Advanced use: configure an 'assign value' to do a part of a calculation and then assign the result of the calculation to a program rule variable. This is the purpose with the "Calculated value" program rule variable.</p> |
| <b>Display text</b> | <b>Display widget</b><br><br><b>Static text</b><br><br><b>Expression to evaluate and display after static text</b>                            | <p>Used to display information that is not an error or a warning, for example feedback to the user. You can also use this action to display important information, for example the patient's allergies, to the user.</p>   |

| Action type                          | Required settings  | Description   |
|--------------------------------------|--|---|
| <p><b>Display key/value pair</b></p> | <p><b>Display widget</b></p> <p><b>Key label</b></p> <p><b>Expression to evaluate and display as value</b></p>   | <p>Used to display information that is not an error or a warning.</p> <p>Example: calculate number of weeks and days in a pregnancy and display it in the format the clinician is used to see it in. The calculation is based on previous recorded data.</p>  |
| <p><b>Error on complete</b></p>      | <p><b>Data element to display error next to</b></p> <p><b>Tracked entity attribute to display error next to</b></p> <p><b>Static text</b></p> <p><b>Expression to evaluate and display after static text</b></p> | <p>Used whenever you've cross-consistencies in the form that must be strictly adhered to. This action prevents the user from continuing until the error is resolved.</p> <p>This action differs from the regular <b>Show error</b> since the error is not shown until the user tries to actually complete the form.</p> <p>If you don't select a data element or a tracked entity attribute to display the error next to, make sure you write a comprehensive error message that helps the user to fix the error.</p> |

| Action type                 | Required settings   | Description   |
|-----------------------------|---|---|
| <b>Hide field</b>           | <b>Data element to hide</b><br><br><b>Tracked entity attribute to hide</b><br><br><b>Custom message for blanked field</b> | <p>Used when you want to hide a field from the user.</p> <p><b>Custom message for blanked field</b> allows you to define a custom message displayed to the user in case the program rule hides and blanks out the field after the user typed in or selected a value.</p> <p>If a hide field action hides a field that contains a value, the field will always be removed. If no message is defined, a standard message will be displayed to alert the user.</p> |
| <b>Hide section</b>         | <b>Program stage section to hide</b>  | TBA   |
| <b>Hide program stage</b>   | <b>Program stage to hide</b>  | Used when you want to hide a program stage section from the user.   |
| <b>Make field mandatory</b> | <b>Data element to make mandatory</b><br><br><b>Tracked entity attribute to make mandatory</b>                            | TBA   |



| Action type              | Required settings  | Description  |
|--------------------------|--|--|
| <p><b>Show error</b></p> | <p><b>Data element to display error next to</b></p> <p><b>Tracked entity attribute to display error next to</b></p> <p><b>Static text</b></p> <p><b>Expression to evaluate and display after static text</b></p> | <p>Used whenever there are rules which must strictly be adhered to. The show error action prevents the user from continuing until the error is resolved.</p> <p>Such a strict validation should only be used when it's certain that the evaluated expression is never true unless the user has made a mistake in data entry.</p> <p>It's mandatory to define a message that is shown to the user when the expression is true and the action is triggered.</p> <p>You can select which data element or tracked entity attribute to link the error to. This will help the user to fix the error.</p> <p>In case several data elements or attributes are involved, select the one that is most likely that the user would need to change.</p> |

| Action type                | Required settings  | Description  |
|----------------------------|--|--|
| <p><b>Show warning</b></p> | <p><b>Data element to display warning next to</b></p> <p><b>Tracked entity attribute to display warning next to</b></p> <p><b>Static text</b></p> <p><b>Expression to evaluate and display after static text</b></p> | <p>Used to give the user a warning about the entered data, but at the same time to allow the user to save and continue.</p> <p>You can use warnings to help the user avoid errors in the entered data, while at the same time allow the user to consciously disregard the warnings and save a value that is outside preset expectations.</p> <p><b>Static text</b> defines the message shown to the user when the expression is true and the action is triggered.</p> <p>You can select which data element or tracked entity attribute to link the error to. This will help the user to fix the error.</p> <p>In case several data elements or attributes are involved, select the one that is most likely that the user would need to change.</p> |

| Action type                       | Required settings  | Description   |
|-----------------------------------|--|---|
| <p><b>Warning on complete</b></p> | <p><b>Data element to display warning next to</b></p> <p><b>Tracked entity attribute to display warning next to</b></p> <p><b>Static text</b></p> <p><b>Expression to evaluate and display after static text</b></p> | <p>Used to give the user a warning if he/she tries to complete inconsistent data, but at the same time to allow the user to continue. The warning is shown in a dialog when the user completes the form.</p> <p><b>Static text</b> defines the message shown to the user when the expression is true and the action is triggered. This field is mandatory.</p> <p>You can select which data element or tracked entity attribute to link the error to. This will help the user to fix the error.</p> <p>If you don't select a data element or a tracked entity attribute to display the error next to, make sure you write a comprehensive error message that helps the user to fix the error.</p> |
| <p><b>Send Message</b></p>        | <p><b>Message template to send</b></p>   | <p>Send Message triggers a notification based on provided message template. This action will be taken immediately. The message template will be parsed and variables will be substituted with actual values.</p>  |

| Action type              | Required settings   | Description   |
|--------------------------|---|---|
| <b>Schedule Message</b>  | <p><b>Message template to send</b></p> <p><b>Data field which contains expression to evaluate the date which notification should be sent at. If this expression results in any value other than Date, then resultant will be discarded and notification will not get scheduled.</b></p> | <p>Schedule Message will schedule notification at date provided by Expression in the data field. Sample expression is given below</p> <pre>d2:addDays( '2018-04-20', '2' )</pre> <p>Message template will be parsed and variables will be substituted with actual values.</p> |
| <b>Hide option</b>       | <p><b>Data element to hide option for</b></p> <p><b>Tracked entity attribute to hide option for</b></p> <p><b>Option that should be hidden</b></p>  | <p>Used to selectively hide a single option for an option set in a given data element/ tracked entity attribute.</p> <p>When combined with <b>show option group</b> the <b>hide option</b> takes precedence.</p>  |
| <b>Hide option group</b> | <p><b>Data element to hide option group for</b></p> <p><b>Tracked entity attribute to hide option group for</b></p> <p><b>Option group that should be hidden</b></p>  | <p>Used to hide all options in a given option group and data element/tracked entity attribute.</p> <p>When combined with <b>show option group</b> the <b>hide option group</b> takes precedence.</p>  |
| <b>Show option group</b> | <p><b>Data element to show option group for</b></p> <p><b>Tracked entity attribute to show option group for</b></p> <p><b>Option group that should be shown</b></p>   | <p>Used to show only options from a given option group in a given data element/ tracked entity attribute. To show an option group implicitly hides all options that is not part of the group(s) that is shown.</p>  |

2. Click **Save**.

3. (Optional) Repeat above steps to add more actions.

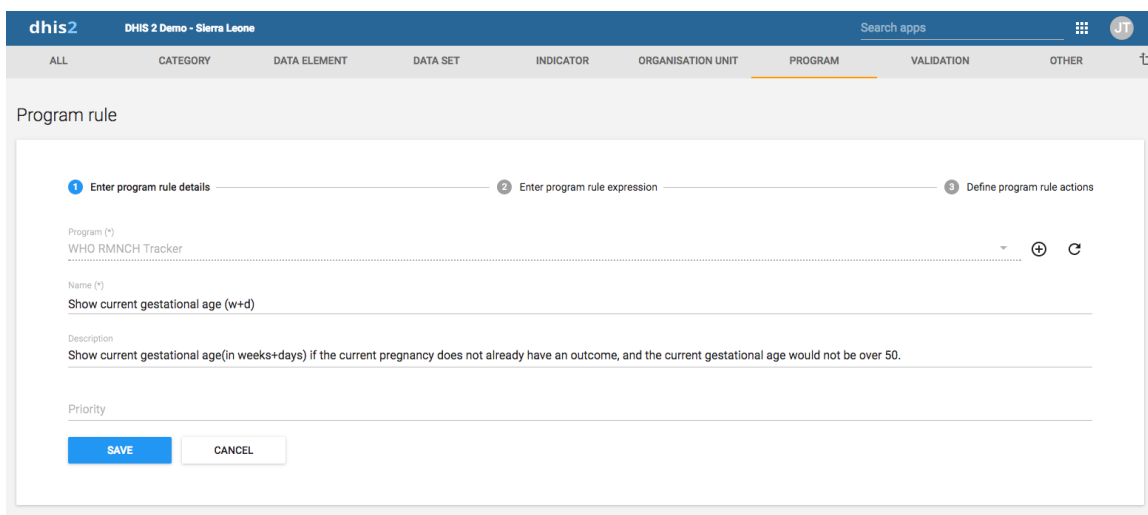
6. Click **Save**.

**Example: Program rules**

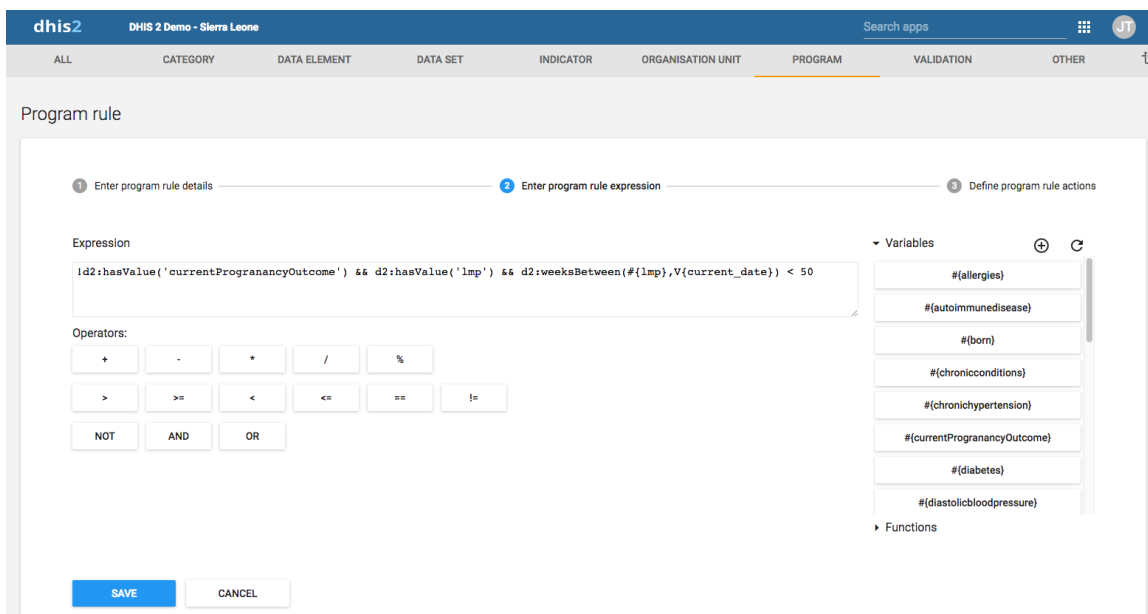
**Note**  
 You can view all examples on the demo server: <https://play.dhis2.org/dev/dhis-web-maintenance/#/list/programSection/programRule>

This example shows how to configure a program rule which calculate number of weeks and days in a pregnancy and display the result in the format the clinician is used to see it in. The calculation is based on previous recorded data.

1.



2.



3.

### Define program rule action

Action (\*)  
Display key/value pair ▼

Location (\*)  
Program indicator widget ▼

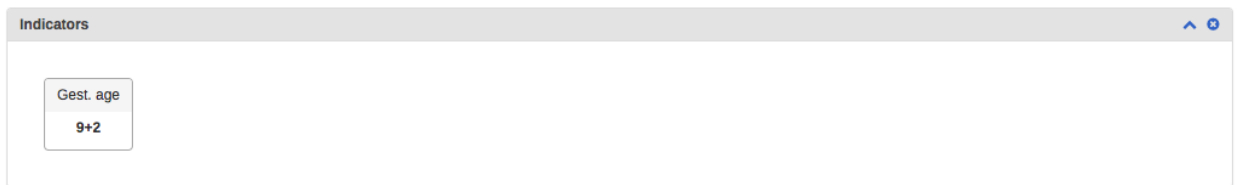
Content (\*)  
Gest. age

Data  
d2:concatenate(d2:weeksBetween(#{lmp}, V{current\_date}), '+', d2:modulus(d2:daysBetween(#{lmp}, \

CANCEL
SAVE

The full expression in the **Data** field:

```
d2:concatenate(d2:weeksBetween(#{lmp}, V{current_date}), '+',
d2:modulus(d2:daysBetween(#{lmp}, V{current_date}), 7))
```



This example shows how to configure a program rule to display text in the Feedback widget in the Tracker Capture app.

1.

The screenshot shows the 'Program rule variable' configuration page in the DHIS2 Maintenance app. The page title is 'Program rule variable'. The form contains the following fields and options:

- Program (\*):** WHO RMNCH Tracker
- Name (\*):** penicillinAllergy (highlighted with a yellow box)
- Code:** (empty)
- Source type (\*):** Data element from the newest event in the current program
- Data element:** WHOMCH Penicillin allergy
- Tracked entity attribute:** (empty)
- Use code for option set
- Program Stage:** (empty)

At the bottom of the form are 'SAVE' and 'CANCEL' buttons.

2.

The screenshot shows the 'Program rule' configuration page in the DHIS2 Maintenance app. The page title is 'Program rule'. The form is divided into three steps:

- 1 Enter program rule details:**
  - Program (\*):** WHO RMNCH Tracker
  - Name (\*):** Show feedback if woman is registered with penicillin allergy
  - Description:** Show a warning in the feedback widget if the woman has penicillin allergy
  - Priority:** (empty)
- 2 Enter program rule expression:** (empty)
- 3 Define program rule actions:** (empty)

At the bottom of the form are 'SAVE' and 'CANCEL' buttons.

3.

dhis2 DHIS 2 Demo - Sierra Leone Search apps JT

ALL CATEGORY DATA ELEMENT DATA SET INDICATOR ORGANISATION UNIT PROGRAM VALIDATION OTHER

Program rule

1 Enter program rule details 2 Enter program rule expression 3 Define program rule actions

Expression  
#(penicillinAllergy) == 'Yes'

Operators:  
 + - \* / %  
 > >= < <= == !=  
 NOT AND OR

Variables  
 #(allergies)  
 #(autoimmunedisease)  
 #(born)  
 #(chronicconditions)  
 #(chronichypertension)  
 #(currentPregnancyOutcome)  
 #(diabetes)  
 #(diastolicbloodpressure)  
 Functions

SAVE CANCEL

4.

Define program rule action

Action (\*)  
 Display text

Location (\*)  
 Feedback widget

Content (\*)  
 Penicillin allergy

Data

CANCEL SAVE

dhis2 DHIS 2 Demo - Sierra Leone Search apps JT

CC: Renal disease  Yes  No

CC: Other chronic condition  Yes  No

WHOMCH Allergies (drugs and/or severe food allergies)

A: Penicillin allergy Yes  x

A: Other medicine allergy Select or search from the list

A: Other severe allergy Select or search from the list

WHOMCH Medication

Current pregnancy

Feedback  
 Penicillin allergy

Profile | Edit  
 Unique ID • 9191132445122  
 First name • Ava



This example shows how to configure a program rule to always display certain data in the Feedback widget in the **Tracker Capture** app. This is useful when you want to make sure that vital data, for example medicine allergies, is always visible.

1.

The screenshot shows the 'Program rule variable' configuration form in the DHIS2 interface. The form is titled 'Program rule variable' and is part of the 'PROGRAM' section. It contains the following fields and options:

- Program (\*)**: WHO RMNCH Tracker
- Name (\*)**: othermedicineallergyexists (highlighted with a yellow box)
- Code**: (empty)
- Use code for option set
- Source type (\*)**: Data element from the newest event in the current program
- Data element**: WHOMCH Other medicine allergy

At the bottom of the form are two buttons: **SAVE** and **CANCEL**.

2.

The screenshot shows the 'Program rule' configuration form in the DHIS2 interface. The form is titled 'Program rule' and is part of the 'PROGRAM' section. It contains the following fields and options:

- Program (\*)**: WHO RMNCH Tracker
- Name (\*)**: Show feedback if the woman is registered with medicine allergy
- Description**: If the woman is registered with any medicine allergy, show info in the feedback widget, including the name of the allergy.
- Priority**: (empty)

At the top of the form are three numbered steps: 1. Enter program rule details, 2. Enter program rule expression, and 3. Define program rule actions. At the bottom of the form are two buttons: **SAVE** and **CANCEL**.

3.

dhis2 DHIS 2 Demo - Sierra Leone Search apps JT

ALL CATEGORY DATA ELEMENT DATA SET INDICATOR ORGANISATION UNIT PROGRAM VALIDATION OTHER

Program rule

1 Enter program rule details 2 Enter program rule expression 3 Define program rule actions

Expression

**#(othermedicineallergyexists) == 'Yes'**

Operators:

+ - \* / %

> >= < <= == !=

NOT AND OR

Variables

- #(allergies)
- #(autoimmunedisease)
- #(born)
- #(chronicconditions)
- #(chronichypertension)
- #(currentPregnancyOutcome)
- #(diabetes)
- #(diastolicbloodpressure)

Functions

SAVE CANCEL

4.

Define program rule action

Action (\*)

Display text

Location (\*)

Feedback widget

Content (\*)

Medicine allergy:

Data

**#(othermedicineallergy)**

CANCEL SAVE

**Pre-existing conditions**

WHOMCH Chronic conditions  Yes  No

CC: Diabetes  Yes  No

CC: Chronic hypertension  Yes  No

CC: Autoimmune disease  Yes  No

CC: HIV Positive  Yes  No

CC: Renal disease  Yes  No

CC: Other chronic condition  Yes  No

WHOMCH Allergies (drugs and/or severe food allergies)

A: Penicillin allergy Yes

A: Other medicine allergy Yes

A: Other medicine allergy specified **Paracetamol**

A: Other severe allergy Select or search from the list

WHOMCH Medication

---

**Profile | Edit**

Unique ID \* 9191132445122

First name \* Ava

Last name \* Didriksson

Mobile number

Email address

**Feedback**

Penicillin allergy

Medicine allergy: Paracetamol

**Relationships | Add child | Add**

No relationships exist

**Enrollment**

Selected program

Enrolling organisation unit Ngelehun CHC

Date of first visit 2017-10-14

**Complete** **Deactivate** **Delete**

Other programs

No active enrollments exist

---

**Indicators**

Gest. age

9+2

---

**Timeline Data Entry**

2017-10-06 Ngelehun CHC Previous deliveries (Open)

2017-10-14 Ngelehun CHC First antenatal care visit (Open)

Date of birth \* 2017-10-06 Due date 2017-05-22

Outcome Select or search from the list

Mode of delivery Select or search from the list

Birthweight

Gest. age at birth

Conditions Select or search from the list

**Complete** **Delete** **Print form**

---

**Profile | Edit**

Unique ID \* 9191132445122

First name \* Ava

Last name \* Didriksson

Mobile number

Email address

**Feedback**

Penicillin allergy

Medicine allergy: Paracetamol

**Relationships | Add child | Add**

No relationships exist

**Notes**

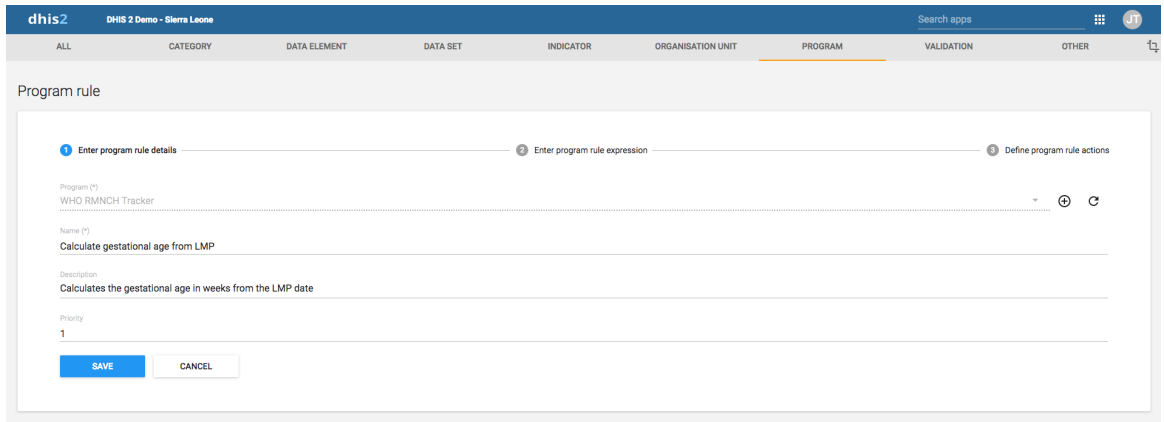
Your note here

**Add** **Clear**

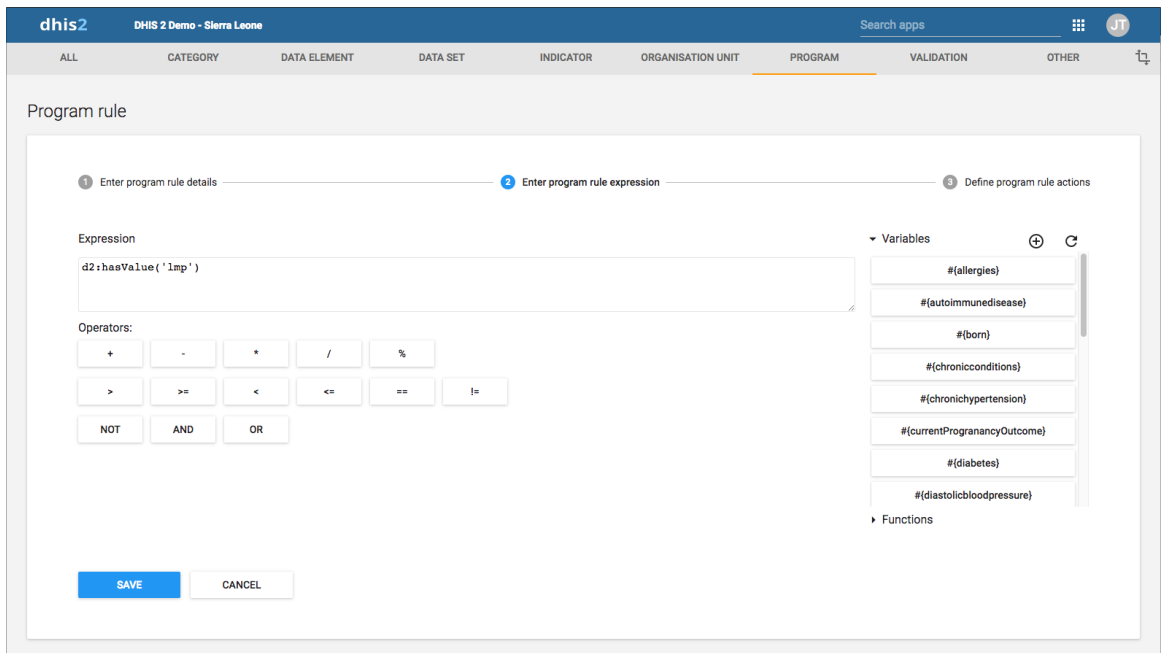
No notes exist

By using a program rule of type "Assign value" you can calculate the "Gestational age at visit" value and fill it in the data entry form. You configure the program rule to calculate "Gestational age at visit" based on either "LMP date" or "Ultrasound estimated due date".

1.



2.



3.

### Define program rule action

Action (\*)

Data element

Program rule variable

Data (\*)

dhis2    DHIS 2 Demo - Sierra Leone

Back ◀ ▶ WHO RMNCH Tracker

---

**Enrollment**

**Selected program**

Enrolling organisation unit:

Date of first visit:

**Other programs**

No active enrollments exist

---

**Indicators**

No indicators exist

---

**Timeline Data Entry**

2017-10-06  
Ngelehun CHC  
Previous deliveries  
(Open)

→

2017-10-14  
Ngelehun CHC  
First antenatal care visit  
(Open)

Date of visit:     Appointment date:

**Pre-existing conditions**

**Current pregnancy**

Date of first day of LMP:

WHOMCH Gestational age in weeks at visit:

**Reference information: Operators and functions to use in program rule expression**

**Tip**

You can nest functions within each other and with sub-expressions to form more complex conditions. An example that produces the gestational age in weeks, based on last menstrual date:

```
d2:floor( d2:daysBetween("#{lastMenstrualDate},V{event_date}) / 7 )
```

**Tip**

The source type will determine how the d2: function calls will evaluate a (sourcefield) parameter.

Example: where #{hemoglobinCurrent} is set to source type **Data element in current event**. The following function call will evaluate whether haemoglobin is entered in the current event.

```
d2:hasValue( 'hemoglobinCurrent' )
```

Example: where #{hemoglobin} is set to source type **Data element from the newest event in the current program**. The following function call will evaluate whether there exists a value for the haemoglobin in any event in the enrollment.

```
d2:hasValue( 'hemoglobin' )
```

Example: where #{hemoglobinPrevious} is set to source type **Data element from previous event**. The following function call will evaluate whether there exists a value for the haemoglobin among the events preceding the current event.

```
d2:hasValue( 'hemoglobinPrevious' )
```

**Possible operators to use in a program rule expression**

| Operator | Description  |
|----------|--|
| +        | Add numbers together   |
| -        | Subtract numbers from each other   |
| *        | Multiply two numbers   |
| /        | Divide two numbers   |
| %        | The modulus of two numbers   |
| &&       | Logical AND. True only when the expression on the left and right side is true. The left and right side can be yes/no, yes only or a sub-expression in parenthesis.                       |
|          | Logical OR. True when either the expression on the left or the expression on the right side is true. The left and right side can be yes/no, yes only or a sub-expression in parenthesis. |

| Operator | Description   |
|----------|---|
| >        | Left number greater than right number   |
| >=       | Left number greater than or equal to right number   |
| <        | Left number less than right number  |
| <=       | Left number less than or equal to right number.   |
| ==       | Left side equal to right side. Supports numbers, text, yes/no and yes only.                       |
| !=       | Left side not equal to right side. Supports numbers, text, yes/no and yes only.                   |
| !        | Negates the following value. Can be used for yes/no, yes only or a sub-expression in parenthesis. |
| ()       | Parenthesis is used to group sub-expressions.   |

**Custom functions to use in a program rule expression**

| Function | Arguments | Description   |
|----------|-----------|---|
| d2:ceil  | (number)  | <p>Rounds the input argument <b>up</b> to the nearest whole number.</p> <p>Example:</p> <pre>d2:ceil({hemoglobinValue})</pre>   |
| d2:floor | (number)  | <p>Rounds the input argument <b>down</b> to the nearest whole number.</p> <p>An example producing the number of weeks the woman is pregnant. Notice that the sub-expression <code>{gestationalAgeDays}/7</code> is evaluated before the floor function is executed:</p> <pre>d2:floor({gestationalAgeDays}/7)</pre> |
| d2:round | (number)  | Rounds the input argument to the nearest whole number.  |

| Function         | Arguments                       | Description  |
|------------------|---------------------------------|--|
| d2:modulus       | (number,number)                 | <p>Produces the modulus when dividing the first with the second argument.</p> <p>An example producing the number of days the woman is into her current pregnancy week:</p> <pre>d2:modulus(#{gestationalAgeDays},7)</pre>  |
| d2:zing          | (number)                        | Evaluates the argument of type number to zero if the value is negative, otherwise to the value itself.   |
| d2:oizp          | (number)                        | Evaluates the argument of type number to one if the value is zero or positive, otherwise to zero.  |
| d2:concatenate   | (object, [,object, object,...]) | <p>Produces a string concatenated string from the input parameters. Supports any number of parameters. Will mainly be in use in future action types, for example to display gestational age with</p> <pre>d2:concatenate('weeks','+',gestationalageDays)</pre>   |
| d2:daysBetween   | (date, date)                    | <p>Produces the number of days between the first and second argument. If the second argument date is before the first argument the return value will be the negative number of days between the two dates. The static date format is 'yyyy-MM-dd'.</p> <p>Example, calculating the gestational age(in days) of a woman, based on the last menstrual period and the current event date:</p> <pre>d2:daysBetween(#{lastMenstrualDate},V{event_date})</pre> |
| d2:weeksBetween  | (date, date)                    | <p>Produces the number of full weeks between the first and second argument. If the second argument date is before the first argument the return value will be the negative number of weeks between the two dates. The static date format is 'yyyy-MM-dd'.</p>  |
| d2:monthsBetween | (date, date)                    | <p>Produces the number of full months between the first and second argument. If the second argument date is before the first argument the return value will be the negative number of months between the two dates. The static date format is 'yyyy-MM-dd'.</p>  |
| d2:yearsBetween  | (date, date)                    | <p>Produces the number of years between the first and second argument. If the second argument date is before the first argument the return value will be the negative number of years between the two dates. The static date format is 'yyyy-MM-dd'.</p>   |



| Function          | Arguments          | Description  |
|-------------------|--------------------|--|
| d2:addDays        | (date, number)     | <p>Produces a date based on the first argument date, adding the second argument number of days.</p> <p>An example calculating the pregnancy due date based on the last menstrual period:</p> <pre>d2:addDays(#{lastMenstrualDate},283)</pre>   |
| d2:count          | (sourcefield)      | <p>Counts the number of values that is entered for the source field in the argument. The source field parameter is the name of one of the defined source fields in the program - see example</p> <p>Example usage where #{previousPregnancyOutcome} is one of the source fields in a repeatable program stage "previous pregnancy":</p> <pre>d2:count('previousPregnancyOutcome')</pre>  |
| d2:countIfValue   | (sourcefield,text) | <p>Counts the number of matching values that is entered for the source field in the first argument. Only occurrences that matches the second argument is counted. The source field parameter is the name of one of the defined source fields in the program - see example.</p> <p>Example usage where #{previousPregnancyOutcome} is one of the source fields in a repeatable program stage "previous pregnancy". The following function will produce the number of previous pregnancies that ended with abortion:</p> <pre>d2:countIfValue('previousPregnancyOutcome','Abortion')</pre> |
| d2:countIfZeroPos | (sourcefield)      | <p>Counts the number of values that is zero or positive entered for the source field in the argument. The source field parameter is the name of one of the defined source fields in the program - see example.</p> <p>Example usage where #{fundalHeightDiscrepancy} is one of the source fields in program, and it can be either positive or negative. The following function will produce the number of positive occurrences:</p> <pre>d2:countIfZeroPos('fundalHeightDiscrepancy')</pre>  |

| Function           | Arguments                       | Description   |
|--------------------|---------------------------------|---|
| d2:hasValue        | (sourcefield)                   | <p>Evaluates to true if the argument source field contains a value, false if no value is entered.</p> <p>Example usage, to find if the source field <code>#{currentPregnancyOutcome}</code> is yet filled in:</p> <pre>d2:hasValue('currentPregnancyOutcome')</pre>   |
| d2:zpsc            | (object, [,object, object,...]) | <p>Returns the number of numeric zero and positive values among the given object arguments. Can be provided with any number of arguments.</p>   |
| d2:validatePattern | (text, regex-pattern)           | <p>Evaluates to true if the input text is an exact match with the supplied regular expression pattern. The regular expression needs to be escaped.</p> <p>Example expression, triggering actions if a number is not on the pattern 9999/99/9:</p> <pre>!d2:validatePattern(A{nrc}, '\\d{6}\\\\d{2}\\\\d')</pre> <p>Example expression, triggering actions that if the address is not consisting of letters or white spaces, then a white space, then a number:</p> <pre>!d2:validatePattern(A{registrationAddress}, '\\\\w ]+ \\\\d+')</pre> <p>Example, triggering actions if a name contains any numbers:</p> <pre>!d2:validatePattern(A{name}, '[^\\\\d]*')</pre> <p>Example expression, triggering actions if a mobile number contains the illegal number sequence 555:</p> <pre>d2:validatePattern(A{mobile}, '.*555.*')</pre> |
| d2:left            | (text, num-chars)               | <p>Evaluates to the left part of a text, num-chars from the first character.</p> <p>The text can be quoted or evaluated from a variable:</p> <pre>d2:left(#{variableWithText}, 3)</pre>   |

| Function          | Arguments                            | Description   |
|-------------------|--------------------------------------|---|
| d2:right          | (text, num-chars)                    | <p>Evaluates to the right part of a text, num-chars from the last character.</p> <p>The text can be quoted or evaluated from a variable:</p> <pre>d2:right(#{variableWithText}, 2)</pre>  |
| d2:substring      | (text, start-char-num, end-char-num) | <p>Evaluates to the part of a string specified by the start and end character number.</p> <p>Example expression:</p> <pre>d2:substring(#{variableWithText}, 1, 3)</pre> <p>If the <code>#{variableWithText}</code> in the above example was 'ABCD', then the result of the evaluation would be 'BC'</p>   |
| d2:split          | (text, delimiter, element-num)       | <p>Split the text by delimiter, and keep the nth element(0 is the first).</p> <p>The text can be quoted or evaluated from a variable, the delimiter must be quoted:</p> <pre>d2:split(#{variableWithText}, '-', 1)</pre> <p>Note: comma delimiter(,) is not supported.</p>  |
| d2:length         | (text)                               | <p>Find the length of a string.</p> <p>Example:</p> <pre>d2:length(#{variableWithText})</pre>   |
| d2:inOrgUnitGroup | (text)                               | <p>Evaluates whether the current organisation unit is in the argument group. The argument can be defined with either ID or organisation unit group code. The current organisation unit will be the event organisation unit when the rules is triggered in the context of an event, and the enrolling organisation unit when the rules is triggered in the event of a TEI registration form.</p> <p>Example expression:</p> <pre>d2:inOrgUnitGroup('HIGH_RISK_FACILITY')</pre> |
| d2:hasUserRole    | (user role)                          | <p>Returns true if current user has this role otherwise false</p> <p>Example expression:</p> <pre>d2:hasUserRole('UYX0T4A3ASA')</pre>   |

| Function     | Arguments                           | Description   |
|--------------|-------------------------------------|---|
| d2:zScoreWFA | Z-Score weight for age indicator    | <p>Calculates z-score based on data provided by WHO weight-for-age indicator. e varies between -3.5 to 3.5 depending upon the value of weight.</p> <p>Example expression:</p> <pre>d2:zScoreWFA( ageInMonths, weight, gender )</pre> <p>&gt; <b>Gender</b> &gt; Gender is considered female by default. Any of the following codes can be used to denote male: 'Male', 'MALE', 'male', 'ma', 'm', 'M', 0, false</p> |
| d2:zScoreHFA | Z-Score height for age indicator    | <p>Calculates z-score based on data provided by WHO height-for-age indicator. Its value varies between -3.5 to 3.5 depending upon the value of height.</p> <p>Example expression:</p> <pre>d2:zScoreHFA( ageInMonths, height, gender )</pre>  |
| d2:zScoreWFH | Z-Score weight for height indicator | <p>Calculates z-score based on data provided by WHO weight-for-height indicator. Its value varies between -3.5 to 3.5 depending upon the value of the weight.</p> <p>Example expression:</p> <pre>d2:zScoreWFH( height, weight, gender )</pre>  |
| d2:minValue  | Get minimum value for provided item | <p>Function gets minimum value of provided data element across entire enrollment.</p> <p>Example expression:</p> <pre>d2:minValue( 'blood-pressure' )</pre>   |
| d2:maxValue  | Get maximum value for provided item | <p>Function gets maximum value of provided data element across entire enrollment.</p> <p>Example expression:</p> <pre>d2:maxValue( 'blood-pressure' )</pre>   |

**Standard variables to use in program rule expressions**

| Variable           | Type     | Description   |
|--------------------|----------|---|
| V{current_date}    | (date)   | <p>Contains the current date whenever the rule is executed.</p> <p>Example expression:</p> <pre>d2:daysBetween("#{symptomDate}",V{current_date}) &lt; 0</pre>   |
| V{event_date}      | (date)   | <p>Contains the event date of the current event execution. Will not have a value at the moment the rule is executed as part of the registration form.</p>   |
| V{event_status}    | (string) | <p>Contains status of the current event or enrollment.</p> <p>Example expression to check status is:</p> <pre>V{event_status} == 'COMPLETED'</pre>  |
| V{due_date}        | (date)   | <p>This variable will contain the current date when the rule is executed. Note: This means that the rule might produce different results at different times, even if nothing else has changed.</p>  |
| V{event_count}     | (number) | <p>Contains the total number of events in the enrollment.</p>   |
| V{enrollment_date} | (date)   | <p>Contains the enrollment date of the current enrollment. Will not have a value for single event programs.</p>   |
| V{incident_date}   | (date)   | <p>Contains the incident date of the current enrollment. Will not have a value for single event programs.</p>   |
| V{enrollment_id}   | (string) | <p>Universal identifier string(UUID) of the current enrollment. Will not have a value for single event programs.</p>  |
| V{event_id}        | (string) | <p>Universal identifier string(UUID) of the current event context. Will not have a value at the moment the rule is executed as part of the registration form.</p>   |
| V{orgunit_code}    | (string) | <p>Contains the code of the orgunit that is linked to the current enrollment. For single event programs the code from the current event orgunit will be used instead.</p> <p>Example expression to check whether orgunit code starts with WB_:</p> <pre>d2:left(V{orgunit_code},3) == 'WB_'</pre> |
| V{environment}     | (string) | <p>Contains a code representing the current runtime environment for the rules. The possible values is "WebClient", "AndroidClient" and "Server". Can be used when a program rule is only supposed to run in one or more of the client types.</p>  |

| Variable                  | Type     | Description   |
|---------------------------|----------|---|
| V{program_<br>stage_id}   | (string) | Contains the ID of the current program stage that triggered the rules. This can be used to run rules in specific program stages, or avoid execution in certain stages. When executing the rules in the context of a TEI registration form the variable will be empty.   |
| V{program_<br>stage_name} | (string) | Contains the name of the current program stage that triggered the rules. This can be used to run rules in specific program stages, or avoid execution in certain stages. When executing the rules in the context of a TEI registration form the variable will be empty. |

## Configure relationship types

### About relationship types

A relationship represents a link between two entities in the Tracker-model. A relationship is considered data in DHIS2 and is based on a Relationship Type, similar to how a Tracked Entity Instance is based on a Tracked Entity Type.

Relationships always include two entities, and these entities can include Tracked Entity Instances, Enrollments and Events, and any combination of these. Note that not all of these combinations are available in the current apps.

In addition, relationships can be defined as unidirectional or bidirectional. The only functional difference is currently that these requires different levels of access to create. Unidirectional relationships requires the user to have data write access to the “from” entity and data read access for the “to” entity, while bidirectional relationships require data write access for both sides.

For more information about configuration and the meaning of 'From constraint' and 'To constraint', see [Relationship model](#).

### Create or edit a relationship type

1. Open the **Maintenance** app and click **Program > Relationship type**.
2. Click the add button.
3. Type a **Name** of the relationship type.
4. (Optional) Assign a **Code**.
5. (Optional) Provide a **Description** of the relationship.
6. (Optional) Select whether the relationship should be bidirectional
7. Provide **Relationship name seen from initiating entity**. This is the name of the relationship that will be shown in the Data Entry app at the 'left' side of the relationship. E.g. in a Mother-child relationship this could be 'Mother of'.
8. (Optional) Provide **Relationship name seen from receiving entity**. This is the name of the relationship that will be shown at the 'right' side of the relationship in the Data Entry app. E.g. in a Mother-child relationship this could be 'Mother'.
9. Select a 'From constraint'. This limits what kind of entities that can be included in the relationship. [Relationship model](#).

- 
10. Select a 'To constraint'. This limits what kind of entities that can be included in the relationship. [Relationship model](#).

11. Click **Save**.

## Configure tracked entity types

### About tracked entity types

A tracked entity is a types of entities which can be tracked through the system. It can be anything from persons to commodities, for example a medicine or a person.

A program must have one tracked entity. To enroll a tracked entity instance into a program, the tracked entity type and tracked entity type of a program must be the same.

Tracked entity attributes are used to register extra information for a tracked entity. Tracked entity attributes can be shared between programs.

### Create or edit a tracked entity attribute

1. Open the **Maintenance** app and click **Program > Tracked entity attribute**.
2. Click the add button.
3. In the **Name** field, type the tracked entity attribute name.
4. (Optional) Type a **Short name**.
5. (Optional) Type a **Form name**.
6. (Optional) In the **Code** field, assign a code.
7. (Optional) Type a **Description**.
8. (Optional) In the **Field mask** field, you may type a template that's used to provide hints for correct formatting of the attribute. **NOTE: So far only implemented in the DHIS2 Android Capture app, not in the Capture and Tracker Capture web apps.** The following are special characters that can be used in the mask. The special characters match exactly one character of the given type.

| Character | Match                      |
|-----------|----------------------------|
| \d        | digit                      |
| \x        | lower case letter          |
| \X        | capital letter             |
| \w        | any alphanumeric character |

For example, the pattern can be used to show hyphens as needed in the input field of the data element. E.g "\d\d\d-\d\d\d-\d\d\d", would show an hyphen for every third digit.

1. Select an **Option set**.
2. In the **Value type** field, select the type of data that the tracked entity attribute will record.

### Value types

| Value type               | Description  |
|--------------------------|--|
| Age                      | -  |
| Coordinate               | A point coordinate specified as longitude and latitude in decimal degrees. All coordinate should be specified in the format "-19.23 , 56.42" with a comma separating the longitude and latitude. |
| Date                     | Dates render as calendar widget in data entry.   |
| Date & time              | -  |
| E-mail                   | -  |
| File                     | A file resource where you can store external files, for example documents and photos.  |
| Image                    | Similar to File, but restricted to images.   |
| Integer                  | Any whole number (positive and negative), including zero.  |
| Letter                   | -  |
| Long text                | Textual value. Renders as text area in forms.  |
| Negative integer         | Any whole number less than (but not including) zero.   |
| Number                   | Any real numeric value with a single decimal point. Thousands separators and scientific notation is not supported.   |
| Percentage               | Whole numbers inclusive between 0 and 100.   |
| Phone number             |  |
| Positive integer         | Any whole number greater than (but not including) zero.  |
| Positive of zero integer | Any positive whole number, including zero.   |



| Value type        | Description   |
|-------------------|---|
| Organisation unit | -   |
| Unit interval     | Any real number greater than or equal to 0 and less than or equal to 1.   |
| Text              | Textual value. The maximum number of allowed characters per value is 50,000.  |
| Time              | Time is stored in HH:mm format.<br>HH is a number between 0 and 23<br>mm is a number between 00 and 59  |
| Tracker associate | -   |
| Username          | Rendered as a dialog with a list of users and a search field. The user will need the "View User" authority to be able to utilise this data type |
| Yes/No            | Boolean values, renders as drop-down lists in data entry.   |
| Yes only          | True values, renders as check-boxes in data entry.  |

### 3. Select an **Aggregation type**.

#### **Aggregation operators**

| Aggregation operator                         | Description  |
|--|--|
| Average                                      | Average the values in both the period as and the organisation unit dimensions.           |
| Average (sum in organisation unit hierarchy) | Average of data values in the period dimension, sum in the organisation unit dimensions. |
| Count  | Count of data values.  |
| Min  | Minimum of data values.  |

| Aggregation operator | Description   |
|----------------------|---|
| Max                  | Maximum of data values.   |
| None                 | No aggregation is performed in any dimension.                     |
| Sum                  | Sum of data values in the period and organisation unit dimension. |
| Standard deviation   | Standard deviation (population-based) of data values.             |
| Variance             | Variance (population-based) of data values.                       |

4. Select **Unique** to specify that the values of the tracked entity attribute is unique.

There are two options for the unique setting:

- **Entire system:** The values of the tracked entity attribute can duplicate with values which belong to other tracked entity attributes. But the values in this tracked entity attribute must not duplicate.

Select **Automatically generated** to allow automatic generation of the tracked entity attribute value. When the generate setting is selected on, an optional field for specifying pattern also displays. This field should contain a pattern based on the TextPattern syntax. When the value is automatically generated, it will be unique for this attribute for the entire system. See the TextPattern section for more information on how it works.

- **Organisation unit:** The values of the tracked entity attribute must not duplicate in the same organisation unit.

5. Select **Inherit** to registry a new entity for relationship with an available entity, all inherit entity attribute values of the entity will be pre-filled in the registration form.

6. (Optional) Select **Confidential**.

This option is only available if you have configured encryption for the system.

7. (Optional) Select **Display in list without program**.

8. (Optional) Assign one or multiple **Legends**.

9. Click **Save**.

### Create or edit a tracked entity type

1. Open the **Maintenance** app and click **Program > Tracked entity type**.
2. Click the add button or an already existing **tracked entity type**.
3. Type a **Name** of the tracked entity.

- 
- (Optional) select a **Color** and an **Icon** that will be used by the data capture apps to identify this tracked entity type.
  4. (Optional) Enter a **Description** of the tracked entity.
  5. (Optional) Enter a **Minimum number of attributes required to search**. This specifies the amount of attributes that need to be filled out in order to be able to search for this **tracked entity type** in a *global search*. See [Configure Search](#) for more information.
  6. (Optional) Enter a **Maximum number of tracked entity instances to return in search**. This specifies the amount of tracked entity instances that will be returned in a *global search*. See [Configure Search](#) for more information.
  7. (Optional) Add **Tracked entity type attributes**. This is used to configure search, see [Configure Search](#) for more information.
  8. (Optional) Enter an **Alternative name** of the tracked entity.
  9. (Optional) Enter an **Alternative name** of the tracked entity.
  10. Click **Save**.

## Configure search

Users can be given search organisation units, which makes it possible to search for tracked entity instances outside their data capture organisation units.

Searching can be done either in the context of a program, or in the context of a tracked entity type. To be give users the option of searching in the context of a program, it is necessary to configure which of the programs tracked entity attributes is searchable. To give users the option of searching in the context of a tracked entity type, you will have to configure which of the tracked entity type attributes is searchable.

### Configure search for tracker program

To be able to search with a program, you will have to make some of the program attributes searchable. Unique program attributes will always be searchable.

1. Open **Program app**
2. Open or create a tracker program
3. Go to **Attributes**
4. If you have no attributes, add one
5. Set the attribute searchable

Searchable program attributes will assigned to a search group.

- Unique group. One group per unique program attribute. Unique attributes cannot be combined with other program attributes in a search. The result from the search can only be 0 or 1 tracked entity instance.
- Non-unique group. This group contains all non-unique program attributes and makes it possible to combine multiple attributes in a search.

---

There are two limits that can be set for a program search, as part of the **Program** configuration.

- Minimum number of attributes required to search: This property defines how many of the non-unique attributes that must be entered before a search can be performed.
- Maximum number of tracked entity instances to return: This property defines the maximum number of results a user will get in her search. If a too large number of tracked entity instances is found, the user must provide a more specific search.

### Configure search for tracked entity type

**Note**

TET = Tracked entity type

To be able to search without a program, you will have to make some of the TET attributes searchable. Unique TET attributes will always be searchable.

1. Open **Tracked entity type app**
2. Open a Tracked entity type
3. If the TET has no attributes, add one
4. Set the attribute searchable

Searchable TET attributes will assigned to a search group.

- Unique group. One group per unique TET attribute. Unique attributes cannot be combined with other TET attributes in a search. The result from the search can only be 0 or 1 tracked entity instance.
- Non-unique group. This group contains all non-unique TET attributes and makes it possible to combine multiple attributes in a search.

There are two limits that can be set for a TET search

- Minimum number of attributes required to search: This property defines how many of the non-unique attributes that must be entered before a search can be performed.
- Maximum number of tracked entity instances to return: This property defines the maximum number of results a user will get in her search. If a too large number of tracked entity instances is found, the user must provide a more specific search.

### Configure search organisation units for a user

To be able to search in other organisation units than the users data capture organisation units, the user must be assigned with search organisation units. Giving a user a search organisation unit will also give it access to search in all children of that organisation unit.

1. Open **Users app**
2. Click on a user
3. Open **Assign search organisation units**
4. Select organisation units
5. Click **Save**

---

## Clone metadata objects

Cloning a data element or other objects can save time when you create many similar objects.

1. Open the **Maintenance** app and find the type of metadata object you want to clone.
2. In the object list, click the options menu and select **Clone**.
3. Modify the options you want.
4. Click **Save**.

## Delete metadata objects

### Note

You can only delete a data element and other data element objects if no data is associated to the data element itself.

### Warning

Any data set that you delete from the system is irrevocably lost. All data entry forms, and section forms which may have been developed will also be removed. Make sure that you have made a backup of your database before deleting any data set in case you need to restore it at some point in time.

1. Open the **Maintenance** app and find the type of metadata object you want to delete.
2. In the object list, click the options menu and select **Delete**.
3. Click **Confirm**.

## Change sharing settings for metadata objects

You can assign different sharing settings to metadata objects, for example organisation units and tracked entity attributes. These sharing settings control which users and users groups that can view or edit a metadata object.

Some metadata objects also allows you to change the sharing setting of data entry for the object. These additional settings control who can view or enter data in form fields using the metadata.

### Note

The default setting is that everyone (**Public access**) can find, view and edit metadata objects.

1. Open the **Maintenance** app and find the type of metadata object you want to modify.
2. In the object list, click the context menu and select **Sharing settings**.
3. (Optional) Add users or user groups: search for a user or a user group and select it. The user or user group is added to the list.
4. Change sharing settings for the access groups you want to modify.
  - **Can edit and view**: The access group can view and edit the object.
  - **Can view only**: The access group can view the object.

---

**No access** (only applicable to **Public access**): The public won't have access to the object.

5. Change data sharing settings for the access groups you want to modify.
  - **Can capture data**: The access group can view and capture data for the object.
  - **Can view data**: The access group can view data for the object.
  - **No access**: The access group won't have access to data for the object.
6. Click **Close**.

### Display details of metadata objects

1. Open the **Maintenance** app and find the type of metadata object you want to view.
2. In the object list, click the options menu and select **Show details**.

### Translate metadata objects

DHIS2 provides functionality for translations of database content, for example data elements, data element groups, indicators, indicator groups or organisation units. You can translate these elements to any number of locales. A locale represents a specific geographical, political, or cultural region.

#### Tip

To activate a translation, open the **System Settings** app, click > > **Appearance** and select a language.

1. Open the **Maintenance** app and find the type of metadata object you want to translate.
2. In the object list, click the options menu and select **Translate**.

#### Tip

If you want to translate an organisation unit level, click directly on the **Translate** icon next to each list item.

3. Select a locale.
4. Type a **Name**, **Short name** and **Description**.
5. Click **Save**.

## Manage users, user roles and user groups

### About user management

Multiple users can access DHIS2 simultaneously and each user can have different authorities. You can fine-tune these authorities so that certain users can only enter data, while others can only generate reports.

- You can create as many users, user roles and user groups as you need.
- You can assign specific authorities to user groups or individual users via user roles.
- You can create multiple user roles each with their own authorities.
- You can assign user roles to users to grant the users the corresponding authorities.
- You can assign each user to organisation units. Then the user can enter data for the assigned organisation units.

### *User management terms and definitions*

| Term       | Definition  | Example   |
|------------|---|---|
| Authority  | A permission to perform one or several specific tasks | Create a new data element<br>Update an organisation unit<br>View a report |
| User       | A person's DHIS2 user account                         | admin<br>traore<br>guest  |
| User role  | A group of authorities                                | Data entry clerk<br>System administrator<br>Antenatal care program access |
| User group | A group of users                                      | Kenya staff<br>Feedback message recipients<br>HIV program coordinators    |

You manager users, user roles and user groups in the **Users** app.

### *Objects in the Users app*

| Object type | Available functions   |
|-------------|---|
| User        | Create, edit, invite, clone, disable, display by organisation unit, delete and show details |
| User role   | Create, edit, share, delete and show details  |
| User group  | Create, edit, join, leave, share, delete and show details                                   |

### About users

Each user in DHIS2 must have a user account which is identified by a user name. You should register a first and last name for each user as well as contact information, for example an email address and a phone number.

It is important that you register the correct contact information. DHIS2 uses this information to contact users directly, for example sending emails to notify users about important events. You can also use the contact information to share for example dashboards and pivot tables.

A user in DHIS2 is associated with an organisation unit. You should assign the organisation unit where the user works.

When you create a user account for a district record officer, you should assign the district where he/she works as the organisation unit.

The assigned organisation unit affects how the user can use DHIS2:

- In the **Data Entry** app, a user can only enter data for the organisation unit she is associated with and the organisation units below that in the hierarchy. For instance, a district records officer will be able to register data for her district and the facilities below that district only.
- In the **Users** app, a user can only create new users for the organisation unit she is associated with in addition to the organisation units below that in the hierarchy.
- In the **Reports** app, a user can only view reports for her organisation unit and those below. (This is something we consider to open up to allow for comparison reports.)

An important part of user management is to control which users are allowed to create new users with which authorities. In DHIS2, you can control which users are allowed to perform this task. The key principle is that a user can only grant authorities and access to data sets that the user itself has access to. The number of users at national, province and district level are often relatively few and can be created and managed by the system administrators. If a large proportion of the facilities are entering data directly into the system, the number of users might become unwieldy. It is recommended to delegate and decentralize this task to the district officers, it will make the process more efficient and support the facility users better.

### About user roles

A user role in DHIS2 is a group of authorities. An authority means the permission to perform one or more specific tasks.

A user role can contain authorities to create a new data element, update an organisation unit or view a report.



---

A user can have multiple user roles. If so, the user's authorities will be the sum of all authorities and data sets in the user roles. This means that you can mix and match user roles for special purposes instead of only creating new ones.

A user role is associated with a collection of data sets. This affects the **Data Entry** app: a user can only enter data for the data sets registered for his/her user role. This can be useful when, for example, you want to allow officers from health programs to enter data only for their relevant data entry forms.

Recommendations:

- Create one user role for each position within the organisation.
- Create the user roles in parallel with defining which user is doing which tasks in the system.
- Only give the user roles the exact authorities they need to perform their job, not more. Only those who are supposed to perform a task should have the authorities to perform it.

### About user groups

A user group is a group of users. You use user groups when you set up sharing of objects or notifications, for example push reports or program notifications.

See also:

[Sharing](#)

[Manage program notifications](#)

[Mange push reports](#)

### Workflow

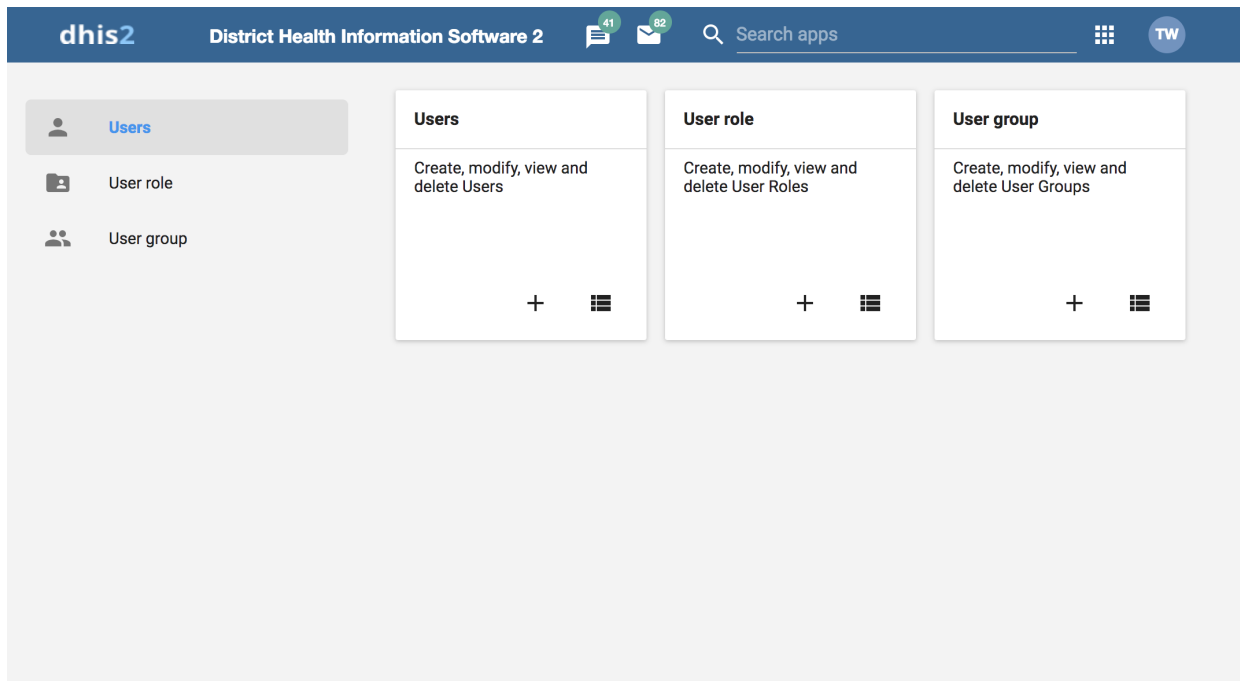
1. Define the positions you need for your project and identify which tasks the different positions will perform.
2. Create roughly one user role for each position.
3. Create users.
4. Assign user roles to the users.
5. Assign the users to organisation units.
6. (Optional) Group users in user groups.
7. Share datasets with users or user-groups via the Sharing Dialog in Data set management section of the Maintenance app

#### Tip

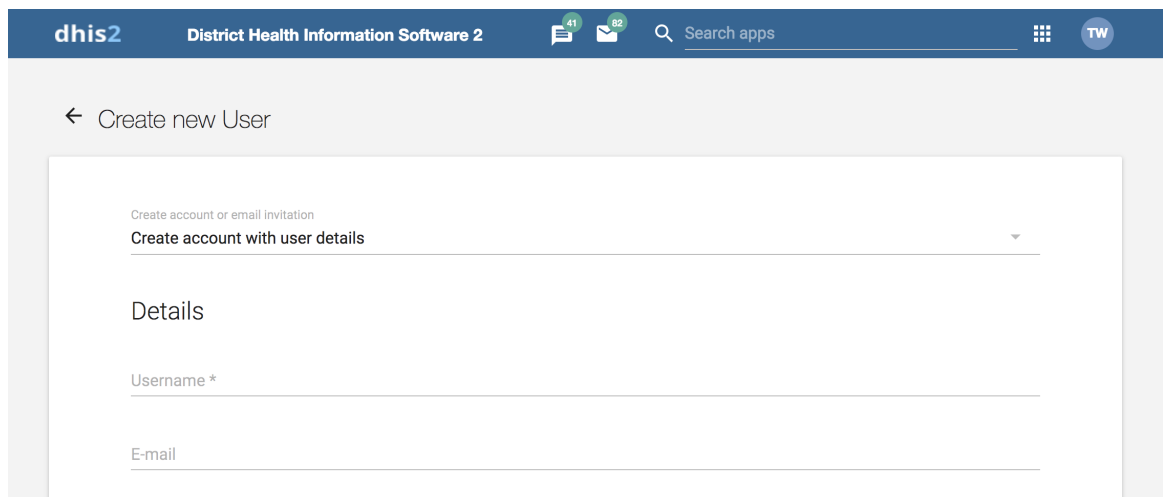
For users to be able to enter data, you must add them to an organisational unit level and share a dataset with them.

## Manage users

### Create a user



1. Open the **Users** app and click on the **+** in the **Users** card.
2. Select whether you want to fill in all the personal user information, or invite the user by email to complete the rest of the user information:
3. **Create account with user details**



Choose this option if you would like to enter all the login details of the new user such as username, password, etc. Under these conditions, the fields username, password, surname, first name, and roles are mandatory.

After you've created the user, the account is ready for the user to use with the user name and password that you provide.

#### 4. Email invitation to create account

The screenshot shows the 'Create new User' interface in DHIS2. At the top, there's a header with 'dhis2 District Health Information Software 2' and navigation icons. The main content area has a back arrow and the title 'Create new User'. Below this is a form with a dropdown menu labeled 'Create account or email invitation' where 'Email invitation to create account' is selected. Underneath the dropdown is a section titled 'Details' containing three input fields: 'Username', 'E-mail \*', and an empty field.

Choose this option if you want to send an invitation by email to the user. Then she/he must return to DHIS2 and finish setting up their user account. The account that the user finishes setting up will be limited according to how you configure the account.

#### Note

In order to use this feature the system should have a valid email configuration in SystemSettings -> Email

Enter the email address to which the invitation should be sent. If you want to, you may also enter the user name that the account will have. If you leave the user name empty, then the user may choose their own user name when they respond to the invitation (as long as it is not taken already for another user.)

After you've created the user, the system sends an email to the address you provided. It contains a unique web link by which the user can return to the system and activate their account by entering the rest of their user information. The user must finish setting up the account within 4 days, after that the invitation becomes invalid.

1. (Optional) Provide values for the fields **OpenID, LDAP identifier, Mobile phone number, WhatsApp, Facebook messenger, Skype, Telegram and Twitter.**
2. Select an **Interface language.**  
You can select a language into which fixed elements of the DHIS2 user interface have been translated.
3. Select a **Database language.**  
You can select a language into which implementation-supplied items have been translated in the database, for example data element names or organisation unit level names.
4. In the **Available roles** section, double-click the user roles you want to assign to the user.

Select **Data capture and maintenance organisation units**.

5.

Interface language  
English

Database language  
Use database locale / no translation

Available roles Selected roles \*

Filter

Antenatal care programssssEDITgjhgasdsssAA  
Brynn DouglasA  
Child Health Program Managers  
Child Health Tracker  
Data entry clerk  
Facility trackerS  
Guest  
Inpatient program  
M and E Officer  
MNCH / PNC (Adult Woman) program

**ASSIGN ALL 21** →

→

←

← REMOVE ALL

Data capture and maintenance organisation units

Search

▸  Sierra Leone

*Selecting an organisation unit provides access to all units in the sub-hierarchy*

[SHOW MORE OPTIONS](#)

Data output and analytic organisation units

Search

▸  Sierra Leone

The data capture and maintenance organisation units control for which organisation units the user can do data entry. You must assign at least one data capture and maintenance organisation unit to each user.

Users will have access to all sub-organisation units of the assigned organisation units. For example, if you've assigned a user to a district which has several facilities contained in the district, the user would have access to the district's data, as well as all of the facilities contained within the district.

6. (Optional) Select **Data output and analysis organisation units**.

The data output and analysis organisation units controls for which organisation units the user can view aggregated data in the analytics apps, for example the **Pivot Table** and **GIS** apps. You can assign any number of data output and analysis organisation units to a user.

Users will have access to all sub-organisation units of the assigned organisation units. You shouldn't select the descendants of an organisation unit which you have already selected. For example, if you've assigned the user to a district, you shouldn't select the facilities within that district.

**Note**

Assigning data output and analysis organisation units organisation units is optional. If you don't specify any organisation unit, the user will have access to the full organisation unit hierarchy for viewing aggregated data. As with the data capture organisation units, *you should not select descendant organisation units of a unit which you have already*

*selected.*

In several places in the analytics apps, you can select "user organisation unit" for the organisation unit dimension. This mechanism will first attempt to use the data view organisation units linked to the current user. If not found, it will use the data capture and maintenance organisation units. If the user has been assigned to multiple organisation units, the use of "user organisation unit" may result in unpredictable behaviour.

1. Click **Show more options** and an additional three fields will show. (Optional)
2. In the **Search organisation units** select the organisation units you want the user to be able to search in.
3. (Optional) In the **Available user groups** section, double-click the user groups you want to assign to the user.
4. (Optional) In the **Available dimension restrictions for data analytics** section, double-click the dimensions you want to assign to the user.

You can restrict the values the user sees in data analytics apps by selecting dimensions that will restrict the user's view.

#### **Example**

Let's say you have defined *Implementing Partner* as a category option group set, and you have shared with this user only one or more specific implementing partners (category option groups). If you want to make sure that the user does not see totals in analytics that include values from other groups, assign *Implementing Partner* to the user.

This insures that any data visible to the user through the analytics apps will be filtered to select only the Implementing Partner category option group(s) which are visible to the user.

1. Click **Save**.

#### **Edit user objects**

1. Open the **Users** app and find the type of user object you want to edit.
2. In the object list, directly click the relevant object, or click the menu icon and select **Edit**.
3. Modify the options you want.
4. Click **Save**.

---

## Disable users

You can disable a user. This means that the user's account is not deleted, but the user can't log in or use DHIS2.

1. Open the **Users** app and click **User**.
2. In the list, click the menu icon of relevant user record and select **Disable**.
3. Click **OK** to confirm.

### Warning

If you are using the [Android Capture App](#) disabling a user will cause the application to delete the local data stored on the phone next time the user attempts an on-line login. Please make sure that when you use the *disable user* function all the data has been synced with the server. Or that you are using this functionality to ensure data deletion in case of a device being lost.

## Display a user's profile

1. Open the **Users** app and click **User**.
2. In the list, click the menu icon of the relevant user and select **Profile**.

## Filter users by organisation unit

You can view all users that have been assigned to a particular organisation unit.

1. Open the **Users** app and click **Users**.
2. Above the user list, click on the **Organisation Unit** filter input.
3. A pop-up will appear in which you can select the organisation units you would like to filter by.

The list of users will be filtered to only include users which have been assigned to the selected organisation units.

## Clone users

1. Open the **Users** app and click **User**.
2. In the object list, click the menu icon of the relevant user and select **Replicate**.
3. Enter a new user name and password for the cloned user account.
4. Click **Replicate**.
5. In the object list, click the user you just created and click **Edit**.
6. Modify the options you want.
7. Click **Save**.

## Change user password

To change a user's password:

1. Open the **Users** app and click **User**.

- 
- In the object list, click the menu icon of the relevant user and select **Edit**.
  - 
  - Enter a new password and retype it.
  - Click **Save**.

### Password requirements

The following rules apply when you create a new password. The password must:

- Contain at least 8 characters. Note that this number is configurable through the system setting "Minimum characters in password", which can be up to 14 characters.
- Not contain more than 40 characters.
- Contain at least one special character (non-alphanumeric character).
- Contain at least one upper-case character.
- Contain at least one lower-case character.
- Contain at least one digit (number).
- Not contain the username or email address of the user account.
- Not contain generic words such as *system*, *admin*, *user*, *login*, and *manager*.
- Not be one of the previous 24 passwords the user has used. This does not apply in case when a super user resets the password for another user.

### Delete user objects

- Open the **Users** app and find the type of user object you want to delete.
- In the object list, click the menu icon of the relevant object and select **Remove**.
- Click **OK** to confirm.

### Display details of user objects

- Open the **Users** app and find the type of user object you want to view.
- In the object list, click the menu icon of the relevant object and select **Show details**.

### Disable Two Factor Authentication for a user

If a user has enabled Two Factor Authentication and then loses access to his/her authentication device (e.g. smartphone gets lost or broken), this user will not be able to log into the system any more. To solve this issue, a user manager can disable Two Factor Authentication for the affected user, so that the user is able to access the system again using just a password.

- Open the **Users** app and click **Users**.
- In the object list, click the menu icon of the relevant user and select **Disable Two Factor Authentication**.
- Click **OK** to confirm

**Note**

The option to disable Two Factor Authentication will only be available for users that have set up Two Factor Authentication via the user-profile-app.

## Manage user roles

### Create a user role

#### Details

Name \*

---

Description

---

#### Authorities

Search

---

Selected authorities only

| Metadata                  |                          |                                     |                                     |                          |
|---------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|
| Name                      | Add/Update Public        | Add/Update Private                  | Delete                              | External access          |
| Analytics Table Hook      | <input type="checkbox"/> |                                     | <input type="checkbox"/>            |                          |
| Attribute                 | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Category Combo            | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Category                  | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Category Option           | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Category Option Group     | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Category Option Group Set | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Chart                     | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Color Set                 | <input type="checkbox"/> |                                     | <input type="checkbox"/>            |                          |
| Constant                  | <input type="checkbox"/> |                                     | <input type="checkbox"/>            |                          |
| Dashboard                 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |                          |

| Apps   |  |
|--|--|
| Name   |  |
| <input type="checkbox"/> See App Management app        |  |
| <input type="checkbox"/> See Browser Cache Cleaner app |  |
| <input type="checkbox"/> See Dashboard app             |  |
| <input type="checkbox"/> See Data Administration app   |  |
| <input type="checkbox"/> See Data Entry app            |  |
| <input type="checkbox"/> See Datastore app             |  |
| <input type="checkbox"/> See Event Capture app         |  |
| <input type="checkbox"/> See Event Reports app         |  |
| <input type="checkbox"/> See Event Visualizer app      |  |
| <input type="checkbox"/> See Import/Export app         |  |

| Tracker   |  |
|---|--|
| Name  |  |
| <input type="checkbox"/> Administer program dashboard configuration                   |  |
| <input type="checkbox"/> Add/Update Enrollment  |  |
| <input type="checkbox"/> Read Enrollment  |  |
| <input type="checkbox"/> Cancel/Delete Enrollment                                     |  |
| <input type="checkbox"/> Read Tracked Entity Data Value                               |  |
| <input type="checkbox"/> Search Tracked Entity Instance                               |  |
| <input type="checkbox"/> Search tracked entity instance across all organisation units |  |
| <input type="checkbox"/> Update Tracked Entities                                      |  |
| <input type="checkbox"/> Uncomplete events  |  |
| <input type="checkbox"/> View event analytics   |  |

1. Open the **Users** app and click **User role**.
2. Click **Add new**.
3. Enter a **Name**, for example "Super user" or "Admin user".
4. Enter a **Description**.
5. In the **Authorities** section, select the authorities you want to give to the user role. You can also use the filter inputs above the authority section to search for a specific authority.
6. Click **Add**.



---

**Edit user objects**

1. Open the **Users** app and find the type of user object you want to edit.
2. In the object list, directly click the relevant object, or click the menu icon and select **Edit**.
3. Modify the options you want.
4. Click **Save**.

**Delete user objects**

1. Open the **Users** app and find the type of user object you want to delete.
2. In the object list, click the menu icon of the relevant object and select **Remove**.
3. Click **OK** to confirm.

**Display details of user objects**

1. Open the **Users** app and find the type of user object you want to view.
2. In the object list, click the menu icon of the relevant object and select **Show details**.

**Change sharing settings for user objects**

1. Open the **Users** app and find the type of user object you want to modify.
2. In the object list, click the relevant object and select **Sharing settings**.
3. (Optional) Search for a user group and select it, then click the plus icon. The user group is added to the list.
4. (Optional) Select **External access (without login)**.
5. Change the settings for the user groups you want to modify.
6. **None**
7. **Can view**: Everyone in the user group can view the object
8. **Can edit and view**: Everyone in the user group can view and edit the object
9. Click **Save**.

**Manage user groups****Create a user group**

1. Open the **Users** app and click **User group**.
2. Click **Add new**.
3. In the **Name** field, type the name of the user group.
4. In the **Available users** section, double-click the users you want to add to the user group.
5. In the **Available user groups** section, double-click the user groups you want to add to the user group.
6. Click **Add**.

---

### Join user groups

1. Open the **Users** app and click **User group**.
2. In the list, click the relevant user group and select **Join group**.

### Leave user groups

1. Open the **Users** app and click **User group**.
2. In the list, click the relevant user group and select **Leave group**.

### Edit user objects

1. Open the **Users** app and find the type of user object you want to edit.
2. In the object list, directly click the relevant object, or click the menu icon and select **Edit**.
3. Modify the options you want.
4. Click **Save**.

### Delete user objects

1. Open the **Users** app and find the type of user object you want to delete.
2. In the object list, click the menu icon of the relevant object and select **Remove**.
3. Click **OK** to confirm.

### Display details of user objects

1. Open the **Users** app and find the type of user object you want to view.
2. In the object list, click the menu icon of the relevant object and select **Show details**.

### Change sharing settings for user objects

1. Open the **Users** app and find the type of user object you want to modify.
2. In the object list, click the relevant object and select **Sharing settings**.
3. (Optional) Search for a user group and select it, then click the plus icon. The user group is added to the list.
4. (Optional) Select **External access (without login)**.
5. Change the settings for the user groups you want to modify.
6. **None**
7. **Can view**: Everyone in the user group can view the object
8. **Can edit and view**: Everyone in the user group can view and edit the object
9. Click **Save**.

### Enable support for OpenID

DHIS2 supports the OpenID standard, which allows third party login using a OpenID provider, for more information see <http://openid.net>. To create a custom OpenID URL for a user name you can visit this URL and log in with your OpenID provider: <http://openid-provider.appspot.com>.

---

To enable support for OpenID in DHIS2, you must:

1. **Set your OpenID provider:** This can be done inside system settings, under "Access". Here you can set both the OpenID provider, and also the label to display on the login page to login with this provider (defaults to Login with OpenID).
2. **Set the OpenID identifier on the user:** For every user that should be able to login with his OpenID identifier, you will need to set this on the user itself. This can be done in user management, under the email field, there is not a field called *OpenID* which can be used to fill in the OpenID identifier.

## Decentralize user management

DHIS2 supports a concept for user management referred to as *managed users* which allows to explicitly define which users should be allowed to manage or modify which users. To "manage a user" implies that you can see and modify that user. The basic concept for user management is that you can see and modify users which you have been granted all of the authorities; in other words you can modify users which have a subset of your own authorities. The managed users concept gives you greater control over this.

The managed users concept allows you to define which users should be able to manage which users. This is configured through user groups and memberships within such groups. A user group can be configured to be allowed to manage other user groups from the standard add and update user interface. The effect is that a specific user can manage all users which are members of user groups which can be managed by a user group that the user is member of. In other words, users can be managed by all members of user groups which are managing user groups they are member of.

To enable this concept you should grant users the authority to "Add/update users within managed groups", and *not* grant access to the standard "Add/update users" authority. An implication of the managed users concept is that when creating a user with the "Add/update users within managed groups" only, the user must be made a member of at least one user group that the current user can manage. If not, the current user would lose access to the user being created immediately. This is validated by the system.

When granted the "Add/update users within managed groups" authority, the system lets a user add members to user groups for which she has read-only access to. The purpose of this is to allow for decentralized user management. You may define a range of user groups where other users may add or remove members, but not remove or change the name of the group.

### Example: user management in a health system

In a health system, users are logically grouped with respect to the task they perform and the position they occupy.

1. Define which users should have the role as system administrators. They are often part of the national HIS division and should have full authority in the system.
2. Create roughly one user role for each position.

Examples of common positions are:

| Position   | Typical tasks  | Recommended authorities  | Comment  |
|--|--|--|--|
| System administrators  | Set up the basic structure (metadata) of the system.   | Add, update and delete the core elements of the system, for example data elements, indicators and data sets. | <p>Only system administrators should modify metadata.</p> <p>If you allow users outside the system administrators team to modify the metadata, it might lead to problems with coordination.</p> <p>Updates to the system should only be performed by the administrators of the system.</p> |
| National health managers<br>Province health managers   | Monitor and analyse data   | Access to the reports module, the <b>GIS, Data Quality</b> apps and the dashboard.                           | Don't need access to enter data, modify data elements or data sets.  |
| National health information system division officers (HISO)<br>District health records and information officers (DHRIO)<br>Facility health records and information officers (HRIO) | Enter data that comes from facilities which are not able to do so directly<br><br>Monitor, evaluate and analyse data | Access to all the analysis and validation apps<br><br>Access to the <b>Data Entry</b> app.                   | -  |
| Data entry clerks  | -  | -  | -  |

## User authorities

|   |   |
|---|---|
| Accept data at lower levels                           | F_ACCEPT_DATA_LOWER_LEVELS              |
| Access my data mart                                   | F_MYDATAMART_VIEW                       |
| Add Facility  | F_FRED_CREATE                           |
| Add Locale  | F_LOCALE_ADD                            |
| Add Option Set  | F_OPTIONSET_ADD                         |
| Add Organisation Unit Group Set                       | F_ORGUNITGROUPSET_ADD                   |
| Add Program Rule                                      | F_PROGRAM_RULE_ADD                      |
| Add Public Map  | F_MAP_PUBLIC_ADD                        |
| Add Relationship Type                                 | F_RELATIONSHIPTYPE_ADD                  |
| Add/Remove Members In Read-Only User Groups           | F_USER_GROUPS_READ_ONLY_ADD_MEMBERS     |
| Add SQL View  | F_SQLVIEW_ADD                           |
| Add Tracked Entities                                  | F_TRACKED_ENTITY_ADD                    |
| Add Tracked Entity Attribute Value                    | F_TRACKED_ENTITY_ATTRIBUTEVALUE_ADD     |
| Add Tracked Entity Form                               | F_TRACKED_ENTITY_FORM_ADD               |
| Add Tracked Entity Instance Comment                   | F_TRACKED_ENTITY_COMMENT_ADD            |
| Add Tracked Entity Relationship                       | F_RELATIONSHIP_ADD                      |
| Add/Update Attribute                                  | F_ATTRIBUTE_ADD                         |
| Add/Update Chart                                      | F_CHART_ADD                             |
| Add/Update Concept                                    | F_CONCEPT_ADD                           |
| Add/Update Constant                                   | F_CONSTANT_ADD                          |
| Add/Update Data Value                                 | F_DATAVALUE_ADD                         |
| Add/Update Indicator Type                             | F_INDICATOR_TYPE_ADD                    |
| Add/Update Min/max rule                               | F_DATAELEMENT_MINMAX_ADD                |
| Add/Update Organisation Unit                          | F_ORGANISATIONUNIT_ADD                  |
| Add/Update Private Category Option Group              | F_CATEGORY_OPTION_GROUP_PRIVATE_ADD     |
| Add/Update Private Category Option Group Set          | F_CATEGORY_OPTION_GROUP_SET_PRIVATE_ADD |
| Add/Update Private Data Element                       | F_DATAELEMENT_PRIVATE_ADD               |
| Add/Update Private Data Element Category              | F_CATEGORY_PRIVATE_ADD                  |
| Add/Update Private Data Element Category Combo        | F_CATEGORY_COMBO_PRIVATE_ADD            |
| Add/Update Private Data Element Category Option       | F_CATEGORY_OPTION_PRIVATE_ADD           |
| Add/Update Private Data Element Category Option Combo | F_CATEGORY_OPTION_COMBO_PRIVATE_ADD     |
| Add/Update Private Data Element Groups                | F_DATAELEMENTGROUP_PRIVATE_ADD          |
| Add/Update Private Data Element Group Sets            | F_DATAELEMENTGROUPSET_PRIVATE_ADD       |
| Add/Update Private Data Set                           | F_DATASET_PRIVATE_ADD                   |
| Add/Update Private Document                           | F_DOCUMENT_PRIVATE_ADD                  |
| Add/Update Private Indicator                          | F_INDICATOR_PRIVATE_ADD                 |
| Add/Update Private Indicator Group                    | F_INDICATORGROUP_PRIVATE_ADD            |

|  |  |
|--|--|
| Add/Update Private Indicator Group Sets              | F_INDICATORGROUPSET_PRIVATE_ADD        |
| Add/Update Private Option Set                        | F_OPTIONSET_PRIVATE_ADD                |
| Add/Update Private Organisation Unit Group           | F_ORGUNITGROUP_PRIVATE_ADD             |
| Add/Update Private Organisation Unit Group Set       | F_ORGUNITGROUPSET_PRIVATE_ADD          |
| Add/Update Private Program                           | F_PROGRAM_PRIVATE_ADD                  |
| Add/Update Private Report                            | F_REPORT_PRIVATE_ADD                   |
| Add/Update Private SQL View                          | F_SQLVIEW_PRIVATE_ADD                  |
| Add/Update Private Tracked Entity Attribute          | F_TRACKED_ENTITY_ATTRIBUTE_PRIVATE_ADD |
| Add/Update Private User Group                        | F_USERGROUP_PRIVATE_ADD                |
| Add/Update Private User Role                         | F_USERROLE_PRIVATE_ADD                 |
| Add/Update Private Validation Rule Group             | F_VALIDATIONRULEGROUP_PRIVATE_ADD      |
| Add/Update Program Attribute                         | F_PROGRAM_ATTRIBUTE_ADD                |
| Add/Update Program Indicator                         | F_ADD_PROGRAM_INDICATOR                |
| Add/Update Program Stage                             | F_PROGRAMSTAGE_ADD                     |
| Add/Update Program Stage Section                     | F_PROGRAMSTAGE_SECTION_ADD             |
| Add/Update Public Category Option Group              | F_CATEGORY_OPTION_GROUP_PUBLIC_ADD     |
| Add/Update Public Category Option Group Set          | F_CATEGORY_OPTION_GROUP_SET_PUBLIC_ADD |
| Add/Update Public Chart                              | F_CHART_PUBLIC_ADD                     |
| Add/Update Public Dashboard                          | F_DASHBOARD_PUBLIC_ADD                 |
| Add/Update Public Data Element                       | F_DATAELEMENT_PUBLIC_ADD               |
| Add/Update Public Data Element Category              | F_CATEGORY_PUBLIC_ADD                  |
| Add/Update Public Data Element Category Combo        | F_CATEGORY_COMBO_PUBLIC_ADD            |
| Add/Update Public Data Element Category Option       | F_CATEGORY_OPTION_PUBLIC_ADD           |
| Add/Update Public Data Element Category Option       | F_CATEGORY_OPTION_DELETE               |
| Add/Update Public Data Element Category Option Combo | F_CATEGORY_OPTION_COMBO_PUBLIC_ADD     |
| Add/Update Public Data Element Groups                | F_DATAELEMENTGROUP_PUBLIC_ADD          |
| Add/Update Public Data Element Group Sets            | F_DATAELEMENTGROUPSET_PUBLIC_ADD       |
| Add/Update Public Data Set                           | F_DATASET_PUBLIC_ADD                   |
| Add/Update Public Document                           | F_DOCUMENT_PUBLIC_ADD                  |
| Add/Update Public Indicator                          | F_INDICATOR_PUBLIC_ADD                 |
| Add/Update Public Indicator Group                    | F_INDICATORGROUP_PUBLIC_ADD            |
| Add/Update Public Indicator Group Sets               | F_INDICATORGROUPSET_PUBLIC_ADD         |
| Add/Update Public Option Set                         | F_OPTIONSET_PUBLIC_ADD                 |
| Add/Update Public Organisation Unit Group            | F_ORGUNITGROUP_PUBLIC_ADD              |
| Add/Update Public Organisation Unit Group Set        | F_ORGUNITGROUPSET_PUBLIC_ADD           |
| Add/Update Public Program                            | F_PROGRAM_PUBLIC_ADD                   |
| Add/Update Public Report                             | F_REPORT_PUBLIC_ADD                    |
| Add/Update Public Report Table                       | F_REPORTTABLE_PUBLIC_ADD               |
| Add/Update Public SQL View                           | F_SQLVIEW_PUBLIC_ADD                   |
| Add/Update Public Tracked Entity Attribute           | F_TRACKED_ENTITY_ATTRIBUTE_PUBLIC_ADD  |

|  |   |
|--|---|
| Add/Update Public User Group                 | F_USERGROUP_PUBLIC_ADD                    |
| Add/Update Public User Role                  | F_USERROLE_PUBLIC_ADD                     |
| Add/Update Public Validation Rule Group      | F_VALIDATIONRULEGROUP_PUBLIC_ADD          |
| Add/Update Section                           | F_SECTION_ADD                             |
| Add/Update Tracked Entity                    | F_TRACKED_ENTITY_ADD                      |
| Add/Update Tracked Entity Attributes         | F_ALLOW_EDIT_TRACKED_ENTITY_ATTRIBUTES    |
| Add/Update Tracked Entity Data Value         | F_TRACKED_ENTITY_DATAVALUE_ADD            |
| Add/Update Tracked Entity Instance           | F_TRACKED_ENTITY_INSTANCE_ADD             |
| Add/Update User                              | F_USER_ADD                                |
| Add/Update User Group Managing Relationships | F_USERGROUP_MANAGING_RELATIONSHIPS_ADD    |
| Add/Update User Within Managed Group         | F_USER_ADD_WITHIN_MANAGED_GROUP           |
| Add/Update Validation Criteria               | F_VALIDATIONCRITERIA_ADD                  |
| Add/Update Validation Rule                   | F_VALIDATIONRULE_ADD                      |
| Add Validation Rule Groups                   | F_VALIDATIONRULEGROUP_ADD                 |
| Administrate data mart                       | F_DATAMART_ADMIN                          |
| Administrate data mart                       | F_DATA_MART_ADMIN                         |
| Administrate data visualizer                 | F_DV_ADMIN                                |
| Administrate GIS                             | F_GIS_ADMIN                               |
| Approve data                                 | F_APPROVE_DATA                            |
| Approve data at lower levels                 | F_APPROVE_DATA_LOWER_LEVELS               |
| Archive data                                 | F_ARCHIVE_DATA                            |
| Change GIS Configuration                     | F_GIS_CONFIGURATION_UPDATE                |
| Change Location of Tracked Entity Instance   | F_TRACKED_ENTITY_INSTANCE_CHANGE_LOCATION |
| Change order in Data Set                     | F_DATASET_ORDER_CHANGE                    |
| Change system settings                       | F_SYSTEM_SETTING                          |
| Change Tracked Entity Instance Location      | F_TRACKED_ENTITY_CHANGE_LOCATION          |
| Chart External Access                        | F_CHART_EXTERNAL                          |
| Concept Management                           | F_CONCEPT_MANAGEMENT                      |
| Constant Management                          | F_CONSTANT_MANAGEMENT                     |
| Copy Excel Item                              | F_COPY_EXCEL_ITEM_ADMINISTRATION          |
| Create and download backup                   | F_DASHBOARD_DOWNLOAD_BACKUP               |
| Data Admin Locking                           | F_DATAADMIN_LOCK                          |
| Data Admin Unlocking                         | F_DATAADMIN_UNLOCK                        |
| Delete Attribute                             | F_ATTRIBUTE_DELETE                        |
| Delete Category Option Group                 | F_CATEGORY_OPTION_GROUP_DELETE            |
| Delete Category Option Group Set             | F_CATEGORY_OPTION_GROUP_SET_DELETE        |
| Delete Chart                                 | F_CHART_DELETE                            |
| Delete Concept                               | F_CONCEPT_DELETE                          |
| Delete Constant                              | F_CONSTANT_DELETE                         |

|  |  |
|--|--|
| Delete Data Element                    | F_DATAELEMENT_DELETE                   |
| Delete Data Element Category           | F_CATEGORY_DELETE                      |
| Delete Data Element Category Combo     | F_CATEGORY_COMBO_DELETE                |
| Delete Data Element Groups             | F_DATAELEMENTGROUP_DELETE              |
| Delete Data Element Group Sets         | F_DATAELEMENTGROUPSET_DELETE           |
| Delete Data Set                        | F_DATASET_DELETE                       |
| Delete Data Value                      | F_DATAVALUE_DELETE                     |
| Delete Document                        | F_DOCUMENT_DELETE                      |
| Delete Excel Template                  | F_EXCEL_TEMPLATE_MANAGEMENT_DELETE     |
| Delete Facility                        | F_FRED_DELETE                          |
| Delete Indicator                       | F_INDICATOR_DELETE                     |
| Delete Indicator Group                 | F_INDICATORGROUP_DELETE                |
| Delete Indicator Group Sets            | F_INDICATORGROUPSET_DELETE             |
| Delete Indicator Type                  | F_INDICATOR_TYPE_DELETE                |
| Delete Locale                          | F_LOCALE_DELETE                        |
| Delete Min/max rule                    | F_DATAELEMENT_MINMAX_DELETE            |
| Delete Option Set                      | F_OPTIONSET_DELETE                     |
| Delete Organisation Unit               | F_ORGANISATIONUNIT_DELETE              |
| Delete Organisation Unit Group         | F_ORGUNITGROUP_DELETE                  |
| Delete Organisation Unit Group Set     | F_ORGUNITGROUPSET_DELETE               |
| Delete Program                         | F_PROGRAM_DELETE                       |
| Delete Program Attribute               | F_PROGRAM_ATTRIBUTE_DELETE             |
| Delete Program Enrollment              | F_PROGRAM_INSTANCE_DELETE              |
| Delete Program Stage                   | F_PROGRAMSTAGE_DELETE                  |
| Delete Program Stage Section           | F_PROGRAMSTAGE_SECTION_DELETE          |
| Delete Relationship Type               | F_RELATIONSHIP_TYPE_DELETE             |
| Delete Report                          | F_REPORT_DELETE                        |
| Delete Report Table                    | F_REPORTTABLE_DELETE                   |
| Delete Section                         | F_SECTION_DELETE                       |
| Delete SMS                             | F_MOBILE_DELETE_SMS                    |
| Delete SQL View                        | F_SQLVIEW_DELETE                       |
| Delete Tracked Entity                  | F_TRACKED_ENTITY_DELETE                |
| Delete Tracked Entity Attribute        | F_TRACKED_ENTITY_ATTRIBUTE_DELETE      |
| Delete Tracked Entity Attribute Value  | F_TRACKED_ENTITY_ATTRIBUTEVALUE_DELETE |
| Delete Tracked Entity Data Value       | F_TRACKED_ENTITY_DATAVALUE_DELETE      |
| Delete Tracked Entity Form             | F_TRACKED_ENTITY_FORM_DELETE           |
| Delete Tracked Entity Instance         | F_TRACKED_ENTITY_INSTANCE_DELETE       |
| Delete Tracked Entity Instance Comment | F_TRACKED_ENTITY_COMMENT_DELETE        |
| Delete Tracked Entity Instance Visit   | F_PROGRAM_STAGE_INSTANCE_DELETE        |
| Delete Tracked Entity Relationship     | F_RELATIONSHIP_DELETE                  |
| Delete User                            | F_USER_DELETE                          |



|  |   |
|--|---|
| Delete User Group                        | F_USERGROUP_DELETE                            |
| Delete User Role                         | F_USERROLE_DELETE                             |
| Delete User Within Managed Group         | F_USER_DELETE_WITHIN_MANAGED_GROUP            |
| Delete Validation Criteria               | F_VALIDATIONCRITERIA_DELETE                   |
| Delete Validation Rule                   | F_VALIDATIONRULE_DELETE                       |
| Delete Validation Rule Group             | F_VALIDATIONRULEGROUP_DELETE                  |
| Eliminate duplicate data elements        | F_ELIMINATE_DUPLICATE_DATA_ELEMENTS           |
| Excel Reporting Administration           | F_EXCEL_REPORT_ADMINISTRATION                 |
| Execute SQL View                         | F_SQLVIEW_EXECUTE                             |
| Export Activity Plan to XLS file         | F_ACTIVITY_PLAN_EXPORT                        |
| Export data                              | F_EXPORT_DATA                                 |
| Export events                            | F_EXPORT_EVENTS                               |
| Export meta-Data                         | F_METADATA_EXPORT                             |
| Generate Activity Plans                  | F_GENERATE_ACTIVITY_PLANS                     |
| Generate min-max values                  | F_GENERATE_MIN_MAX_VALUES                     |
| Generate Program Statistics Report       | F_GENERATE_STATISTICAL_PROGRAM_REPORT         |
| Generate Program Summary Report          | F_GENERATE_PROGRAM_SUMMARY_REPORT             |
| Generate Tracked Entity Tabular report   | F_GENERATE_BENEFICIARY_TABULAR_REPORT         |
| Import data                              | F_IMPORT_DATA                                 |
| Import events                            | F_IMPORT_EVENTS                               |
| Import from other systems                | F_IMPORT_OTHER_SYSTEMS                        |
| Import GML                               | F_IMPORT_GML                                  |
| Import meta-Data                         | F_METADATA_IMPORT                             |
| Insert custom Java script and CSS        | F_INSERT_CUSTOM_JS_CSS                        |
| List Excel Template                      | F_EXCEL_TEMPLATE_MANAGEMENT_LIST              |
| List Tracked Entity Instance             | F_TRACKED_ENTITY_INSTANCE_LIST                |
| List User Groups                         | F_USERGROUP_LIST                              |
| List User Roles                          | F_USERROLE_LIST                               |
| Load event reminder messages             | F_PROGRAM_STAGE_INSTANCE_REMINDER             |
| Load Tracked Entity Instance History     | F_TRACKED_ENTITY_INSTANCE_HISTORY             |
| Lock Data Set                            | F_DATASET_LOCK                                |
| Manage integration routes                | F_MANAGE_INTEGRATION_ROUTES                   |
| Manage Program Indicators                | F_PROGRAM_INDICATOR_MANAGEMENT                |
| Manage Program Rule                      | F_PROGRAM_RULE_MANAGEMENT                     |
| Manage Tracked Entities                  | F_TRACKED_ENTITY_MANAGEMENT                   |
| Manage Tracked Entity Instance Reminders | F_TRACKED_ENTITY_INSTANCE_REMINDER_MANAGEMENT |
| Map External Access                      | F_MAP_EXTERNAL                                |
| Merge organisation units                 | F_MERGE_ORGANISATION_UNITS                    |
| Move Organisation Unit                   | F_ORGANISATIONUNIT_MOVE                       |

|   |  |
|---|--|
| Multiple Individual Data Entry                      | F_NAME_BASED_DATA_ENTRY                          |
| Option Set Management                               | F_OPTIONSET_MANAGEMENT                           |
| Organisation Unit Registration                      | F_ORGANISATION_REGISTRATION                      |
| Perform maintenance tasks                           | F_PERFORM_MAINTENANCE                            |
| Program Enrollment                                  | F_PROGRAM_ENROLLMENT                             |
| Program Event Management                            | F_PROGRAM_INSTANCE_MANAGEMENT                    |
| Program Stage Section Management                    | F_PROGRAMSTAGE_SECTION_MANAGEMENT                |
| Program Tracking Management                         | F_PROGRAM_TRACKING_MANAGEMENT                    |
| Program Un-enrollment                               | F_PROGRAM_UNENROLLMENT                           |
| Prune organisation units                            | F_PRUNE_ORGANISATION_UNITS                       |
| Remove Empty Tracked Entity Events                  | F_TRACKED_ENTITY_REMOVE_EMPTY_EVENTS             |
| Rename Excel Template file                          | F_EXCEL_TEMPLATE_MANAGEMENT_RENAME               |
| Report Table External Access                        | F_REPORTTABLE_EXTERNAL                           |
| Run validation                                      | F_RUN_VALIDATION                                 |
| Scheduling Administration                           | F_SCHEDULING_ADMIN                               |
| Scheduling case aggregate query builder             | F_SCHEDULING_CASE_AGGREGATE_QUERY_BUILDER        |
| Scheduling send messages                            | F_SCHEDULING_SEND_MESSAGE                        |
| Search Activity Plan                                | F_ACTIVITY_PLAN                                  |
| Search events without registration                  | F_PROGRAM_STAGE_INSTANCE_SEARCH                  |
| Search events with registration                     | F_PROGRAM_TRACKING_SEARCH                        |
| Search Tracked Entity Instance                      | F_TRACKED_ENTITY_INSTANCE_SEARCH                 |
| Search Tracked Entity Instance in All Org Units     | F_TRACKED_ENTITY_INSTANCE_SEARCH_IN_ALL_ORGUNITS |
| See API Module                                      | M_dhis-web-api                                   |
| See Apps Maintenance module                         | M_dhis-web-maintenance-appmanager                |
| See Browser Cache Cleaner module                    | M_dhis-web-cache-cleaner                         |
| See Dashboard integration module                    | M_dhis-web-dashboard-integration                 |
| See Dashboard module                                | M_dhis-web-dashboard                             |
| See Data Administration module                      | M_dhis-web-maintenance-dataadmin                 |
| See Data Elements and Indicators Maintenance module | M_dhis-web-maintenance-datadictionary            |
| See Data Entry module                               | M_dhis-web-dataentry                             |
| See Data Mart module                                | M_dhis-web-datamart                              |
| See Data Set Maintenance module                     | M_dhis-web-maintenance-dataset                   |
| See Data Visualizer module                          | M_dhis-web-visualizer                            |
| See Event Capture module                            | M_dhis-web-event-capture                         |
| See Event Reports module                            | M_dhis-web-event-reports                         |
| See Event Visualizer module                         | M_dhis-web-event-visualizer                      |
| See Excel Report module                             | M_dhis-web-excel-reporting                       |
| See Export Data Mart Module                         | M_dhis-web-exportdatamart                        |

|   |   |
|---|---|
| See FRED API Module                                       | M_dhis-web-api-fred                     |
| See GIS module  | M_dhis-web-gis                          |
| See GIS module  | M_dhis-web-mapping                      |
| See Import-Export module                                  | M_dhis-web-importexport                 |
| See Individual Records                                    | M_dhis-web-caseentry                    |
| See Light module  | M_dhis-web-light                        |
| See Line-listing DataEntry module                         | M_dhis-web-dataentry-national           |
| See Mobile Maintenance module                             | M_dhis-web-maintenance-mobile           |
| See NRHM Reports module                                   | M_dhis-web-reports                      |
| See Organisation Unit Maintenance module                  | M_dhis-web-maintenance-organisationunit |
| See Pivot Table module                                    | M_dhis-web-pivot                        |
| See Report module   | M_dhis-web-reporting                    |
| See Settings Maintenance module                           | M_dhis-web-maintenance-settings         |
| See Smartphone module                                     | M_dhis-web-mobile                       |
| See SMS module  | M_dhis-web-sms                          |
| See Tracked Entity And Programs module                    | M_dhis-web-maintenance-program          |
| See Tracker Capture module                                | M_dhis-web-tracker-capture              |
| See User Maintenance module                               | M_dhis-web-maintenance-user             |
| See Validation Analysis module                            | M_dhis-web-validationrule-local-in      |
| See Validation Rule module                                | M_dhis-web-validationrule               |
| Send message  | F_SEND_MESSAGE                          |
| Send SMS  | F_MOBILE_SENDSMS                        |
| Set mobile settings                                       | F_MOBILE_SETTINGS                       |
| Single Event Without Registration Data Entry              | F_ANONYMOUS_DATA_ENTRY                  |
| Single Event With Registration Data Entry                 | F_SINGLE_EVENT_DATA_ENTRY               |
| Sql View External Access                                  | F_SQLVIEW_EXTERNAL                      |
| Sql View Management                                       | F_SQLVIEW_MANAGEMENT                    |
| Tracked Entity Aggregation                                | F_TRACKED_ENTITY_AGGREGATION            |
| Tracked Entity Form Management                            | F_TRACKED_ENTITY_FORM_MANAGEMENT        |
| Tracked Entity Instance Dashboard                         | F_TRACKED_ENTITY_INSTANCE_DASHBOARD     |
| Tracked Entity Instance Management                        | F_TRACKED_ENTITY_INSTANCE_MANAGEMENT    |
| Tracked Entity Relationship Management                    | F_RELATIONSHIP_MANAGEMENT               |
| Update Facility   | F_FRED_UPDATE                           |
| Update Organisation Unit Level                            | F_ORGANISATIONUNITLEVEL_UPDATE          |
| Update Program Rule                                       | F_PROGRAM_RULE_UPDATE                   |
| Update Relationship Type                                  | F_RELATIONSHIPTYPE_UPDATE               |
| Update Tracked Entities                                   | F_TRACKED_ENTITY_UPDATE                 |
| Update Tracked Entity Attribute                           | F_TRACKED_ENTITY_ATTRIBUTE_EDIT         |
| Upload Excel Template                                     | F_EXCEL_TEMPLATE_MANAGEMENT_UPLOAD      |
| View and Search Tracked Entity Attributes and Identifiers | F_ACCESS_TRACKED_ENTITY_ATTRIBUTES      |
| View data browser   | F_VIEW_DATABROWSER                      |

|  |   |
|--|---|
| View Program Stage Completeness Report                               | F_PROGRAM_STAGE_COMPLETENESS            |
| View program tracking  | F_PROGRAM_TRACKING_LIST                 |
| View Report  | F_REPORT_VIEW                           |
| View Tracked Entity Attribute  | F_TRACKED_ENTITY_ATTRIBUTE_VIEW         |
| View unapproved data   | F_VIEW_UNAPPROVED_DATA                  |
| View User  | F_USER_VIEW                             |
| View User Group Managing Relationships                               | F_USERGROUP_MANAGING_RELATIONSHIPS_VIEW |
| View User Within Managed Group                                       | F_USER_VIEW_WITHIN_MANAGED_GROUP        |
| Delete tracked entity instance and associated enrollments and events | F_TEI_CASCADE_DELETE                    |
| Delete enrollment and associated events                              | F_ENROLLMENT_CASCADE_DELETE             |
| Edit expired data  | F_EDIT_EXPIRED                          |

## About sharing of objects

This chapter discusses the sharing of entities feature in DHIS2.

### Sharing of objects

Many objects in DHIS2, like reports, charts, maps and indicators, can be shared. DHIS2 supports sharing of metadata or sharing of data. Sharing of metadata means making an object, like a report, available for reading or modification to a group of users or to everyone. Sharing of data means making the actual data captured available to others, and controlling who can capture that kind of data. For instance for reports, the sharing dialog can be opened by clicking on the "Sharing settings" button next to each report in the list. Implementers can use this feature to allow access to certain objects to only certain user groups. Users can use the feature to decide who they would like to share objects (such as pivot tables, charts, dashboards, etc) with.

If sharing is supported for a particular class of objects, a dialog will be available called "Sharing settings", usually available by clicking on the name of the object or in the analytics tools, through an icon (Share with other people). Once you have accessed the sharing settings for the object you wish to share, a dialog similar to the one below will be shown.













Category combination

## Sharing settings


### Births attended by

Created by: Tom Wakiki

Who has access

|  |   |  |  |
|--|---|--|--|
|   | Public access<br>Anyone can find, view and edit |   |   |
|   | External access<br>No access                    |   |   |
|   | Administrators                                  |   |   |
|  | John Barnes                                     |  |  |

Add users and user groups

Enter names 

CLOSE

You can share your report with everyone or with a number of user groups. "External access" can be enabled to allow this resource to be shared with everyone, including users which cannot logon to DHIS2. This is useful for sharing public resources with external systems. Note, that if objects are shared externally, then they are visible to anyone who has access to the URL which provides the resource without any login credentials.

Next to "Public access" you can choose your public access option under "METADATA": "No access", "Can view only" or "Can edit and view", and under "DATA": "No access", "Can view data", "Can capture data". Public access refers to users which are logged into the system. Edit also implies deleting the report.

To share with a group, simply start typing the name of the group and the "Search for user groups" input field and select your desired group. Click on the "+" icon next to the input field to share with that group. For each group you can set an access option, similar to public access.

---

Sharing with a user group implies that all users in that group will get access to the shared object. To create a user group you can go to the dashboard module and click on "Groups". This will lead you to the list of groups where you can click "Add new" in the top right corner. Creating user groups is open for everyone from the dashboard module.

### **Metadata sharing and access control**

The objects which support metadata sharing are indicator, indicator group, indicator group set, data dictionary, data set, program, standard report, resource, report table, chart, map and user group. Out of those objects, report table, chart, map and user group are open for everyone to create privately. Private means that the objects are available only to yourself or potentially to a number of user groups if you choose to share the object. These objects are referred to as "open" objects and can be created by all users. The remaining objects require that your user account has the authority to create them. These objects are referred to as "non-open" objects.

A user can be granted the authority to create publicly accessible objects or privately accessible objects. In order to create a publicly accessible object (available for viewing or editing by anyone) your user account must have the authority to do so. As an example, to create a publicly accessible chart, your user must have the "Create public chart" authority granted. The authority to create private objects applies only to non-open objects. For example, to allow a user to create indicators which will only be accessible to that user and not to everyone, the user can be issued with the "Create private indicator" authority.

Sharing a non-open object with another person and let her edit the object requires that the person's user account has the authority for updating that type of objects granted. For instance, if you want to let another person edit your indicator, that person's user account must have the "Update indicator" authority granted. This does not apply for open objects.

When you create a new object it will automatically become viewable for everyone if your user account has the authority to create public objects. As an example, if you create a standard report and you have the "Create public standard report" authority granted, the report will become viewable for everyone. If you do not have that authority granted the report will be viewable only to yourself. After you have created an object, you may navigate to the "Sharing settings" dialog and set your desired access control level.

If you need a user account which is able to view absolutely all objects you can create a user role with the "ALL" authority and assign a user to that role. If you need to switch between a "complete" view of objects and a "personal" view of objects it is recommended to create two user accounts, one assigned with the "ALL" authority and one without.

### **Metadata sharing applied**

The metadata sharing functionality is useful in several scenarios. One use-case is setting up a DHIS2 instance for a global organisation with operations in multiple countries. Typically the organisation has a set of global data sets, indicators and reports which should apply to all countries, while all countries will have the need for country-specific data sets, indicators and reports. In this scenario the following approach could work:

- Set up one user group for global personnel.
- Set up a user group for personnel in each country.
- Create global data sets and reports, make them viewable for everyone and editable for the global user group only.
- Create country-specific data sets and reports, make them viewable and editable for the country user group and the global user group only.

---

This way, the global indicators and reports could be viewed and analysed by everyone, but maintained by the global user group only. The country-specific data sets, indicators and reports could be viewed and maintained by the country and global personnel, without being visible or impacting the system for other countries in the organisation.

A similar approach could work for a scenario with a donor, multiple funding agencies and implementing partners in a country, where user groups could be set up for each of those entities. That way each implementing partner could create and share their reports within their organisation without affecting or allowing access to others. Reports could also be shared with supervisors and funding agencies at the end of reporting periods.

Another use-case is a country department of health with multiple health programs. Typically there is a need for having general reports and charts for the department while allowing the health programs to develop specific reports and charts for internal use. This can be achieved by creating user groups for each health program. Later, when developing reports and charts, these can be made viewable and editable to the program user group only. This way the reports will not be visible to other programs and users. This is beneficial because the reports are kept internal to the program and because the visible list of reports of other users are kept shorter and more relevant.

### **Data sharing and access control**

The objects which support data sharing are data set, tracked entity type, program and program stage. The purpose of data sharing is to control which users can capture data, and which users can see the data captured.

#### **Data sharing for event based programs**

Applies to the object types of tracked entity type, program and program stage. When working with single event programs in event capture, a user will have to possess the "DATA:Can view data" sharing level to see the program and its data. Without this sharing level, the program and its data will not be visible to the user. When working with tracker programs in tracker capture, the user will need to have "DATA:Can view data" to both the tracked entity type and program. In case of a tracker program, the user will also need "DATA:Can view data" on each program stage individually to be able to see the data within the program. To capture data the user needs the "DATA:Can capture data" sharing level.

#### **Note**

To see and capture data for a program, a data capture user also needs to report for an organisation unit to where the program has been assigned.

#### ***Data sharing for tracker programs***



| Object type                | Can view data   | Can capture data   | Comment   |
|----------------------------|---|--|---|
| <b>Tracked entity type</b> | <ul style="list-style-type: none"> <li>• Search for tracked entities with this tracked entity type.</li> <li>• See tracked entity type attribute values for this tracked entity type.</li> </ul>  | <ul style="list-style-type: none"> <li>• Edit visible tracked entity attributes for tracked entity instances of this type.</li> <li>• Register/create new tracked entity instances of this type.</li> <li>• Delete tracked entity instances of this type.</li> <li>• Deactivate/reactivate tracked entity instances of this type.</li> </ul>                                     |   |
| <b>Program</b>             | <ul style="list-style-type: none"> <li>• Search for tracked entities within this program.</li> <li>• See tracked entity attributes specific to this program.</li> <li>• See enrollment details for the program.</li> <li>• See notes for the enrollment.</li> </ul> | <ul style="list-style-type: none"> <li>• Enroll into the program.</li> <li>• Edit enrollment details for the program.</li> <li>• Complete/reopen enrollments into the program.</li> <li>• Add notes for the program.</li> <li>• Edit relationships for the program.</li> <li>• Send message to tracked entity instance.</li> <li>• Delete enrollments in the program.</li> </ul> | Both "Can view data" and "Can capture data" also requires the user to have "Can view data" for the tracked entity type. |

| Object type          | Can view data   | Can capture data   | Comment   |
|----------------------|---|--|---|
| <b>Program stage</b> | <ul style="list-style-type: none"> <li>• See the program stage and its events and data within an enrollment.</li> <li>• See the program stage notes.</li> </ul> | <ul style="list-style-type: none"> <li>• Add/schedule/refer a new event within the program stage.</li> <li>• Complete/reopen the events within the program stage.</li> <li>• Edit tracked entity data values within events in the program stage.</li> <li>• Add notes for events in the program stage.</li> <li>• Delete events in the program stage.</li> </ul> | Both "Can view data" and "Can capture data" also requires the user to have "Can view data" for the program and the tracked entity type. |

#### Data sharing for single event programs

| Object type    | Can view data   | Can capture data  | Comment |
|----------------|---|---|---------|
| <b>Program</b> | <ul style="list-style-type: none"> <li>• See list of events within the program.</li> <li>• See tracked entity data values for events in the program.</li> </ul> | <ul style="list-style-type: none"> <li>• Add new events into the program.</li> <li>• Edit data for events in the program.</li> <li>• Delete events in the program.</li> </ul> |         |

#### Data sharing for data sets

Applies to the object types of data set and category option . When working in Data Entry app, the user will need to have "DATA:Can capture data" to both see and capture data in the data set. To save data for an entry field in Data Set users need:

1. Authority: F\_DATAVALUE\_ADD ( Can add data value )
2. Data Set is shared with "Data: Can capture data"
3. Data Element is shared with "Metadata: Can View"
4. All Category Options used by selected Data Set are shared with "Data: Can capture data"

#### Note

To see and capture data for a data set, a data capture user also needs to report for an organisation unit to where the data set has been assigned.

#### Data sharing for data sets

| Object type           | Can view data  | Can capture data   | Comment   |
|-----------------------|--|--|---|
| <b>Data set</b>       | <ul style="list-style-type: none"> <li>• View Data Set's data in Analytics</li> </ul>                                  | <ul style="list-style-type: none"> <li>• Can see DataSet in Data Entry app</li> <li>• Can save data for Data Set using API</li> </ul>                | For saving data value in Data Entry app, users also need "Can capture data" for Category Options within selected Data Set.            |
| <b>CategoryOption</b> | <ul style="list-style-type: none"> <li>• Can view data values belong to shared Category Option in analytics</li> </ul> | <ul style="list-style-type: none"> <li>• Can save data value for input fields in Data Entry app which belongs to shared Category Options.</li> </ul> | For CategoryOptionCombo and AttributeOptionCombo to be writeable, all belongs CategoryOptions must be shared with "Can capture data". |

## Configure the Maps app

### Context

Setting up the Maps simply means storing coordinates for the organisation units you want to show on the map in the database. Coordinates are often distributed in proprietary formats and will need to be converted to a format which DHIS2 understands. ESRI shapefiles are the most common geospatial vector data format for desktop applications. You might find shapefiles for your country [here](#) or in many other geospatial data repositories on the web. Some amount of work needs to be done in order to use these coordinates in DHIS2 GIS, namely transforming the data into a suitable format and ensuring the name which are contained in the geospatial data match exactly with the names of the organization units which they should be matched to.

Only organisation units with POINT geometry types can be edited through the Maintenance App at this time. To modify POLYGON geometries, please use the GML import feature.

To edit the POINT coordinates of an organisation unit, open the Maintenance App and navigate to the Organisation Unit section. Click on the Organisation Unit you would like to view or edit, you can search or filter the list from on the left-hand side of the screen. Once an organisation unit is selected, you can edit the **Latitude** and **Longitude** values to update the POINT coordinates. If the Organisation Unit has a POLYGON geometry, the coordinates cannot be edited.

If you are going to add or update coordinates for a large number of units, or if you need to update polygon geometries, you should use the automatic GML import. The following section explains how to perform a GML import.

#### Important

The only co-ordinate reference system supported by DHIS2 is EPSG: 4326, also known as geographic longitude/latitude. Coordinates must be stored with the longitude (east/west position) preceding the latitude (north/south position). If your vector data is in a different CRS than EPSG 4326, you will need to re-project the data first before importing into DHIS2.

### Importing coordinates

Step 1 - Simplify/generalize your geographical data

The boundaries in geographical data files are usually very accurate, too much so for the needs of a web-based GIS. This usually does not affect the performance when using GIS files on a local system, but it is usually necessary to optimize the geographical data for the web-based GIS system of DHIS2. All geographical data needs to be downloaded from the server and rendered in a browser, so if the data is overly complex, the performance of the DHIS2 GIS will be negatively impacted. This optimization process can be described as follows:

**Coordinates:** The number of significant decimal digits (e.g. 23.02937874993774) should be shortened to fewer digits (e.g. 23.03). Although this will result in some inaccuracies on the map, given the usual scale at which maps in DHIS2 are produced (> 1:50,000), the loss of precision should not be noticeable. Normally, no more than four significant digits after the decimal point should be necessary., **Polygons:** In addition to shortening the number of significant digits, the actual number of points should also be reduced to an optimal level. Finding this optimal level may take a bit of experimentation. Decreasing the precision of the points as well as the number of points through generalization, will lead to degradation of the polygon. However, after a bit of experimentation, an optimal level of generalization can be found, where the accuracy of the polygon is visually acceptable, and the performance of the GIS is optimal.

---

For polygons, we need to make the boundary lines less detailed by removing some of the line points. Make a backup of your shapefiles before you start. One possible method is the use of [MapShaper](#) which is an online tool which can be used to generalize geographical data. To use MapShaper, simply upload your shapefile to the site. Then, at the centre bottom you see a slider that starts at 0%. It is usually acceptable to drag it up to about 80%. In the left menu you can check "show original lines" to compare the result and you may want to give a different simplification method a try. When you are happy with the result, click "export" in the top right corner. Then check the first of the four options called "Shapefile - polygons", click "create" and wait for the download buttons to appear. Now, download the two files to your local computer and overwrite the existing ones. Move on to the next step with your new simplified shapefile.

### Step 2 - Convert the shapefile to GML

The recommended tool for geographical format conversions is called "ogr2ogr". This should be available for most Linux distributions `sudo apt-get install gdal-bin`. For Windows, go to <http://fwtools.maptools.org/> and download "FWTools", install it and open up the FWTools command shell. During the format conversion we also want to ensure that the output has the correct coordinate projection (called EPSG:4326 with geographic longitude and latitude). For a more detailed reference of geographic coordinates, please refer to this [site](#). If you have already reprojected the geographic data to the geographic latitude/longitude (EPSG:4326) system, there is no need to explicitly define the output coordinate system, assuming that ogr2ogr can determine the input spatial reference system. Note that most shapefiles are using the EPSG:4326 system. You can determine the spatial reference system by executing the following command.

```
ogrinfo -al -so filename.shp
```

Assuming that the projection is reported to be EPSG:27700 by ogrinfo, we can transform it to EPSG:4326 by executing the following command.

```
ogr2ogr -s_srs EPSG:27700 -t_srs EPSG:4326 -f GML filename.gml filename.shp
```

If the geographic data is already in EPSG:4326, you can simply transform the shapefile to GML by executing the following command.

```
ogr2ogr -f GML filename.gml filename.shp
```

You will find the created GML file in the same folder as the shapefile.

### Step 3 - Prepare the GML file

Unfortunately, the GML file is not ready for importation yet. Open it in a robust text editor like Geany (Linux) or Notepad++ (Windows). GML is an XML based format which means that you will recognize the regular XML tag hierarchy. In the GML file an organisation unit is represented as `<gml:featureMember>`. Inside the feature members we usually find a lot of attributes, but we are just going to import their coordinates.

In order to import geospatial data from the feature members of the GML input, DHIS2 must match each of them with an organisation unit in its database. The feature member element must, in other words, contain a reference to its corresponding organisation unit. The reference itself must be one of three possible DHIS2 identifiers: **uid**, **code** or **name**. The identifier of choice must be provided as a property for each feature member element. The importer will look for a property with the local name of either *Uid*, *Code* or *Name*, e.g. "ogr:Name" or "anyPrefix:Code".

If your feature members already contain a property of the identifier you wish to use (such as the name of an area) you can use search and replace in a text editor to rename these elements to a name DHIS2 will recognize (see the below table). This is typically a workflow which is applicable when using the name as the identifier (the source shapefile or even GML will usually contain the name for each area it defines).

#### Organisation unit identifiers supported for GML import

| Matching priority | Identifier | Valid spellings  | Guaranteed unique |
|-------------------|------------|------------------|-------------------|
| 1                 | Uid        | uid, Uid, UID    | Yes               |
| 2                 | Code       | code, Code, CODE | No                |
| 3                 | Name       | name, Name, NAME | No                |

In the case of renaming properties one would usually find a tag named something like "ogr:DISTRICT\_NAME", "ogr:NAME\_1" and rename it to "ogr:Name". If using the *code* or *uid* identifiers on the other hand, looking up the correct values in the DHIS2 database and going through the GML file, adding the properties for each corresponding feature member might be necessary. In any of the cases it is important to realize that the identifier used must **uniquely** identify an organisation unit (e.g. if there are two organisation units in the database of the same name or code, these cannot be matched properly on either). As *uid* is the only guaranteed-to-be-unique identifier it is the most robust choice. However, as matching on name is usually easier (given that the name is already part of your data), a viable approach to solving uniqueness conflicts can be to match any non-uniquely named organisation units on a different identifier (*uid*, preferably) and the rest on their names.

As can be seen in the above table there is a matching priority, meaning if any two or more identifiers are provided for the same feature member, matching will be performed on the highest priority identifier. Note also the valid properties which can be used in your GML. The namespace prefix is not important as only the local name is used.

A common pitfall of performing preparation of the GML files is syntax- or element naming errors. Therefore please make sure that all properties of the GML file are started and terminated with correctly corresponding tags. Also make sure the properties follow either of the given valid spellings of the property name. The identifying properties are supposed to look like e.g. `<ogr:Name>Moyamba District</ogr:Name>`, `<somePrefix:uid>x7uuia898nJ</somePrefix:uid>` or `<CODE>OU_12345</CODE>`. Another common error is not making sure the identifier matches exactly, especially when using the *name* property. All matches are performed on exact values, meaning that "Moyamba" in a source GML file would not be matched against "Moyamba District" in the database.

Have a brief look at the identifiers and compare them to the corresponding values in the database. If they seem to match fairly good, it is about time to do a preview in the import-export module.

Go to Services -> Import-Export, select "Preview", select the GML file and click "Import". Look for new/updated organisation units. Our intention is to add coordinates to already existing organisation units in the database, so we want as many updates as possible and 0 new. Those listed as new will be created as root units and mess up the organisation unit trees in DHIS2. If any listed as new, click the number and the organisation units in question will appear in the list below. If there are any slight misspellings compared to the organisation unit names in the database - fix them and do the preview again. Otherwise, click the "discard all" button below the list and then the "Import all" button above the list.

If the import process completes successfully, you should now be able to utilize the geographical data in the DHIS2 GIS. If not, check the log for hints and look for common errors such as:

- 
- Name duplicates in the GML file. The name column in the database is unique and does not accept two organisation units with the same name.
  - The "shortname" column in the organisationunit table in your database has a too small varchar definition. Increase it to 100.
  - Special name characters in the GML file. Be sure to convert these to appropriate XML equivalentents or escape sequences.
  - Wrongly formatted input GML, non-matching tags

## Configure report functionality

### Data sources for reporting

#### Types of data and aggregation

In the bigger picture of HIS terminology all data in DHIS2 are usually called aggregated as they are aggregates (e.g. monthly summaries) of medical records or some kind of service registers reported from the health facilities. Aggregation inside DHIS2 however, which is the topic here, is concerned with how the raw data captured in DHIS2 (through data entry or import) are further aggregated over time (e.g. from monthly to quarterly values) or up the organisational hierarchy (e.g. from facility to district values).

#### Terminology

- *Raw data* refers to data that is registered into the DHIS2 either through data entry or data import, and has not been manipulated by the DHIS2 aggregation process. All these data are stored in the table (or Java object if you prefer) called `DataValue`.
- *Aggregated data* refers to data that has been aggregated by the DHIS2, meaning it is no longer raw data, but some kind of aggregate of the raw data.
- *Indicator values* can also be understood as aggregated data, but these are special in the way that they are calculated based on user defined formulas (factor \* numerator/ denominator). Indicator values are therefore processed data and not raw data, and are located in the `aggregatedindicatorvalue` table/object. Indicators are calculated at any level of the organisational hierarchy and these calculations are then based on the aggregated data values available at each level. A `level` attribute in the `aggregateddatavalue` table refers to the organisational level of the orgunit the value has been calculated for.
- *Period and Period type* are used to specify the time dimension of the raw or aggregated values, and data can be aggregated from one period type to another, e.g. from monthly to quarterly, or daily to monthly. Each data value has one period and that period has one period type. E.g. data values for the periods Jan, Feb, and Mar 2009, all of the monthly period type can be aggregated together to an aggregated data value with the period Q1 2009 and period type Quarterly.

#### Basic rules of aggregation

##### What is added together

Data (raw) can be registered at any organisational level, e.g. at national hospital at level 2, a health facility at level 5, or at a bigger PHC at level 4. This varies from country to country, but DHIS2 is flexible in allowing data entry or data import to take place at any level. This means that orgunits that themselves have children can register data, sometimes the same data elements as their children units. The basic rule of aggregation in DHIS2 is that *all raw data is aggregated together*, meaning data registered at a facility on level 5 is added to the data registered for a PHC at level 4.

It is up to the user/system administrator/designer to make sure that no duplication of data entry is taking place and that e.g. data entered at level 4 are not about the same services/visits that are reported by orgunit children at level 5.

**NOTE**



In some cases you want to have duplication of data in the system, but in a controlled manner. E.g. when you have two different sources of data for population estimates, both level 5 catchment population data and another population data source for level 4 based on census data (because sum of level 5 catchments is not always the same as level 4 census data). Then you can specify using advanced aggregation settings (see further down) that the system should e.g. not add level 5 population data to the level 4 population data, and that level 3,2,1 population data aggregates are only based on level 4 data and does not include level 5 data.

### **How data gets added together**

How data is aggregated depends on the dimension of aggregation (see further down).

Along the orgunit level dimension data is always summed up; i.e. simply added together. Note that raw data is never percentages, and therefore can be summed together. Indicator values that can be percentages are treated differently (re-calculated at each level, never summed up).

Along the time dimension there are several possibilities, the two most common ways to aggregate are sum and average. The user can specify for each data element which method to use by setting the aggregation operator (see further down). Monthly service data are normally summed together over time, e.g. the number of vaccines given in a year is the sum of the vaccines given for each month of that year. For population, equipment, staff and other kind of what is often called semi-permanent data the average method is often the one to use, as, e.g. 'number of nurses' working at a facility in a year would not be the sum of the two numbers reported in the six-monthly staffing report, but rather the average of the two numbers. More details further down under 'aggregation operators'.

### **Dimensions of aggregation**

#### **Organisational units and levels**

Organisational units are used to represent the 'where' dimension associated with data values. In DHIS2, organisational units are arranged in a hierarchy, which typically corresponds to the hierarchical nature of the organisation or country. Organisational unit levels correspond to the distinct levels within the hierarchy. For instance, a country may be organized into provinces, then districts, then facilities, and then sub-centres. This organisational hierarchy would have five levels. Within each level, a number of organisational units would exist. During the aggregation process, data is aggregated from the lower organisational unit levels to higher levels. Depending on the aggregation operator, data may be 'summed' or 'averaged' within a given organisational unit level, to derive the aggregate total for all the organisational units that are contained within a higher level organisational unit level. For instance, if there are ten districts contained in a province and the aggregation operator for a given data element has been defined as 'SUM', the aggregate total for the province would be calculated as the sum of the values of the individual ten districts contained in that province.

#### **Period**

Periods are used to represent the 'when' dimension associated with data values. Data can easily be aggregated from weeks to months, from months to quarters, and from quarters to years. DHIS2 uses known rules of how these different intervals are contained within other intervals (for instance Quarter 1 2010 is known to contain January 2010, February 2010 and March 2010) in

---

order to aggregate data from smaller time intervals, e.g. weeks, into longer time intervals, e.g. months.

### **Data Elements and Categories**

The data element dimension specifies 'what' is being recorded by a particular data value. Data element categories are actually degenerated dimensions of the data element dimension, and are used to disaggregate the data element dimension into finer categories. Data element categories, such as 'Age' and 'Gender', are used to record a particular data element, typically for different population groups. These categories can then be used to calculate the overall total for the category and the total of all categories.

### **Aggregation operators, methods for aggregation**

#### **Sum**

The 'sum' operator simply calculates the sum of all data values that are contained within a particular aggregation matrix. For instance, if data is recorded on a monthly basis at the district level and is aggregated to provincial quarterly totals, all data contained in all districts for a given province and all weeks for the given quarter will be added together to obtain the aggregate total.

#### **Average**

When the average aggregation operator is selected, the unweighted average of all data values within a given aggregation matrix are calculated.

It is important to understand how DHIS2 treats null values in the context of the average operator. It is fairly common for some organisational units not to submit data for certain data elements. In the context of the average operator, the average results from the number of data elements that are actually present (therefore NOT NULL) within a given aggregation matrix. If there are 12 districts within a given province, but only 10 of these have submitted data, the average aggregate will result from these ten values that are actually present in the database, and will not take into account the missing values.

### **Advanced aggregation settings (aggregation levels)**

#### **Aggregation levels**

The normal rule of the system is to aggregate all raw data together when moving up the organisational hierarchy, and the system assumes that data entry is not being duplicated by entering the same services provided to the same clients at both facility level and also entering an 'aggregated' (sum of all facilities) number at a higher level. This is to more easily facilitate aggregation when the same services are provided but to different clients/catchment populations at facilities on level 5 and a PHC (the parent of the same facilities) at level 4. In this way a facility at level 5 and a PHC at level 4 can share the same data elements and simply add together their numbers to provide the total of services provided in the geographical area.

Sometimes such an aggregation is not desired, simply because it would mean duplicating data about the same population. This is the case when you have two different sources of data for two different orgunit levels. E.g. catchment population for facilities can come from a different source than district populations and therefore the sum of the facility catchment populations do not match the district population provided by e.g. census data. If this is the case we would actually want duplicated data in the system so that each level can have as accurate numbers as possible, but then we do NOT want to aggregate these data sources together.

---

In the Data Element section you can edit data elements and for each of them specify how aggregation is done for each level. In the case described above we need to tell the system NOT to include facility data on population in any of the aggregations above that level, as the level above, in this case the districts have registered their population directly as raw data. The district population data should then be used at all levels above and including the district level, while facility level should use its own data.

### **How to edit data element aggregation**

This is controlled through something called aggregation levels and at the end of the edit data element screen there is a tick-box called Aggregation Levels. If you tick that one you will see a list of aggregation levels, available and selected. Default is to have no aggregation levels defined, then all raw data in the hierarchy will be added together. To specify the rule described above, and given a hierarchy of Country, Province, District, Facility: select Facility and District as your aggregation levels. Basically you select where you have data. Selecting Facility means that Facilities will use data from facilities (given since this is the lowest level). Selecting District means that the District level raw data will be used when aggregating data for District level (hence no aggregation will take place at that level), and the facility data will not be part of the aggregated District values. When aggregating data at Province level the District level raw data will be used since this is the highest available aggregation level selected. Also for Country level aggregates the District raw data will be used. Just to repeat, if we had not specified that District level was an aggregation level, then the facility data and district data would have been added together and caused duplicate (double) population data for districts and all levels above.

### **Resource tables**

Resource tables provide additional information about the dimensions of the data in a format that is well suited for external tools to combine with the data value table. By joining the data value table with these resource tables one can easily aggregate along the data element category dimension or data element/indicator/organisation unit groups dimensions. E.g. by tagging all the data values with the category option male or female and provide this in a separate column 'gender' one can get subtotals of male and female based on data values that are collected for category option combinations like (male, <5) and (male, >5). See the Pivot Tables section for more examples of how these can be used. orgunitstructure is another important table in the database that helps to provide the hierarchy of orgunits together with the data. By joining the orgunitstructure table with the data values table you can get rows of data values with the full hierarchy, e.g. on the form: OU1, OU2, OU3, OU4, DataElement, Period, Value (Sierra Leone, Bo, Badija, Ngelehun CHC, BCG <1, Jan-10, 32) This format makes it much easier for e.g. pivot tables or other OLAP tools to aggregate data up the hierarchy.

### **Report tables**

Report tables are defined, cross-tabulated reports which can be used as the basis of further reports, such as Excel Pivot Tables or simply downloaded as an Excel sheet. Report tables are intended to provide a specific view of data which is required, such as "Monthly National ANC Indicators". This report table might provide all ANC indicators for a country, aggregated by month for the entire country. This data could of course be retrieved from the main datamart, but report tables generally perform faster and present well defined views of data to users.

### **How to create report tables**

To create a new report table, go to the Report tables section of the Reports module (Reports -> Report Table). Above the list of standard reports, use the "Add report table" or "Add Dataelement Dimension Table" buttons. A regular report table can be used to hold data on data elements, indicators or dataset completeness, while Dataelement dimension tables are used to include data

element categories in report tables. Creating the tables are done in the same way, however, the only exception being when choosing data.

To create a report table, you start by making some general choices for the table, the most important of which is the crosstab dimension. Then, you choose which data elements, indicators, datasets or data element dimensions you want to include. Finally you select which organisation units and time periods to use in the report table. Each of these steps are described in detail below.

**General options**

| Report Table       |                          | Crosstab dimensions                    |                          |
|--------------------|--------------------------|--|--------------------------|
| Name               | <input type="text"/>     | Indicators / data elements / data sets | <input type="checkbox"/> |
| Sort order         | None                     | Organisation units                     | <input type="checkbox"/> |
| Top limit          | None                     | Periods                                | <input type="checkbox"/> |
| Include regression | <input type="checkbox"/> |  |                          |

**Cross tab dimensions**

You can cross-tab one or more of the following dimensions: data element/indicator, orgunit, and period, which means that columns will be created based on the values of the dimensions chosen, e.g. if indicators is selected you will get column names in the table reflecting the names of the selected indicators.

For example, if you cross-tab on indicators and periods, the column headers will say "<indicator title> \<period>". The organisation units will be listed as rows. See screenshot for clarification:

| Organisation unit      | ANC coverage February 2010 | ANC coverage 2010 |
|------------------------|----------------------------|-------------------|
| Jappineh Village OPD   | 0.0                        | 0.0               |
| Jappineh PHC Circuit   | 0.0                        | 0.0               |
| Jarra Central District | 0.0                        | 0.0               |

If you cross-tab on indicators and organisation units, the column headers of the table will say "<indicator title> \<organisation unit>". Now the periods will be listed as rows. See screenshot for clarification:

| Period        | ANC coverage Jarra Central District | ANC coverage Jappineh PHC Circuit | ANC coverage Jappineh Village OPD |
|---------------|-------------------------------------|-----------------------------------|-----------------------------------|
| 2010          | 0.0                                 | 0.0                               | 0.0                               |
| February 2010 | 0.0                                 | 0.0                               | 0.0                               |

Note that the options made here regarding crosstab dimensions may have consequences for what options are available when using the report table as a data source later, for example for standard reports.

**Sort order**

Affects the rightmost column in the table, allows you to choose to sort it low to high or high to low.

## Top limit

Top limit allow you to set a maximum number of rows you want to include in the report table.

## Include regression

This adds additional columns with regression values that can be included in the report design, e.g. in line charts.

## Selecting data

**Available indicators**

AFP Non-polio rate  
 ANC Registrants receiving IPT1  
 ANC Registrants receiving IPT2  
 ANC Registrants receiving IPT3  
 Average number of ANC visits per registrants  
 Average number of visits per client

Add selected
Add all
Remove selected
Remove all

**Selected indicators**

## Indicators/Data elements

Here you select the data elements/indicators that you want to include in the report. Use the group filter to more easily find what you are looking for and double click on the items you want to include, or use the buttons to add/remove elements. You can have both data elements and indicators in the same report.

## Data sets

Here you select the data sets that you want to include in the report. Including a data set will give you data on the data completeness of the given set, not data on its data elements. Double click on the items you want to include, or use the buttons.

## Selecting report parameters

[Toggle fixed organisation units](#) [Toggle fixed periods](#)

### Relative periods

Reporting month  Months this year  Quarters this year  This year

Months last year  Quarters last year  Last year

### Report parameters

Reporting month  Grand parent organisation unit  Parent organisation unit  Organisation unit

---

There are two ways to select both what organisation units to include in a report, and what time periods should be included: relative, or fixed. Fixed organisation units and/or periods means that you select the units/periods to include in the report table when you create the report table. Using relative periods, you can select the time and/or units as parameters when the report table is populated, for example when running a standard report or creating a chart. A combination is also possible, for example to add some organisation units in the report permanently while letting the users choose additional. Report parameters is discussed below. In general, using fixed organisation units and/or time periods are an unnecessary restriction.

### Fixed Organisation Units

To add fixed organisation units, click "Toggle fixed organisation units". A panel will appear where you can choose orgunits to always include in the report. If you leave it blank, the users select orgunits when running the report through the use of report parameters. Use the drop down menu to filter organisation units by level, double click or use the buttons to add/remove.

### Fixed Periods

To add fixed periods, click "Toggle fixed organisation units". A panel will appear where you can choose periods to always include in the report. If you leave it blank, the users select periods when running the report through the use of report parameters. Use the drop down menu to choose period type (week, month, etc), the Prev and Next button to choose year, and double click or use the buttons to add/remove.

### Relative periods

Instead of using fixed/static periods like 'Jan-2010' or 'Q1-2010', more generic periods can be used to create reusable report tables, e.g. for monthly reports the period 'Reporting month' will simply pick the current reporting month selected by the user when running the report. Note that all relative periods are relative to a "reporting month". The reporting month is either selected by the users, otherwise the current month is used. Here is a description of the possible relative periods:

- *Reporting month:*

Use this for monthly reports. The month selected in the reporting month parameter will be used in the report.

- *Months/Quarters this year:*

This will provide one value per month or quarter in the year. This is well suited for standard monthly or quarterly reports where all month/quarters need to be listed. Periods that still have no data will be empty, but will always keep the same column name.

- *This year:*

This is the cumulative so far in the year, aggregating the periods from the beginning of the year up to and including the selected reporting month.

- *Months/Quarters last year:*

This will provide one value per month or quarter last year, relative to the reporting month. This is well suited for standard monthly or quarterly reports where all month/quarters need to be listed. Periods that still have no data will be empty, but will always keep the same column name.

- *Last year:*

---

This is the cumulative last year, relative to the reporting month, aggregating all the periods from last year.

### Example - relative periods

Let's say we have chosen three indicators: A, B and C, and we have also chosen to use the relative periods 'Reporting month' and 'This year' when we created the report table. If the reporting month (selected automatically or by the user) is for example May 2010, the report table will calculate the values for the three selected indicators for May 2010 (= the 'Reporting month') and the accumulated values for the three selected indicators so far in 2010 (= so far 'This year').

Thus, we will end up with six values for each of the organisation units: "Indicator A May 2010", "Indicator B May 2010" "Indicator C May 2010", "Indicator A so far in 2010", "Indicator B so far in 2010" and "Indicator C so far in 2010".

### Report parameters

Report parameters make the reports more generic and reusable over time and for different organisation units. These parameters will pop up when generating the report table or running a report based on the report table. The users will select what they want to see in the report. There are four possible report parameters, and you can select none, all, or any combination.

- *Reporting month:*

This decides which month will be used when the system is choosing the relative periods. If the box it not checked, the user will not be asked for the reporting month when the report is generated - the current month will then be used.

- *Grand parent organisation unit:*

Select the grand parent of all the orgunit children and grand children you want listed in the report. E.g. a selected region will trigger the use of the region itself, all its district, and all their sub-districts.

- *Parent organisation unit:*

Select the parent of all the orgunit children you want listed in the report. E.g. a selected district will trigger the use of the district itself and all its children/sub-districts.

- *Organisation unit:*

This triggers the use of this orgunit in the report. No children are listed.

### Example - report parameters

Continuing with the example on relative periods just above, let's say that in addition to 'Reporting month', we have chosen 'Parent organisation unit' as a report parameter when we created the report table. When we're running the report table, we will be asked to select an organisation unit. Now, let's say we choose "Region R" as the organisation unit. "Region R" has the children "District X" and "District Y".

When the report is run, the system will aggregate data for both "District X" and "District Y". The data will be aggregated from the lowest level where they have been collected. The values for the districts will be aggregated further to give an aggregated value for "Region R".

Thus, the report table will generate the six values presented in the previous example, for "District X", "District Y" and "Region R".

## Data element dimension tables

These tables enable the use of data element categories in report tables. There are two differences from regular report tables. The first is that it is not possible to select crosstab dimensions, as the columns will always be the disaggregations from the category combinations. The other is the actual choice of data. Only one category combination can be added per report, and only data elements from the same category combo can be selected.

Subtotals and the total will also be included in the table, e.g. a gender (male, female) + EPI age(<1, >1) category combo would give the following columns: male+<1, male+>1, Female+<1, female+>1, male, female,<1, >1, total.

### Selecting data

The screenshot shows a user interface for selecting data elements. At the top, there is a section titled "Available data elements". Below this title is a dropdown menu with the text "[ Select category combination ]". Underneath the dropdown is a list of data elements: "EPI-Hepatitis B Immunization", "Measles Immunization", "Meningitis Immunization", "Oral Polio Virus Immunization", "Penta Immunization", and "Pneumococcus Virus Immunization". Below the list are four buttons: "Add selected", "Add all", "Remove selected", and "Remove all". Below these buttons is another section titled "Selected data elements", which is currently empty.

Use the drop down menu to choose category combinations. The data elements using this category combination will be listed. Double click to add to the report, or use the buttons.

### Report table - best practices

To make the report tables reusable over time and across orgunits they can have parameters. Four types of parameters are allowed; orgunit, parent orgunit (for listing of orgunits in one area), grand parent orgunit and reporting month. As a side note it can be mentioned that we are looking into expanding this to include reporting quarter and year, or to make that period parameter more generic with regard to period type somehow. The ability to use period as a parameter makes the report table reusable over time and as such fits nicely with report needs such as monthly, quarterly or annual reports. When a report is run by the user in DHIS2, the user must specify the values for the report tables that are linked to the report. First the report table is re-generated (deleted and re-created with updated data), and then the report is run (in the background, in Jasper report engine).

Report tables can consist of values related to data elements, indicators or data completeness, which is related to completeness of reporting across orgunits for a given month. Completeness reports will be covered in a separate section.

There are three dimensions in a report table that identify the data; indicators or data elements, orgunits and periods. For each of these dimensions the user can select which metadata values to include in the report. The user must select one or more data elements or indicators to appear in the report. The orgunit selection can be substituted with a parameter, either one specific orgunit



---

or an orgunit parent (making itself and all its children appear in the report). If one or more orgunits are selected and no orgunit parameter is used, then the report is static with regard to which orgunits to include, which in most cases is an unnecessary restriction to a report.

### Using relative periods

The period selection is more advanced as it can in addition to specific periods like Jan-09, Q1-08, 2007 also contain what is called relative periods. As report usually is run routinely over time a specific period like Jan-09 is not very useful in a report. Instead, if you want to design a monthly report, you should use the relative period called Reporting Month. Then you must also include Reporting Month as one of your report parameters to let the system know what exactly is the Reporting Month on the time of report generation. There are many other relative periods available, and they all relate to the report parameter Reporting Month. E.g. the relative period called So far this year refers to the accumulative value for the year incl. the Reporting Month. If you want a trend report with multiple periods in stead of one aggregated period, you can select e.g. 'Months this year', which would give you values for each month so far in the year. You can do a similar report with quarters. The idea is to support as many generic report types as possible using relative periods, so if you have other report needs, please suggest new relative periods on the mailing list, and they might be added to the report table options.

### Cross-tabbing dimensions

Cross tabbing is a very powerful functionality in report design, as the typical DHIS2 data table with references to period, data element/indicator and orgunit makes more advanced report design very difficult, as you cannot put e.g. specific indicators, periods or orgunits on specific columns. E.g. by cross-tabbing on the indicator dimension in an indicator report table you will get the indicator names on the column headers in your report, in addition to a column referencing orgunit, and another column referencing period. With such a table design you could drag and drop indicator names to specific columns or chart positions in the iReport software. Similarly you can cross tab on orgunits or periods to make their names specifically available to report design. E.g. by cross-tabbing on periods and selecting the two relative periods 'Reporting month' and 'This year', you can design reports with both the last month and the accumulative annual value for given month as they will be available as column headers in your report table. It is also possible to combine two dimensions in cross-tabbing, e.g. period and indicator, which makes it possible to e.g. look at three selected indicators for two specific relative periods. This would e.g. make it possible to make a table or chart based report with BCG, DPT3 and Measles coverage, both for the last month and the accumulative coverage so far in the year.

All in all, by combining the functionality of cross tabbing, relative periods and report table parameters you should have a tool to support most report scenarios. If not, we would be very happy to receive suggestions to further improvements to report tables. As already mentioned, we have started to look at more fine-grained parameters for the period dimension as the 'Reporting month' does not cover enough, or at least is not intuitive enough, when it comes to e.g. quarterly reports.

### Report table outcome

When the report table is run, the system will calculate values for specified indicators/data elements/data sets, orgunits and periods. The data will be presented in DHIS2 in a table layout. The column headers will correspond to the cross-tab dimension you have selected. An example report table showing ANC coverage for a district in The Gambia, is shown below. Here the indicator and the periods are cross-tabbed, as can be seen from the column headers.

| Organisation unit      | ANC coverage<br>February 2010 | ANC coverage<br>2010 |
|------------------------|-------------------------------|----------------------|
| Jappineh Village OPD   | 0.0                           | 0.0                  |
| Jappineh PHC Circuit   | 0.0                           | 0.0                  |
| Jarra Central District | 0.0                           | 0.0                  |

Above the table there are six buttons; five download buttons and one Back button. Clicking the Back button will simply take you back to the previous screen. The function of the five download buttons, are presented below the screenshot:



### The five download buttons

- *Download as Excel:*

Downloads a generated Excel file you can open in Excel.

- *Download as CSV:*

Downloads a generated .csv file. CSV stands for **C**omma **S**eparated **V**alues. It's a text file with the file ending .csv. Each line in the file corresponds to a row in the table, while the columns are separated with semi colons (;). The file can be opened in a text editor as well as in a spread sheet program (such as Excel).

- *Download as PDF:*

Downloads a generated PDF file. The data will be presented in a similar layout as the generated table you are already viewing in DHIS2.

- *Download as Report:*

Downloads a "styled" PDF file. In addition to present the data in a table layout, this file also presents a chart, showing the aggregated data from all the chosen periods and the parent organisation unit chosen for the report table. The report is generated using the Jasper report engine.

- *Download as JRXML:*

Downloads the design file for the generated Report described in the previous bullet. The design file (with the file ending .jrxml) can be opened in the Jasper iReport Designer software. If you plan to design standard reports, this is the starting point.

## Standard reports

### What is a standard report?

A standard report is a manually designed report that presents data in a manually specified layout. Standard reports can be based either on report tables or SQL queries. Both approaches are described in the following sections. The main advantage of using report tables is that of simplicity - no special development skills are required. In cases where you have special requirements or need to utilize additional parts of the DHIS2 database you might want to use a SQL based standard report. In any case you will be able to utilize report parameters in order to create

---

dynamic reports. The following guide will use the report table approach, while the SQL approach is covered towards the end.

### Designing Standard reports in iReport

Jasper iReport Designer is a tool for creating reports that can be used as Standard Reports in DHIS2. The tool allows for the creation of standard report templates that can easily be exported from DHIS2 with up to date data. The process of creating reports involves four major steps:

1. A report table must be created in DHIS2 with the indicators/data elements/datasets to be used in the report.
2. You have to run the report table and download the design file (Click the "Download as JRXML" button).
3. Open the downloaded .jrxml file using the free software Jasper iReport Designer to edit the layout of the report.
4. The edited report can then be uploaded to DHIS2 to be used as a standard report.

If you want to preview your report during the design in iReport, you actually have to upload your file to DHIS2 to see how it looks.

These four steps will be describe in detail in the coming sections. In general, when you are making standard reports you should have a clear idea of how it should look before you even make the report table, as how the report table is designed has implications for how the report can be formatted in iReport. For example, what crosstab dimensions are selected in the report table has consequences for what crosstabs are available for the standard report, and it has consequences for what types of charts you can make.

#### Download and open the design file

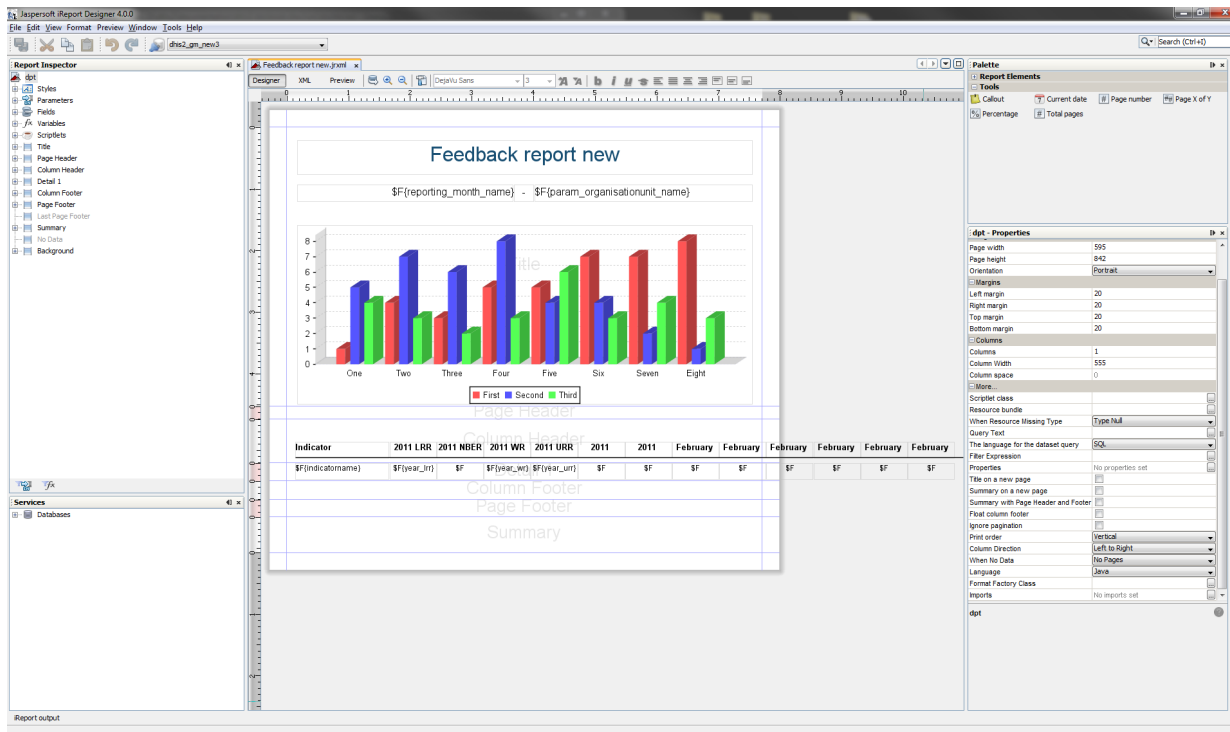
##### NOTE

If you have not created a report table yet, you have to do so. See section "How to create report tables" to do so.\*

Locate your desired report table and run it by clicking the green circle with a white arrow inside. When the report is shown, click the "Download as JRXML" button to download the design file. Then open that file in the Jasper iReport Designer software.

#### Editing the report

You are now ready to edit the layout of the report. The main iReport window consists of a "Report Inspector" to the left, the report document in the middle, a "Palette" area on the upper right hand side and a "Properties" area on the lower right hand side. The "Report Inspector" are used for selecting and examining the various properties of the report, and when selecting an item in the inspector, the "Properties" panel changes to display properties relating to the selection. The "Palette" is used for adding various elements, e.g. text boxes, images and charts to the document.



**NOTE**  
 If you cannot see the Palette or Properties sidebar, you can enable them from the menu item called "Window" on the menu bar.

The iReport document is divided into seven main bands, divided by layout separators (the blue lines). These lines are used to decide how big each of the areas should be on the report.

The areas all have different purposes:

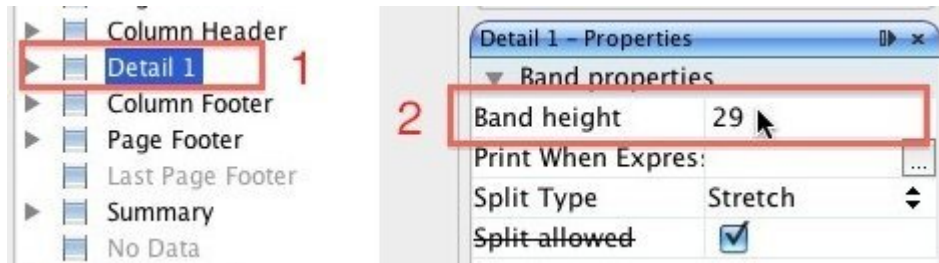
- Title - area for the title of the report
- Page header - area for the page header
- Column header - area for column headers (for the table)
- Detail 1 - area where the actual report data will be placed
- Column footer - area to make footer of the table
- Page footer - area for the page footer
- Summary - elements in this area will be placed at the end of the report

By default you will see that only the Title, Column Header and the Detail 1 bands have data. For most reports this is OK. The Title band is suitable for a title and e.g. a chart. Data fields entered into the Detail 1 area will be iterated over to create a table. For example, if a field called "dataelementname" is placed in the Detail 1 band, all data elements in the report table will be listed here. We'll come back to data fields management just a little below.

The unused bands in the report are contracted to add more space for your report data. You can however increase/decrease the band height as you like. There are two ways to do that. The first way is simply to drag the blue band-line as shown below.



The other way to adjust the band height is to select a band in the "Report Inspector", and then adjust the "Band height" value in the "Detail 1 - properties" area in the lower right corner.



As the fields are already present on the report, you probably don't want to do anything than just fix the layout and drag fields around. You can also resize the fields by dragging the side, top or bottom lines. If you want to change the text in the column headers, you simply double click the field and change the text.

To add the a field to the table, we simply drag it to the Detail 1 band from the "Report Inspector". The column header will be added automatically.

By double clicking the box, the text can be edited. The format of the text, such as size, font and alignment, can be adjusted with the tools above the document.



**NOTE**  
 Fields starting with "\$F" present values that are retrieved from the database every time the report is run. The values here will vary, so do not change these fields unless you want a static value here!

**Text**

There are two types of text in iReport: «Text labels» and «Text fields» (data fields). They work in different ways, and should be used for different purposes. The main point is that text fields are just placeholders that will be filled with the correct text from the report table when the report is run, while text labels will stay the way they are when the report is run.

**Static text**

Static text are text plain text labels that can be edited normally. There are two ways to edit text labels:

- By double clicking in the text box

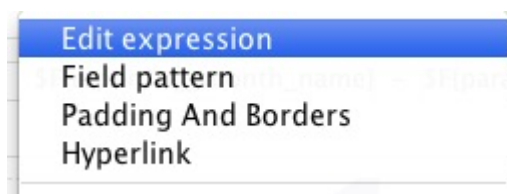
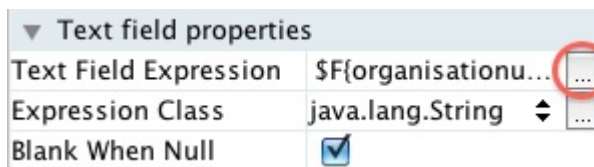
By using the Static text properties in the Properties panel



### Text fields

Text fields are formulas that will be filled from the report table when the report is run. Unlike static text, these can not be edited in a normal way. However, they can be manipulated in various ways to ensure that the desired output will be produced. There are three ways to edit the text fields:

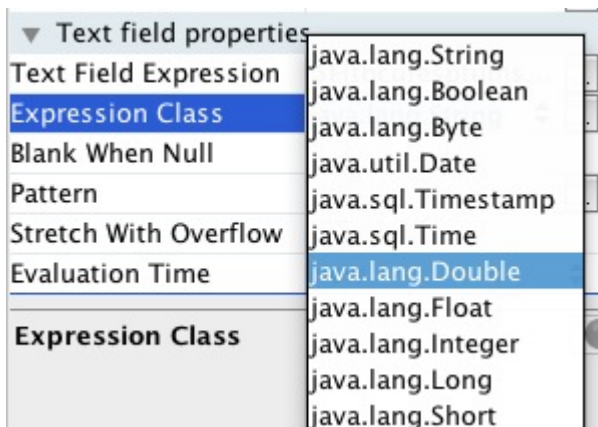
- By right clicking on the text box and selecting Edit expression
- By double clicking the text field (not recommended, as this will not bring up the expression editor)
- By using the Text field properties in the Properties panel



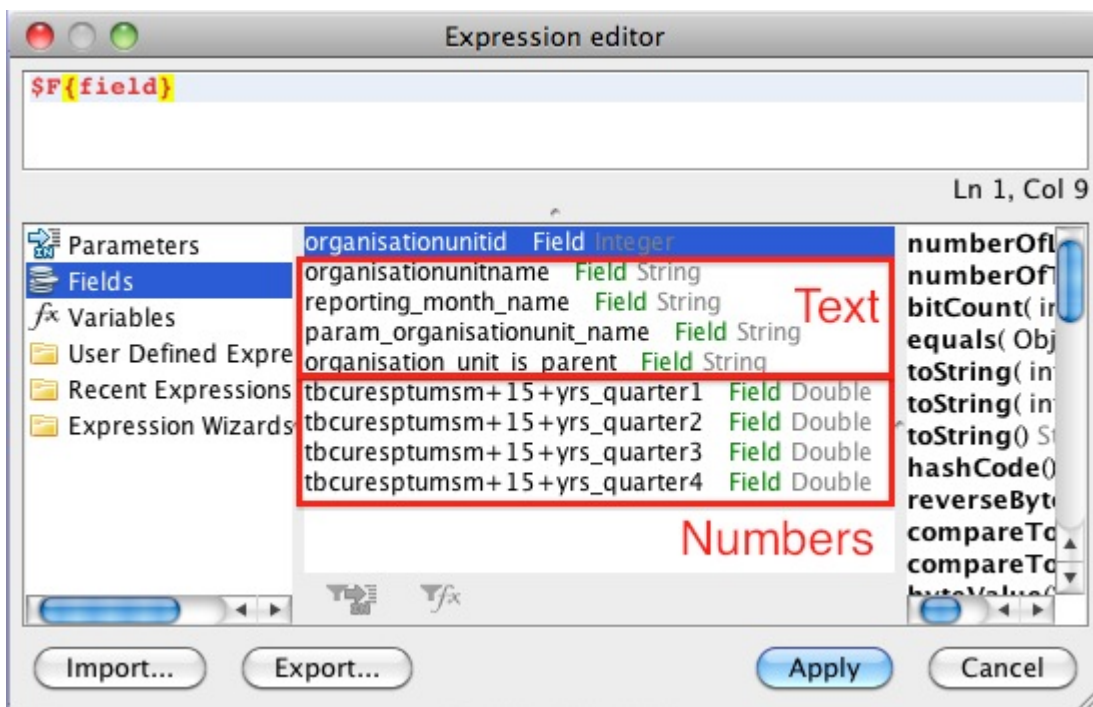
Text fields can represent either numbers or text, so that they can be used both for showing for example names of district or for numeric values. It is therefore important the Expression class, seen in the Text field properties matches the Text field expression. For the default text fields in the .jrxml file downloaded from DHIS2 this is not a problem, but it is important when making new text fields. The two most important Expression classes are `java.lang.Double` for numbers and `java.lang.String` for text.

### Example

For example, let us say you have a quarterly report where you would like to add a new column with the yearly total. You therefore add a new Static text field to the column header band, and a Text field to the details band in. By default, new Text fields are set to `java.lang.String` (text). However, the yearly total column will be filled with numbers. We therefore have to change the Expression class for the new text field to `java.lang.Double`:



When we edit the text field expression, we see the Expression editor window with all the available columns from the report table. We can see here that each of these are marked with what type they are - text or number. What we need to make sure of is therefore that the expression class we choose for the text field matches the actual expression.



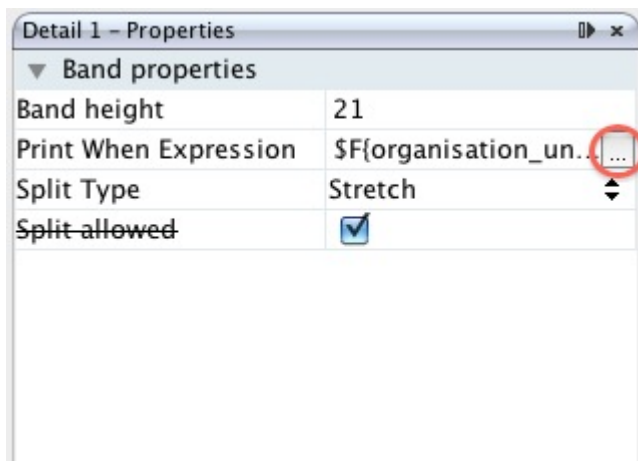
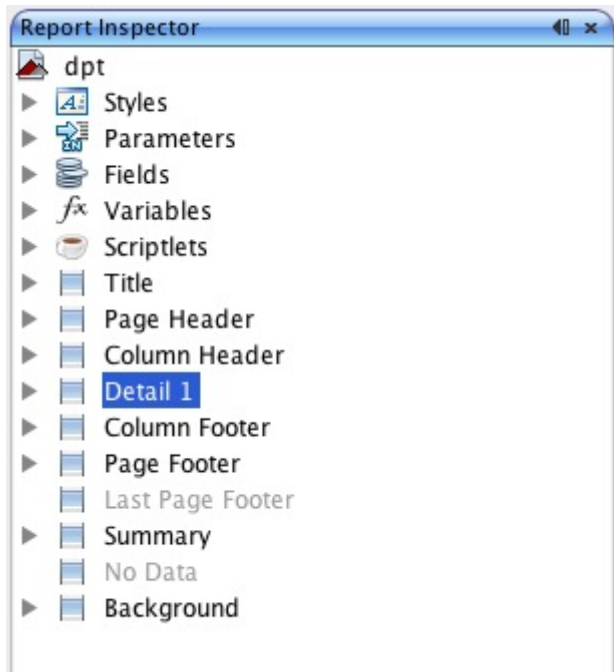
**Filtering the table rows**

In the default table exported from DHIS2, there are some rows that it might be better to leave out of the table, and some that it would be preferable to have at the end. For example, when making a table based on a report table with the «parent organisation unit» parameter, the default table might have a row with the national level somewhere in between all the regions. In iReport, this can be changed so that the «parent organisation unit» appears at the bottom of the table. This

involves two steps that will be explained below. Note that this will not work where there is only one organisation units, and it is therefore most useful when using the «parent organisation unit» or «grand parent organisation unit» parameters in the report table.

**Hiding the «parameter organisation unit» from the table**

We exclude the "parameter organisation unit" from the table by using a property in the Details band called "Print when expression". To set a Print when expression, start by selecting the Detail band in the Report inspector, then edit the Print when expression in the properties panel.

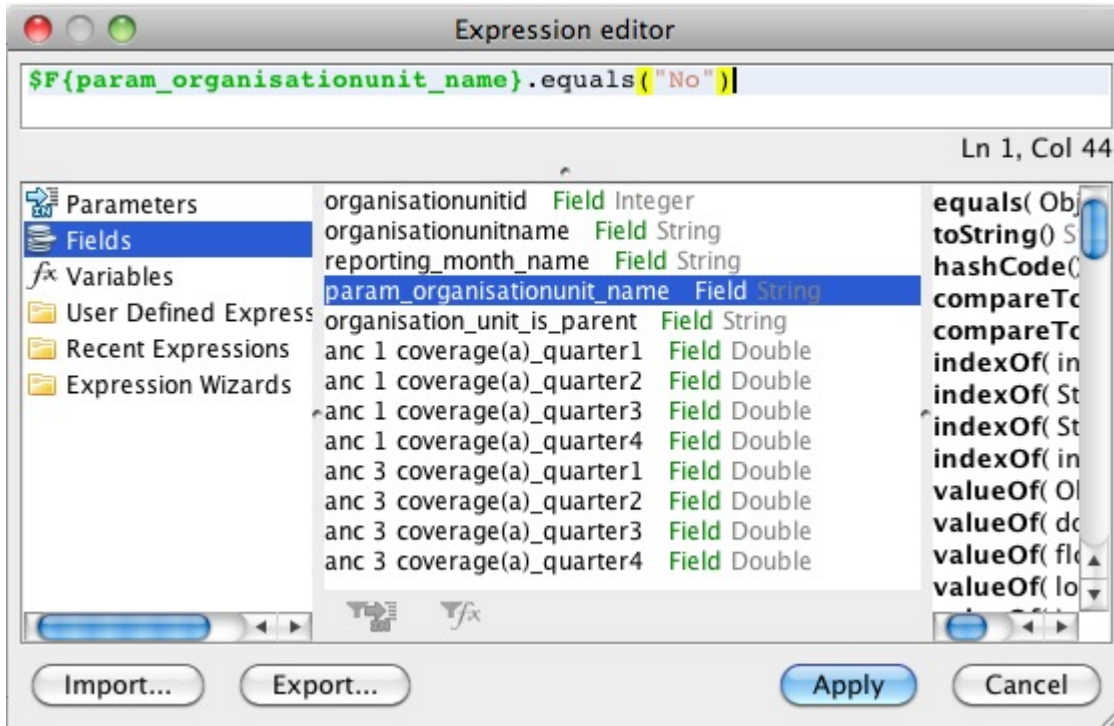


The Expression editor window should now appear. What we must do is to create an expression that checks if the row being generated is the row with the organisation unit given as a parameter. The report table contains a column that we can use for this called organisation\_unit\_is\_parent. To exclude the row with the parameter organisation unit, double click on organisation\_unit\_is\_parent in the list to copy it to the expression area, then add .equals("No") at the end so that the code is:

```
$F{organisation_unit_is_parent}.equals("No")
```



This tells the report engine to only print table rows where the organisation unit is not the parent organisation unit.



**Putting the "param organisation unit" at the bottom of the table**

Instead of removing the "param organisation unit" from the table entirely, it is also possible to put it at the bottom (or top) of the table. This is done by using the sort functionality explained in the next section, and choosing to sort first by "organisation\_unit\_is\_parent". Other sorting options can be added in addition to this, for example to make a list where the param organisation unit is at the bottom of the table, with the other organisation units listed alphabetically above it.

**Hiding other rows**

Using the expression editor it is also possible to exclude other rows from the table, in addition to the parent organisation unit as was explained above. In Ghana, for example, all regions have a «fake district» which is the name of the region in square brackets. This can also be excluded from the table using the Print when expression that was introduced above. To do this, follow the instructions above to bring up the Expression editor window. Then, we use Java expressions to test whether or not the row should be hidden.

**Example - removing rows with organisation units starting with [**

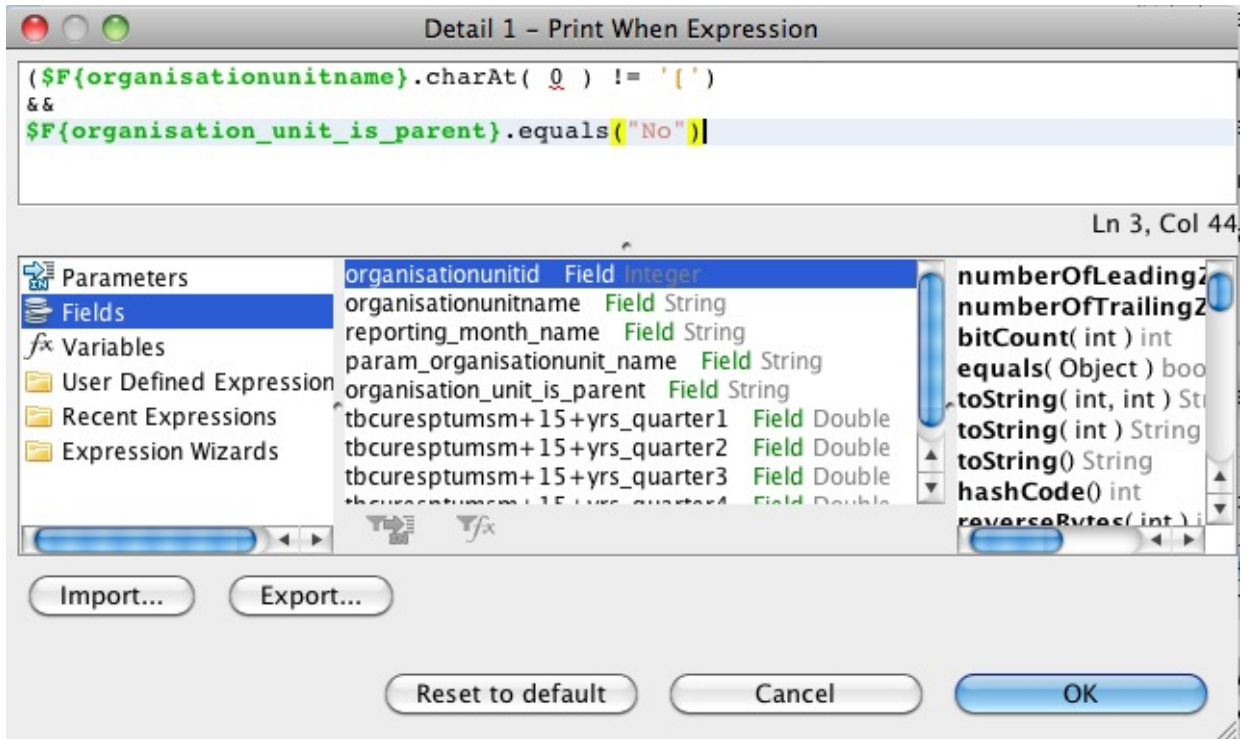
Example - removing rows with organisation units starting with [

```
($F{organisationunitname}.charAt( 0 ) != '[')
```

This makes the report skip any rows where the first character of the organisation unit name is [.

It is also possible to combine several of these expressions. To do this we put the expressions in a parenthesis with the two characters && in between. For example, to make a table that leaves both organisation units whose name starts with [ and the parent organisation unit, we can use the following expression:

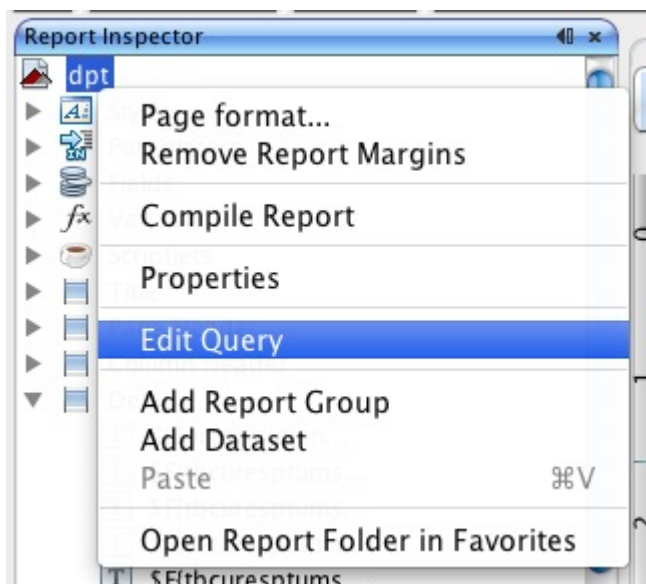
```
($F{organisationunitname}.charAt( 0 ) != '[')&&$F{organisation_unit_is_parent}.equals("No")
```



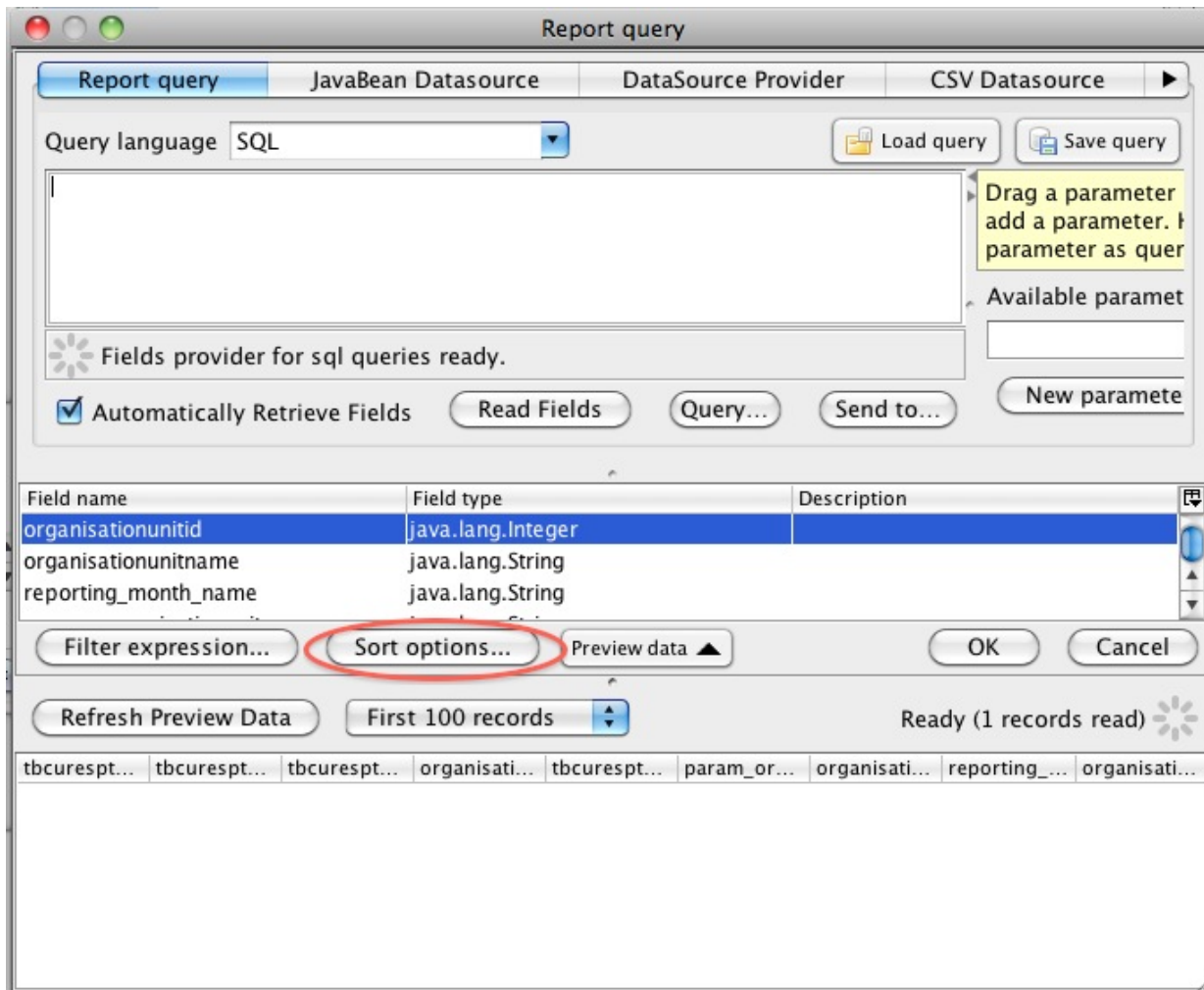
### Sorting

Often you will be making reports where the first column is organisation unit names. However, it can be a problem that the list of organisation units are not sorted alphabetically. This can be fixed in iReport through a few simple steps.

In the report inspector, right click on the name of the report (by default this is dpt) and select Edit query.

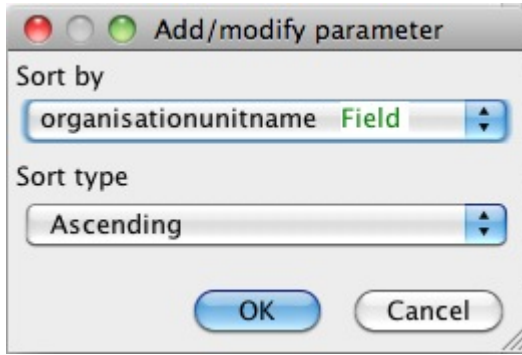


A Report query window will appear. Click on the Sort options button.



A Sorting window as show below will appear. Here, we can add our sorting options. Click the Add field button. Another small window will show up, with a drop down menu where you can choose Sort by organisationunitname to have the table sorted alphabetically by name.





Click OK - Close - OK to close the three windows. The table should now be sorted.

**Changing indicator/data element names**

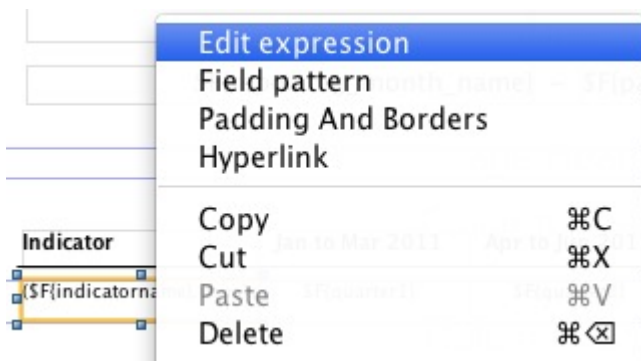
By default, the reports from DHIS2 uses the short names for indicators and data elements in reports and charts. In some cases these are not always very meaningful for third parties, but with some work they can be given custom names through iReport. This is useful for example if you are making a report with indicators as rows and periods as column, or for charts with indicators.

| Indicator    | Jan to Mar 20 |
|--------------|---------------|
| Bed Util All |               |
| Bed Util Mat |               |
| Bed Util Ped |               |

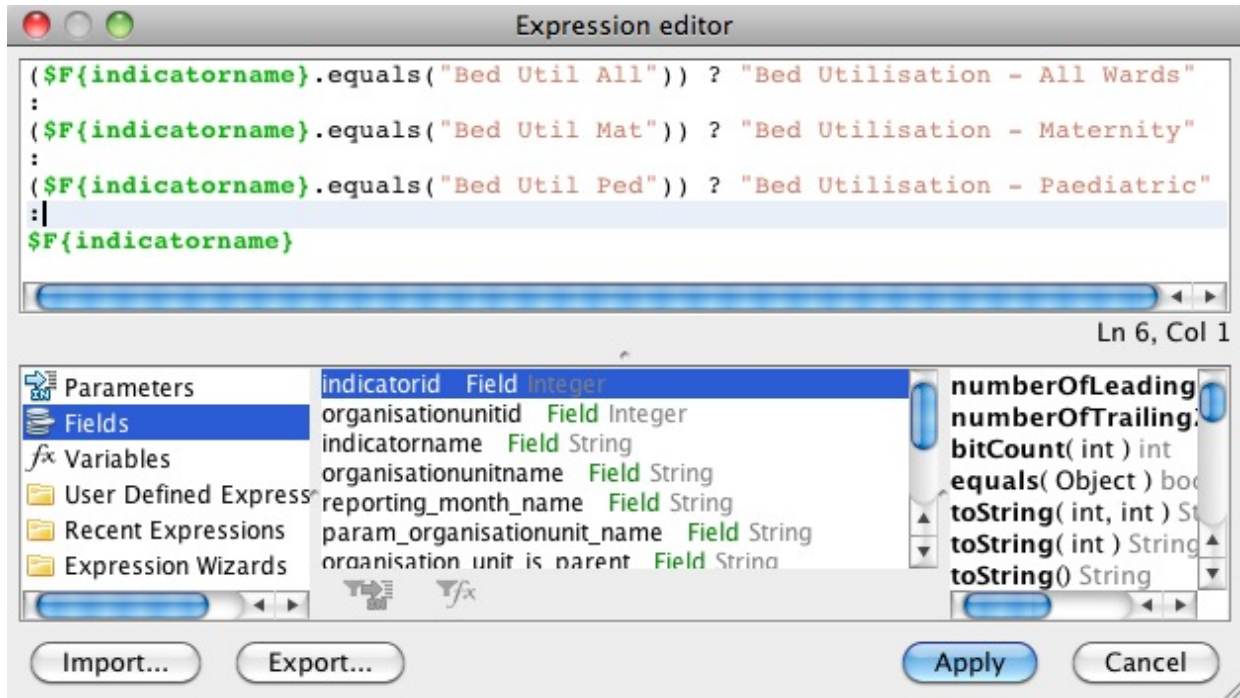


| Indicator                    | Jan to Mar 20 |
|------------------------------|---------------|
| Bed Utilisation - All Wards  |               |
| Bed Utilisation - Maternity  |               |
| Bed Utilisation - Paediatric |               |

To change the names of an indicator or data element, we have to edit its «expression» or formula, for example by right clicking the text box and choosing Edit expression to bring up the Expression editor.



Next, we have to insert some Java code. In the following example, we will be replacing the shortname of three indicators with their proper names. The code searches for the shortname, and then replaces it with a proper name.



```

($F{indicatorname}.equals("Bed Util All")) ? "Bed Utilisation - All Wards"
:
($F{indicatorname}.equals("Bed Util Mat")) ? "Bed Utilisation - Maternity"
:
($F{indicatorname}.equals("Bed Util Ped")) ? "Bed Utilisation - Paediatric"
:
$F{indicatorname}

```

From this, we can see a pattern that is reusable for more general cases.

- For each indicator or data element we want to change the name for, we need one line
- Each line is separated by a colon :
- We finish the expression with a «regular» line

Each line has the same format, where the red text is the shortname, the blue text is what we want to insert instead.

```

($F{indicatorname}.equals("Bed Util All")) ? "Bed Utilisation - All Wards"

```

The same expressions can be used for example when having indicator names along the category axis of a chart.

### Adding horizontal totals

By using the expression editor, it is possible to add a column to the table with totals for each row. In the following example, we will make a table with three months as columns as well as a column with the totals for the three months.

We start by dragging a text label into the table header and changing its text to "Total", and dragging a text field into the details row.

As was discussed in the section on "Text field", we have to change the properties of the new text field so that it can display numbers. To do this, change the "Expressions Class" in the properties panel to "java.lang.Double".

Right click the text field and choose "Edit Expression". This will bring up the "Expressions editor". As the expression, we want to sum up all the columns. In this case we have three value expressions we want to sum up: "September", "October 2010", "November 2010". The name of these fields will vary depending on the crosstab dimension you have chosen in the report table. In our case, the expression we make is

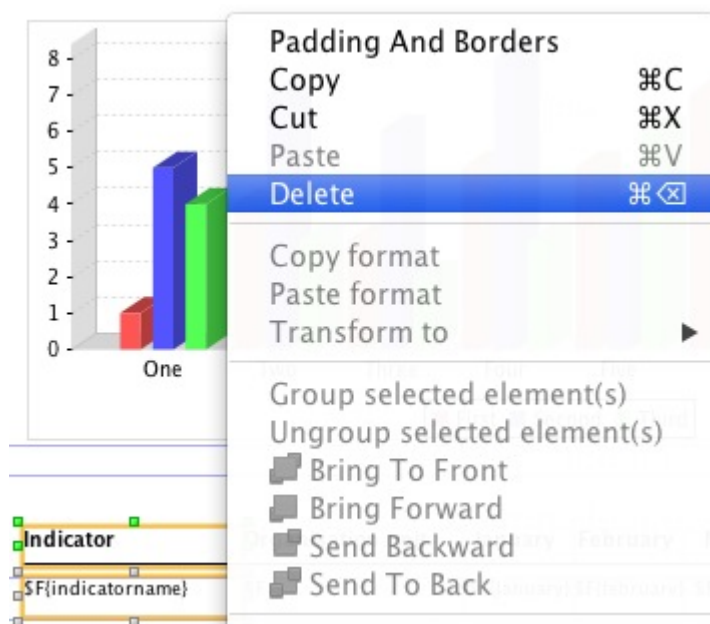
```
$f{September}+$f{October 2010}+$f{November 2010}
```

Each row of the table will have a totals column to the right.

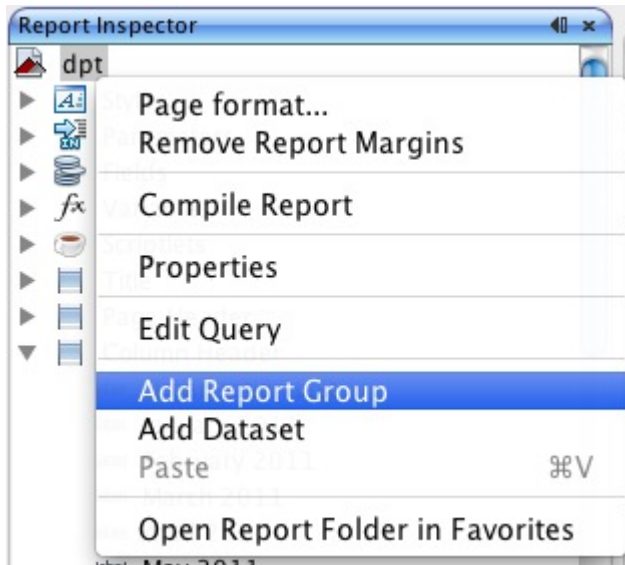
### Groups of tables

There are cases when it can be useful to have several tables in one report. This can be done using Report groups. Using this functionality, one can for example create a report one table for each indicator, or one table of each organisation unit. In the following, we will go through the steps needed to make a report with three indicators, each represented in one table. It is important that the report table does not crosstab on indicators when we want to make groups of tables based on indicators.

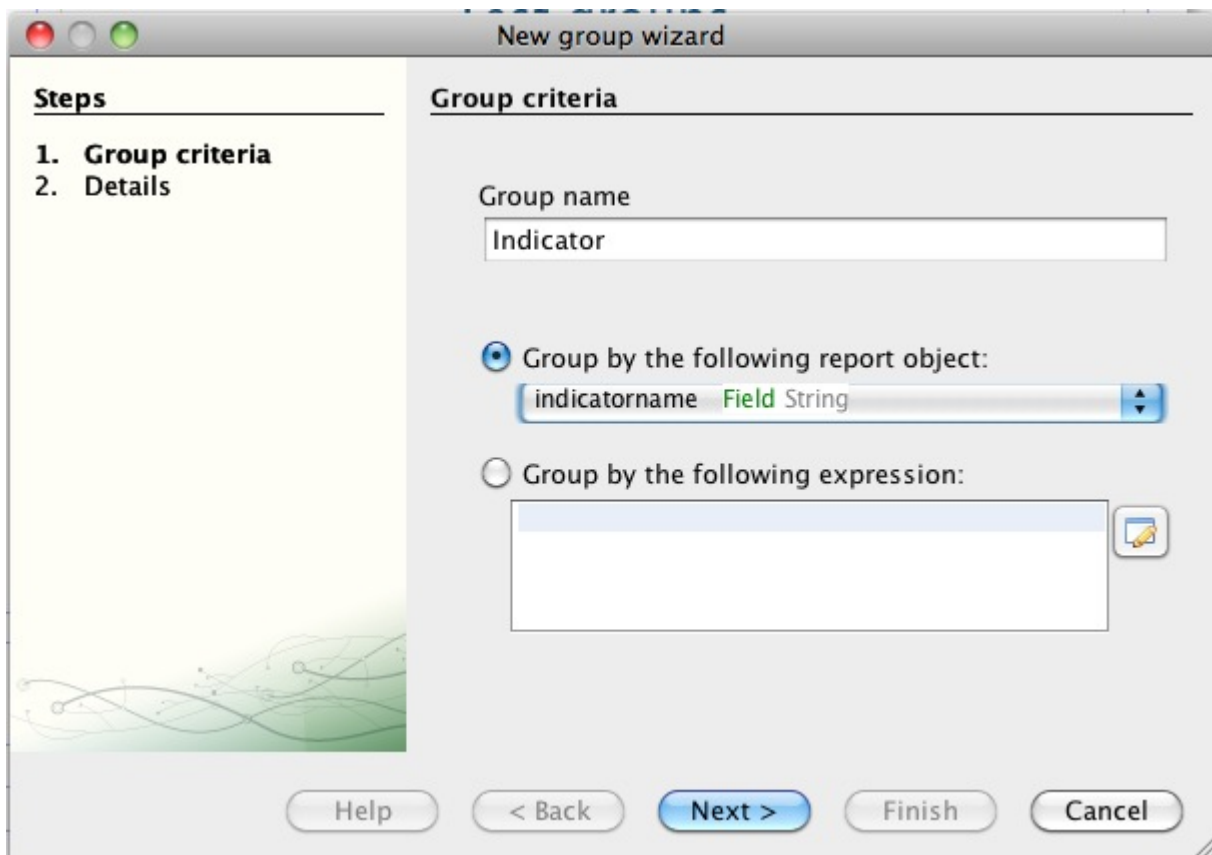
In our example, the .jrxml file downloaded from DHIS2 will by default have one column for organisation unit and one for indicators (assuming we have chosen periods as the only crosstab dimension). We start by removing the indicator column, since this is not needed in our case, and realign the other fields to fit the report.



Next, we create our Report group. Go to the report inspector, right click on the report name (dpt is the default) and choose Add Report Group.



A window will appear, with a report group wizard. Select a name for the group, in this case we choose «Indicator». In the drop down menu, we can select what columns in the report table we want the groups to be based on. So, if we wanted one table for each organisation unit, we would choose organisation unit name as the report object to group according to. However, since we are grouping by indicators in this example, we choose indicatorname. Then click next.



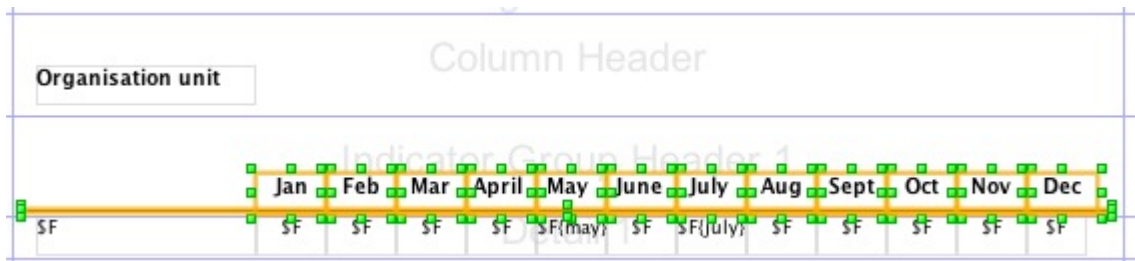
The next step is to select whether or not we want a separate Group header and Group footer band for each report group. In this case, we choose to include both. Click Finish, and the group bands should appear in the report.



If you upload and run the report, it will now create one table for each indicator. However, it will not look very good as there will be no header row over each table - only one header at the top of each page. Also, there is no indication as to which table is showing which indicator. In the following, we will fix this.

Instead of having the title row in the column header, we can instead move it to the Group header. This will make the heading show up above each individual table. Furthermore, we can add a heading to each table with the name of the indicator.

Move the column headers from the Column header band to the Indicator group header band.



Next, add a text field to the Indicator group heading band, and edit it's expression to display the indicator name.





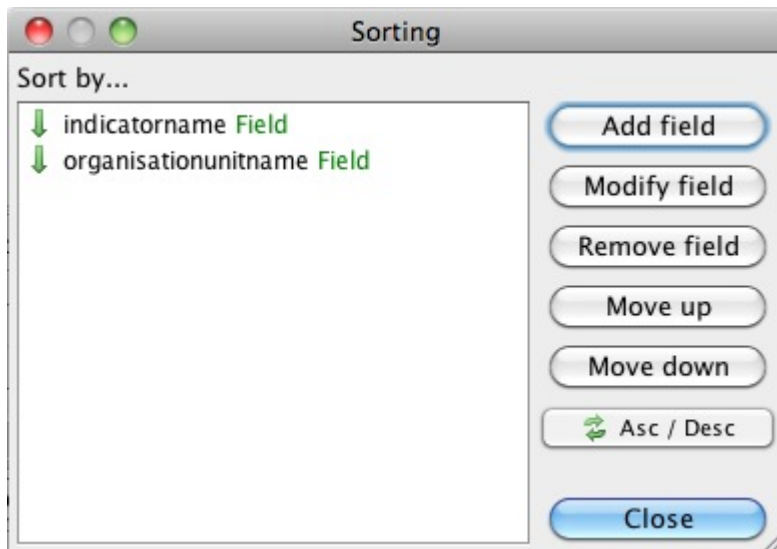


The report should now have three tables, one for each indicator. Each table will have a heading with the name of the indicator, and also a table header row.

| EPI BCG coverage |     |     |     |       |     |      |      |     |      |     |     |     |
|------------------|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
|                  | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
| Ashanti          |     |     |     |       |     |      |      |     |      |     |     |     |
| Central          |     |     |     |       |     |      |      |     |      |     |     |     |
| ZR               |     |     |     |       |     |      |      |     |      |     |     |     |
| Eastern          |     |     |     |       |     |      |      |     |      |     |     |     |
| Upper West       |     |     |     |       |     |      |      |     |      |     |     |     |

**Sorting and grouping**

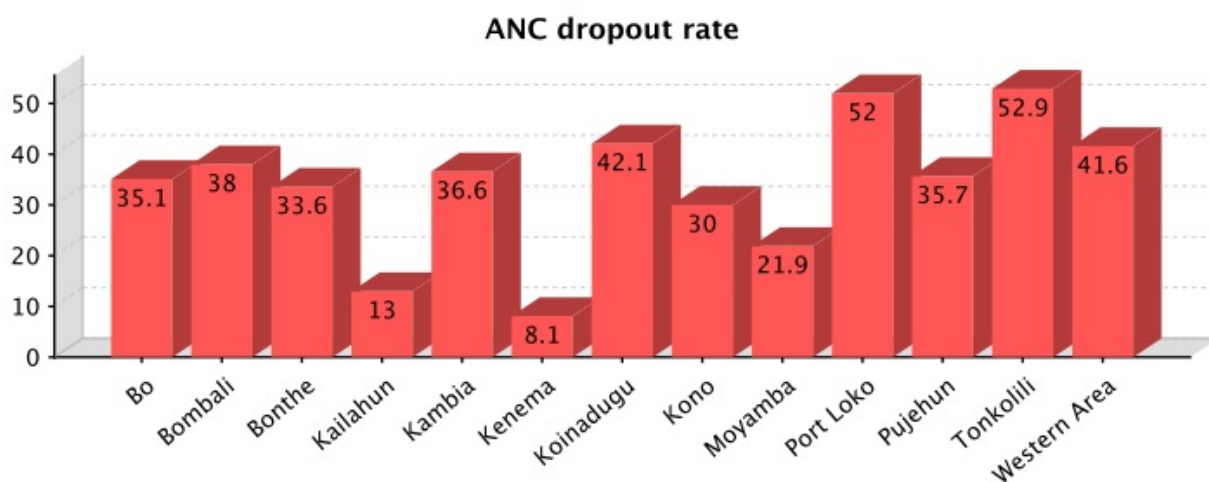
When using grouping, some precautions must be taken with regards to sorting. Notably, when adding sorting parameters, whatever parameter is used as basis for the grouping must come first. Thus if you are grouping the report by indicator, and want sort the organisation units alphabetically, you have to choose to sort first by indicator, then by organisation unit name as shown below. For instructions on how to add sorting, see the sorting section above.



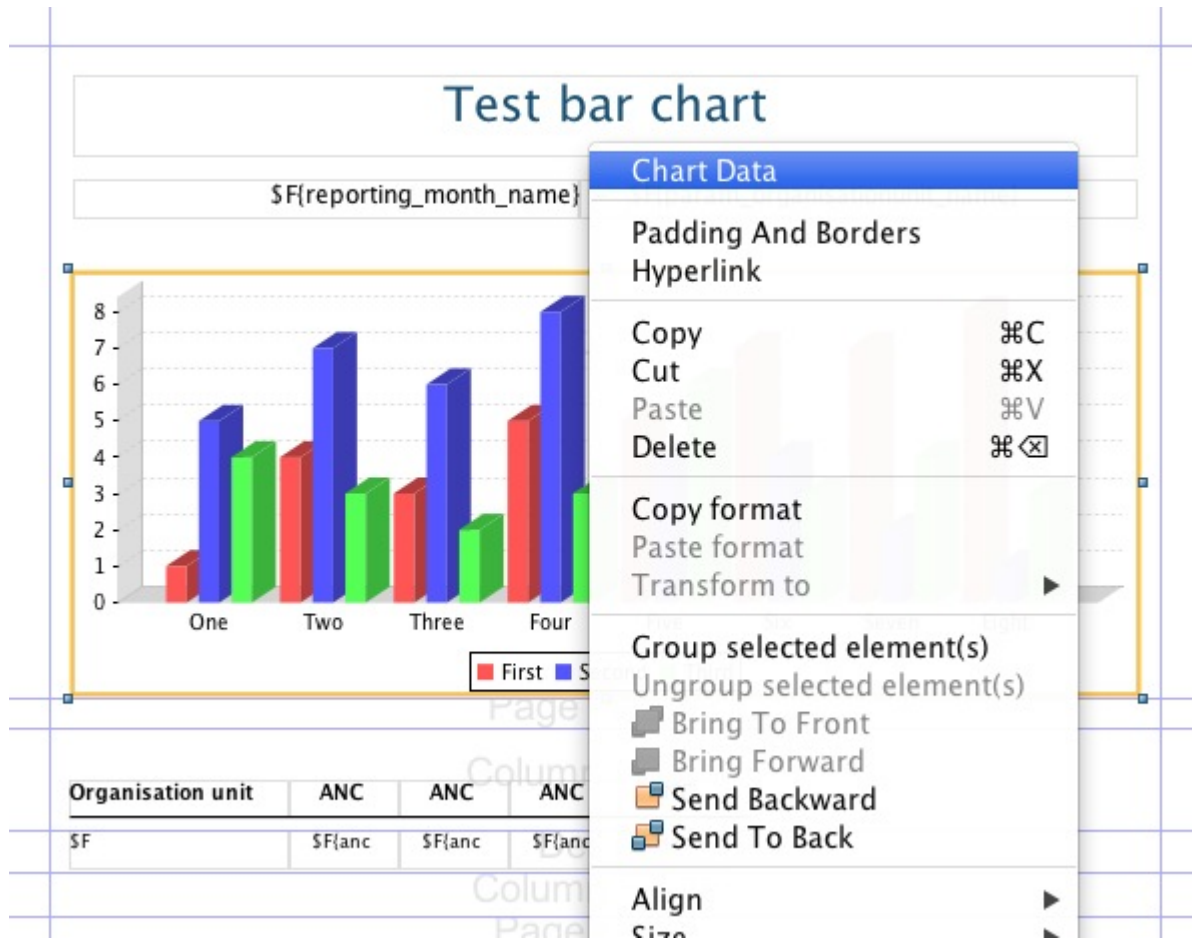
## Charts

By default, a 3D bar chart is included in the .jrxml file that is downloaded from DHIS 2. This is set up so that only data from the «parameter organisation unit» (often the parent or grand parent) is used. Usually, this is a good solution. Since it is the default, we will start by looking at bar charts, before looking at line charts.

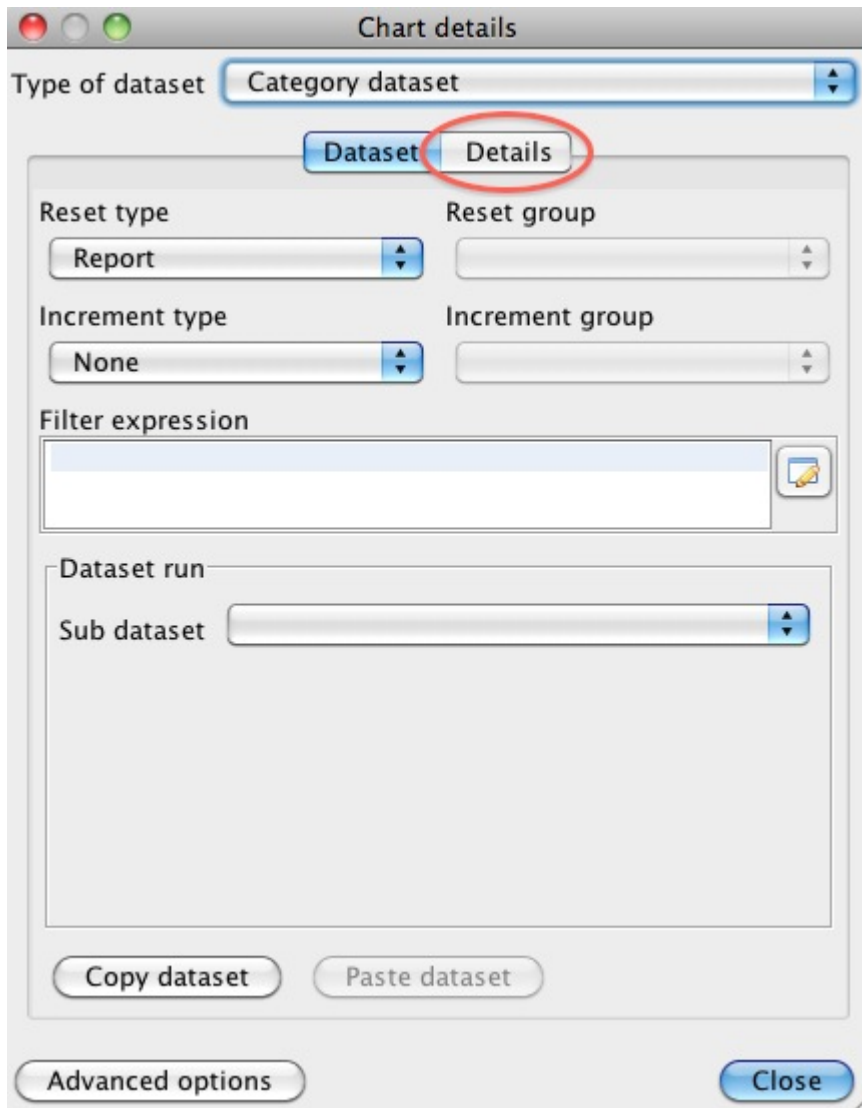
### Bar charts



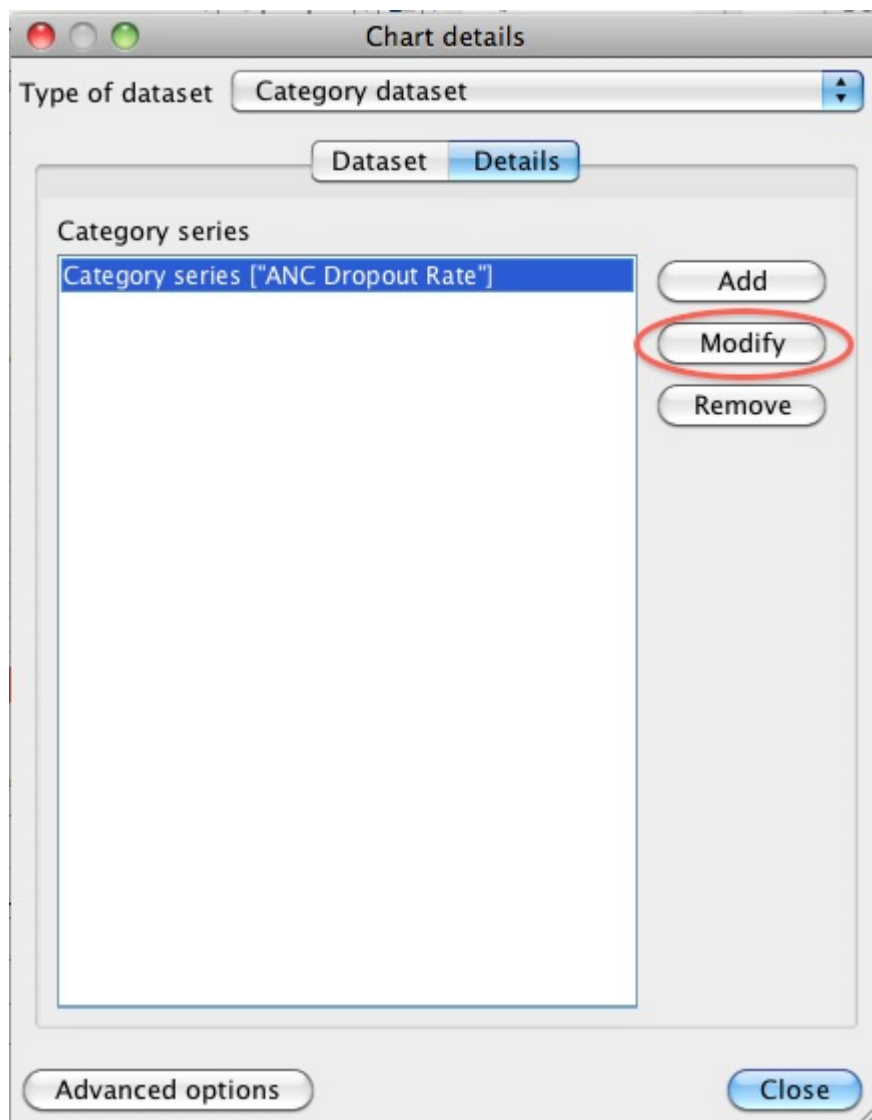
Bar charts are the default chart type in DHIS2. In this section, we will look at how to make a bar charts like the one above, comparing the value of one indicator in several districts. To edit the default chart in iReport, right click on it and choose Chart data.



A window will appear. By default, the Filter expression is filled in so that only data for the parent organisation unit will be displayed. If for some reason you do not want this, simply delete the text in the text box. In this case we do NOT want the filter, as we are making a chart showing a comparison across districts. To continue, click the details tab.



Under details, you see the list of series for the chart. By default, one series is created per crosstab column. In this case, we are looking at data for one indicator for the whole of 2010, for a number of districts. The indicator is along the crosstab dimension.



To make changes to a series, select it and click modify. Another window will appear where there are four areas that can be edit. The three first are required, but it is sufficient to add an empty quote («») in one of the first two.

The screenshot shows a configuration dialog with two tabs: "Data" (selected) and "Item Hyperlink". It contains four text input fields, each with a small edit icon to its right:

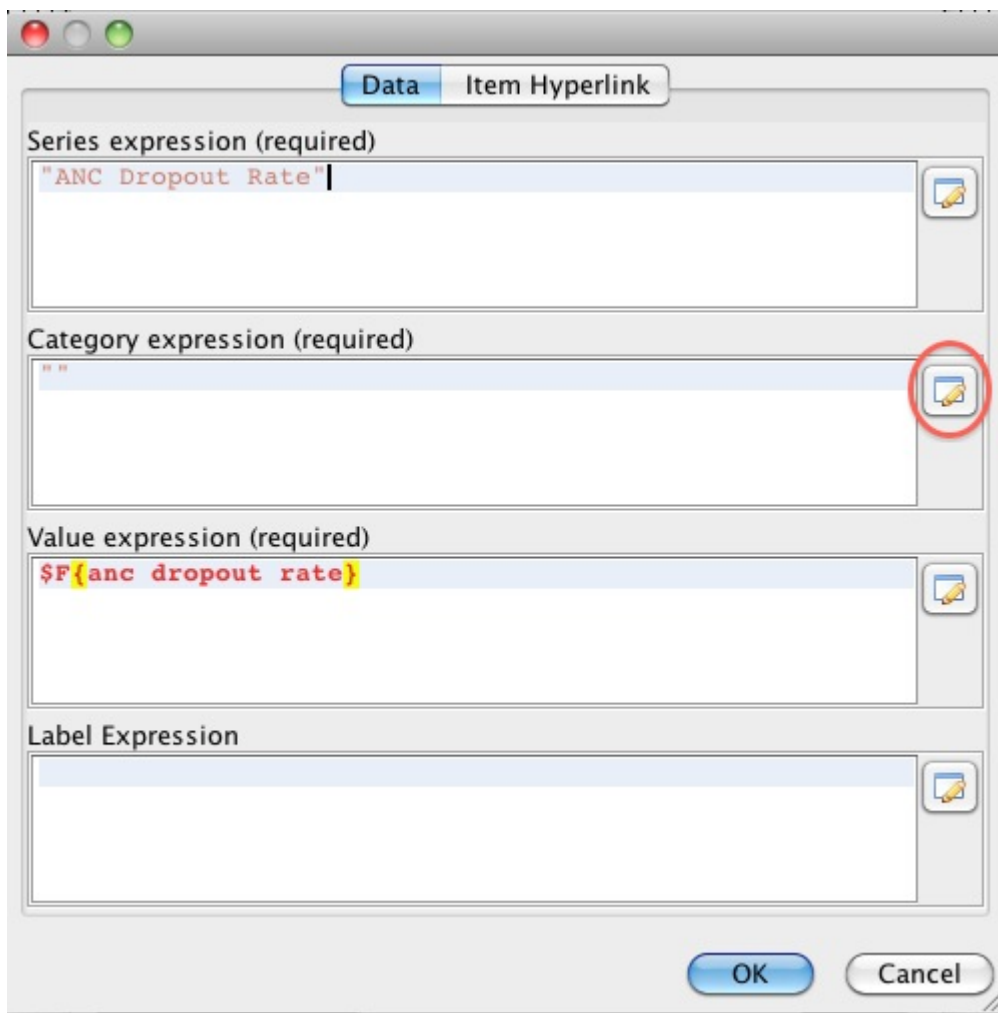
- Series expression (required):** Contains the text "ANC Dropout Rate".
- Category expression (required):** Contains a single vertical bar character "|".
- Value expression (required):** Contains the expression `$F{anc dropout rate}`.
- Label Expression:** Is currently empty.

At the bottom of the dialog are "OK" and "Cancel" buttons.

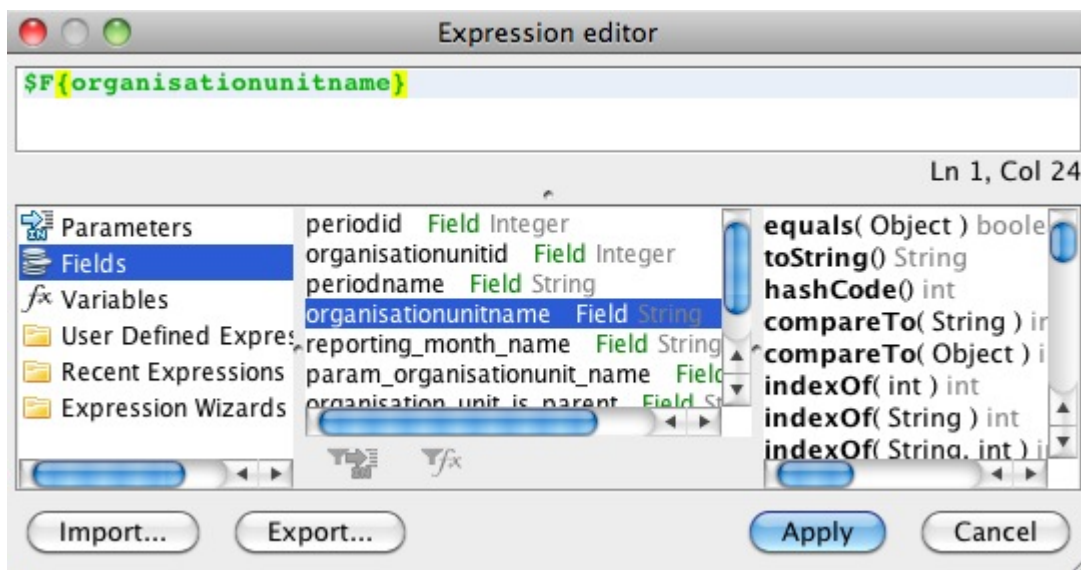
The first box is a text field where the name of the series can be inserted or edited. This is the field that will be used to fill the text in the legend box (shown below).

■ ANC Dropout Rate

However, if you want to have the name of each bar along the x-axis of the chart instead of using the legend, this can be done by adding whatever text you want to present in the Category expression field, or by inserting an expression to have it filled automatically when the report is run. In this case, we want to have one bar for each organisation unit. We therefore edit the category expression by clicking on the button to the right.



As the expression, we chose organisationunitname, as shown below.



When we are finished, the series editor should look like below. Click OK, then Close to close the Chart Details window.

The screenshot shows a configuration window with two tabs: 'Data' (selected) and 'Item Hyperlink'. It contains four text input fields, each with a small edit icon to its right:

- Series expression (required):** Contains the text `"ANC Dropout Rate"`.
- Category expression (required):** Contains the text `$F{organisationunitname}`.
- Value expression (required):** Contains the text `$F{anc dropout rate}`.
- Label Expression:** Is currently empty.

At the bottom of the window are 'OK' and 'Cancel' buttons.

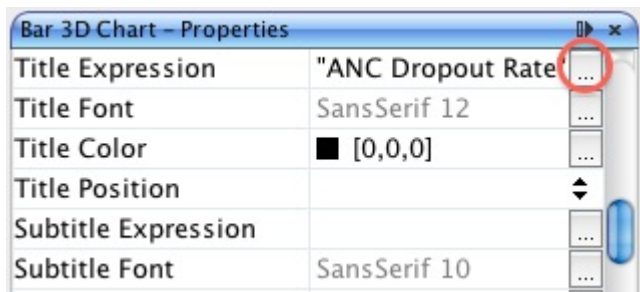
If you add a good description in the Category expression area, you can leave out the legend box. This is done in the Report properties panel of iReport, where you can also edit many other details of the chart.

The screenshot shows a 'Bar 3D Chart - Properties' panel with the following settings:

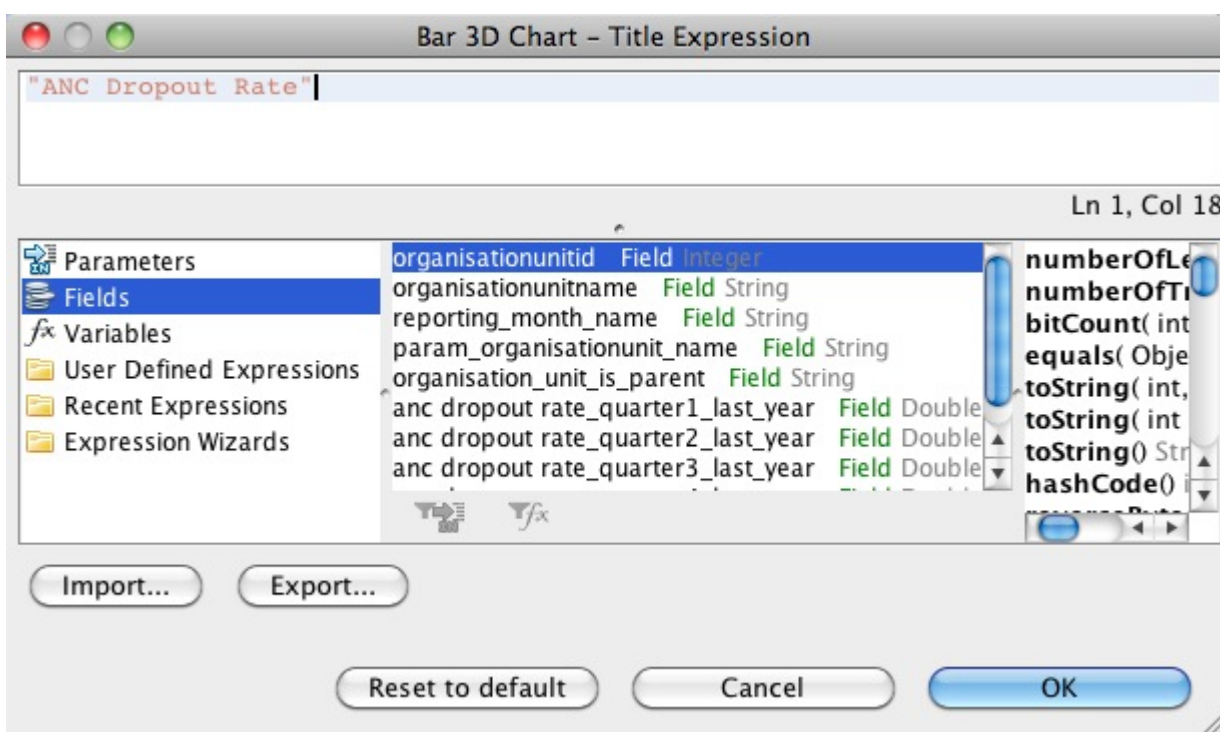
|                       |                                     |     |
|-----------------------|-------------------------------------|-----|
| Subtitle Color        | ■ [0,0,0]                           | ... |
| Show Legend           | <input checked="" type="checkbox"/> |     |
| Legend Font           | SansSerif 10                        | ... |
| Legend Color          | ■ [0,0,0]                           | ... |
| Legend Background Col | □ [255,255,255]                     | ... |
| Legend Position       |                                     | ⬆   |

We can also add a title to the chart, for example the name of the indicator. This is also done in the Chart properties panel, under Title expression.





The Expression editor window will appear, where you can enter the title. Note that the title must be in quotes, as shown below.



The chart is now ready.

**Line charts**

Line charts can be useful in many circumstances. However, to make line charts the report data (report table) must be suited for it. Thus if you want to make a line chart, it is important that the report table does not have periods in the crosstab dimension. Examples where this is useful is if you are making a report for a single organisation unit with one or more indicators, or if you are making a report with one indicator and one or more organisation units.

Below, we will go through the steps needed to make a report with a line chart showing the development of three indicators over one year, for one organisation unit. We start by making a report table with the choices shown below:

**Crosstab dimensions**

- Indicators / data elements / data sets
- Organisation units
- Periods

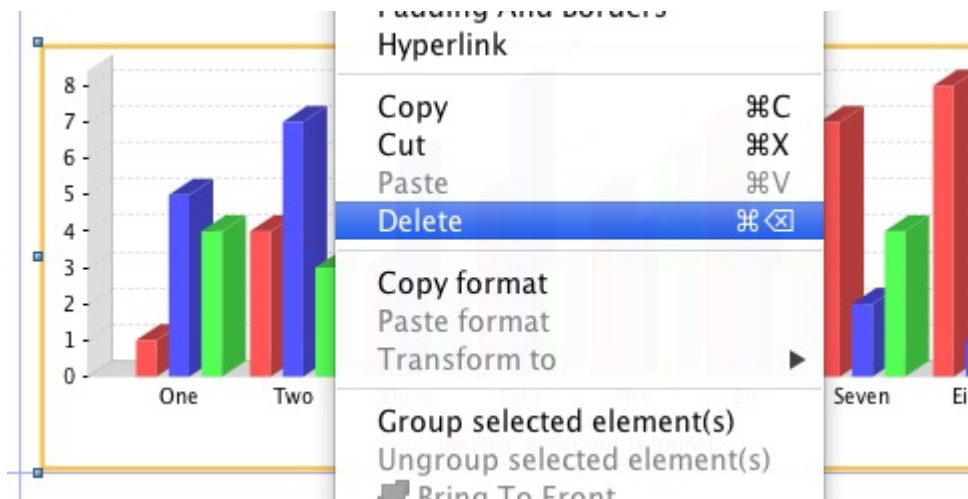
**Relative periods**

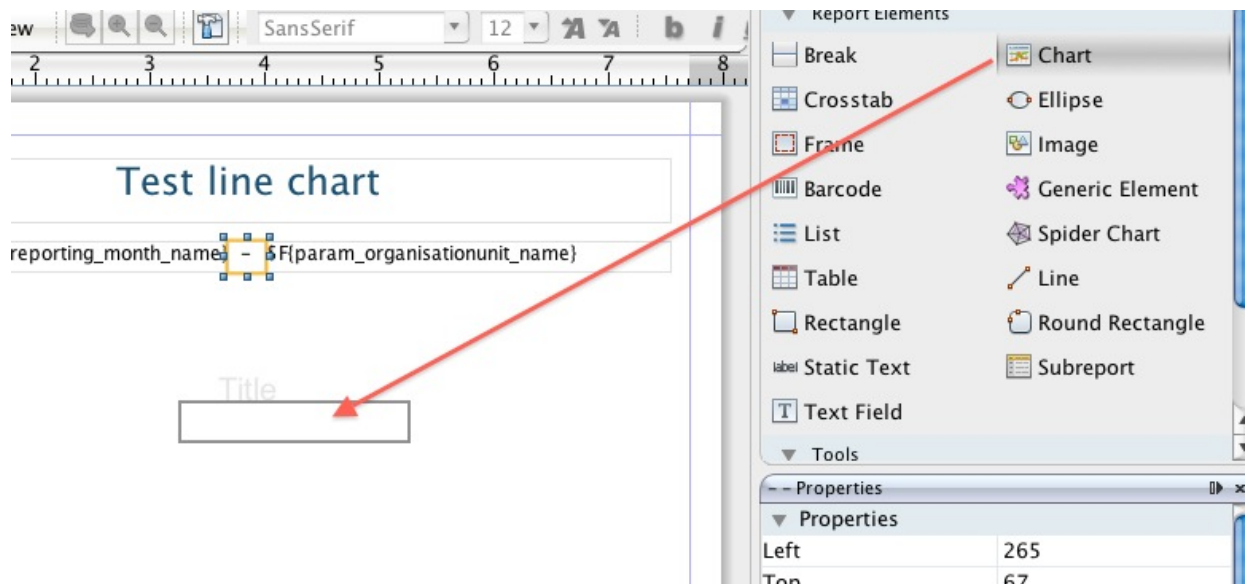
- Reporting month  Months this year  Quarters this year  This year
- Months last year  Quarters last year  Last year

**Report parameters**

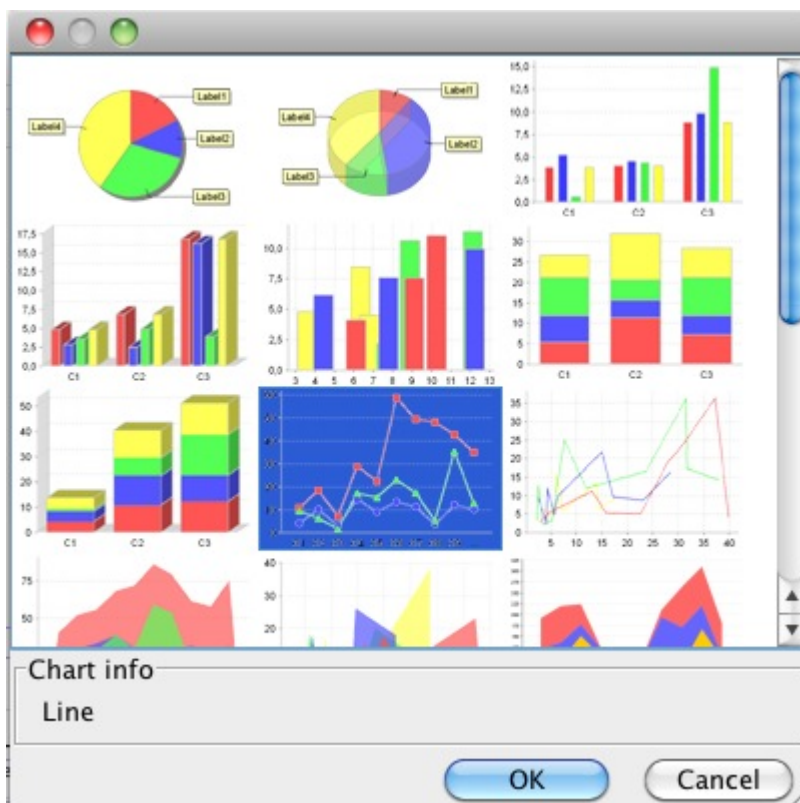
- Reporting month  Parent organisation unit  Organisation unit

When we open the resulting .jrxml-file in iReport, the default line chart is included. Since we want to make a line chart, we delete this chart and drag a new chart element into the report from the Palette panel.





As soon as we drag the Chart element into the report, a window will appear. We choose the Line chart, as shown below.



A chart wizard will appear. Click next in the first step, then Finish in the next - we will add the data later.

### Category Chart Wizard

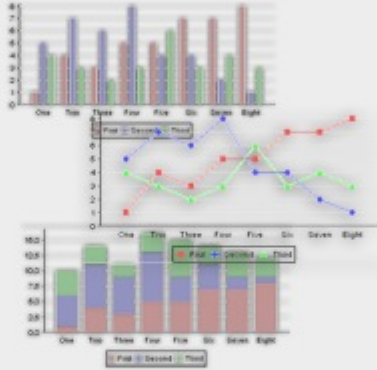
#### Steps

1. Dataset
2. Series
3. Categories and Values

#### Dataset

### Category dataset chart

This chart uses a Category dataset which can handle different series of values.



To fill this chart you can use the main dataset of the report, or a sub-dataset if you have defined one.

You can even specify special rules to collect the data for the chart later using the Chart Data dialog.

Now please select the dataset to use.

#### Dataset

Main report dataset

Help < Back **Next >** Finish Cancel

**Category Chart Wizard**

**Steps**

1. Dataset
2. **Series**
3. Categories and Values

**Series**

**Series**  
A category chart requires three expressions: the first identifies the series, the second the category and the last the value.

The **categories** appear on the X axis.  
The **values** appear on the Y axis.

The series expression is useful when you need to represent several sets of data in your chart. If you need a single series chart, set the series expression to a constant value like an empty string ("").

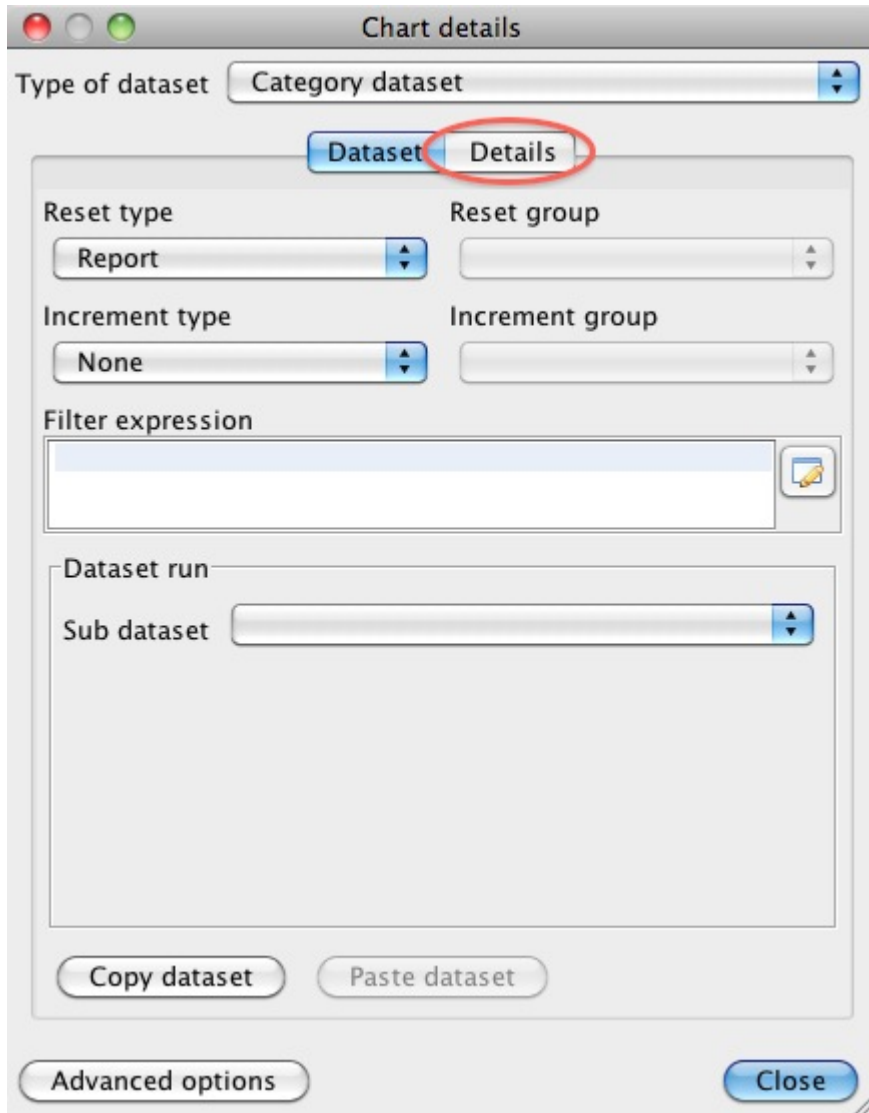
"Dummy Series"

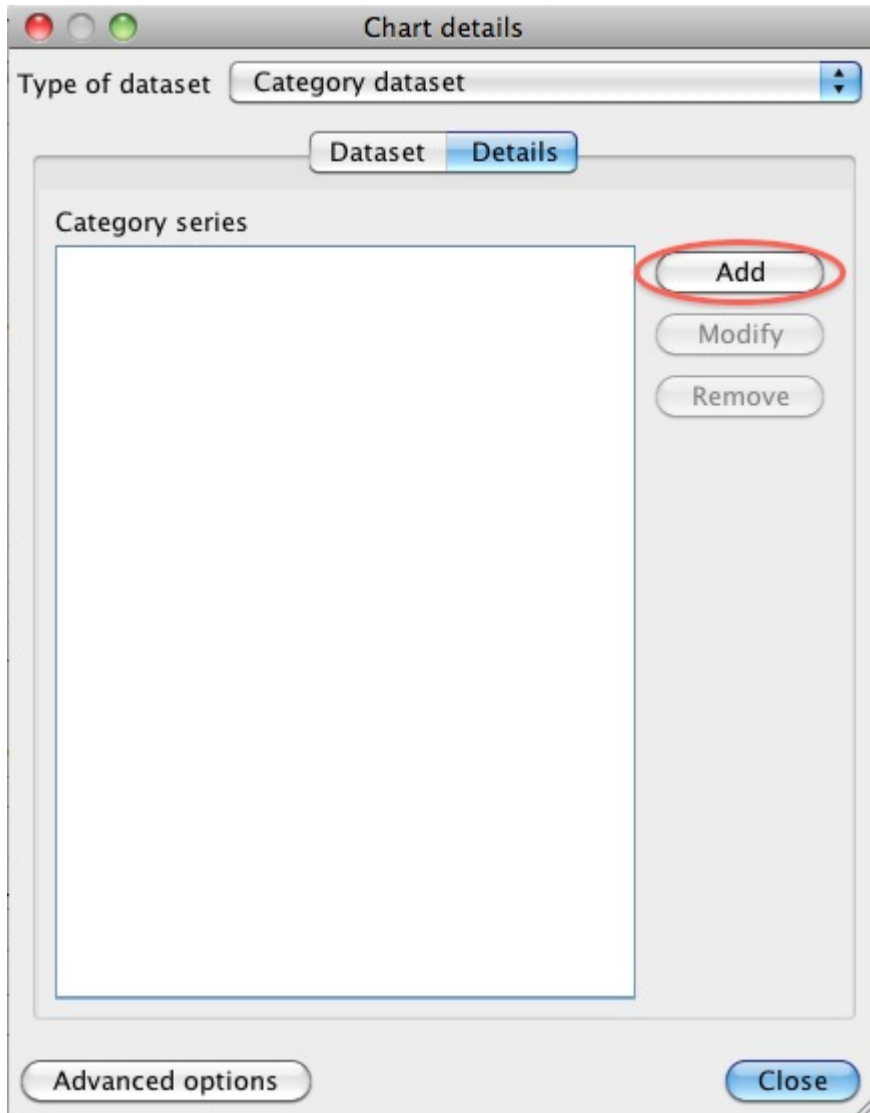
Help < Back Next > **Finish** Cancel

Next, adjust the size and position of the chart in your report. Then, we will add one data series for each of our three indicators. Right-click on the chart and choose Chart data. If you are making a chart with one indicator and several organisation units, you probably want to make a filter expression so that only data from the parameter/parent organisation unit is used in the chart. To do this, add this line to the Filter expression area:

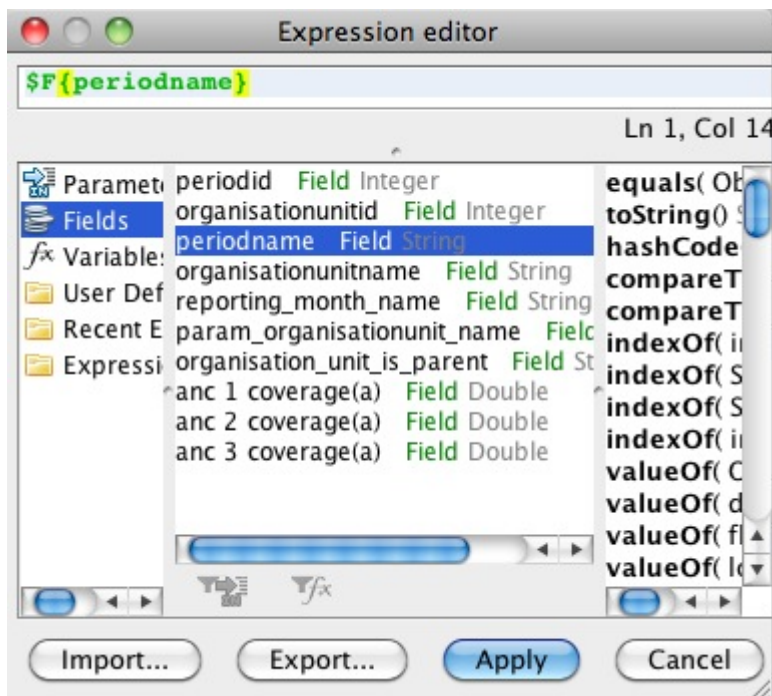
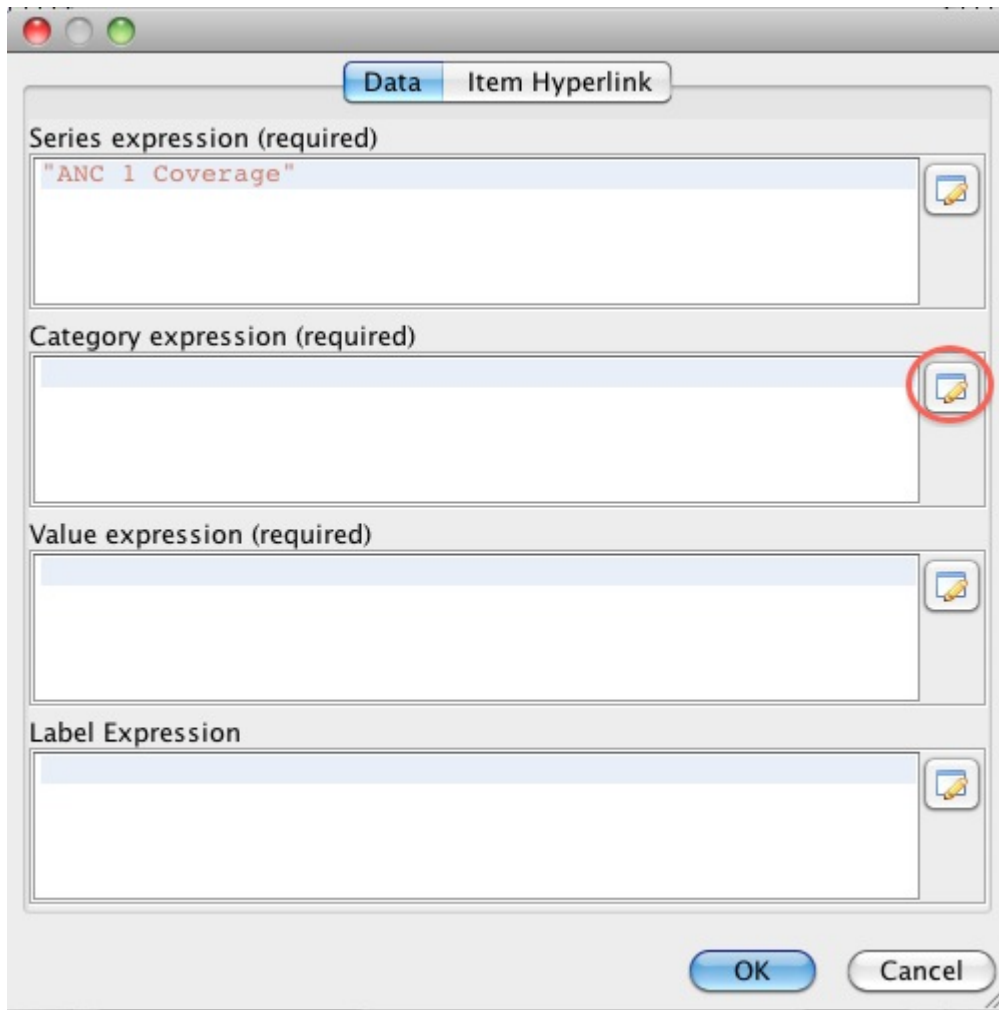
```
$F{organisation_unit_is_parent}.equals("Yes")
```

In our example, we only have one organisation unit, so this is not necessary. Next, click the details tab to see a list of the series in the chart. For now, this list is empty, but we will add one series for each of our three indicators. To add a series, click the Add button.





In the window that appears, enter the name of the first of the indicators in the Series expression window. Remember to put the name in quotes. In the category expression (along the x-axis) we want the months, so we use the button next to the field to open the Expression editor and add periodname.



In the value expression, we add the actual data values for our first indicator. Use the Expression editor again to do this. When we are finished, the window should look like the one below, only with different names according to the indicator.

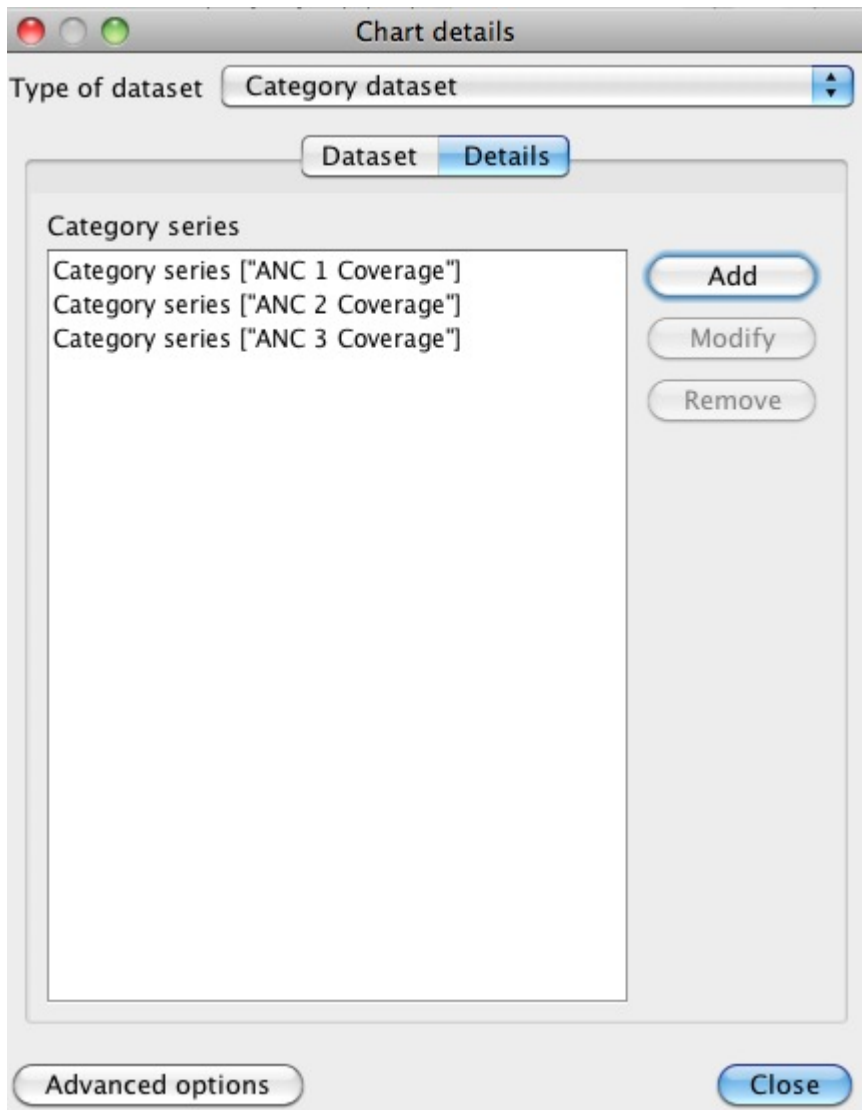


The image shows a configuration dialog box for a line chart series. The dialog has a title bar with two tabs: "Data" (selected) and "Item Hyperlink". It contains four text input fields, each with a small edit icon to its right:

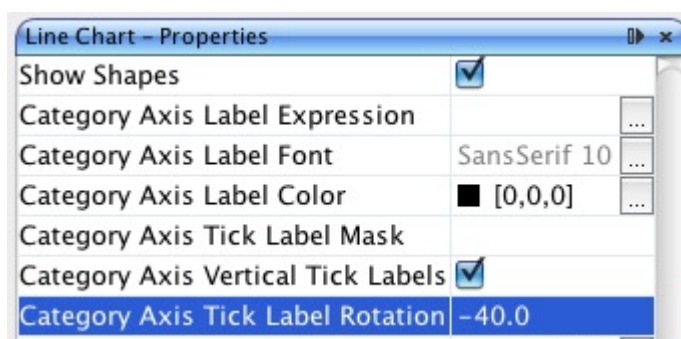
- Series expression (required):** Contains the text `"ANC 1 Coverage"`.
- Category expression (required):** Contains the text `$F{periodname}`.
- Value expression (required):** Contains the text `$F{anc 1 coverage(a)}`.
- Label Expression:** This field is currently empty.

At the bottom right of the dialog are two buttons: "OK" and "Cancel".

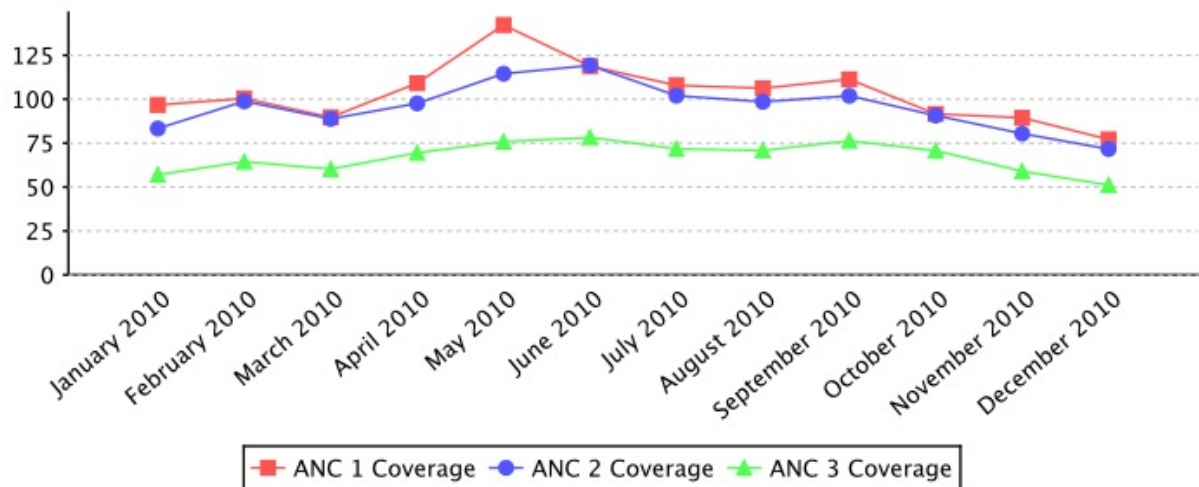
You can then Click OK to close the window. Follow the same steps to add a series for the other indicators.



Close the window, and the data for the line chart should be ready. However, some additional adjustments might be needed - most of these can be found in the Line chart properties panel. For example, when making a month by month chart as we have in example, there is often not enough space for the month names along the category axis. This can be fixed by rotating the labels by for example -40 degrees, by using the property Category Axis Tick Label Rotation.



Many other options are available to give the chart the desired look.

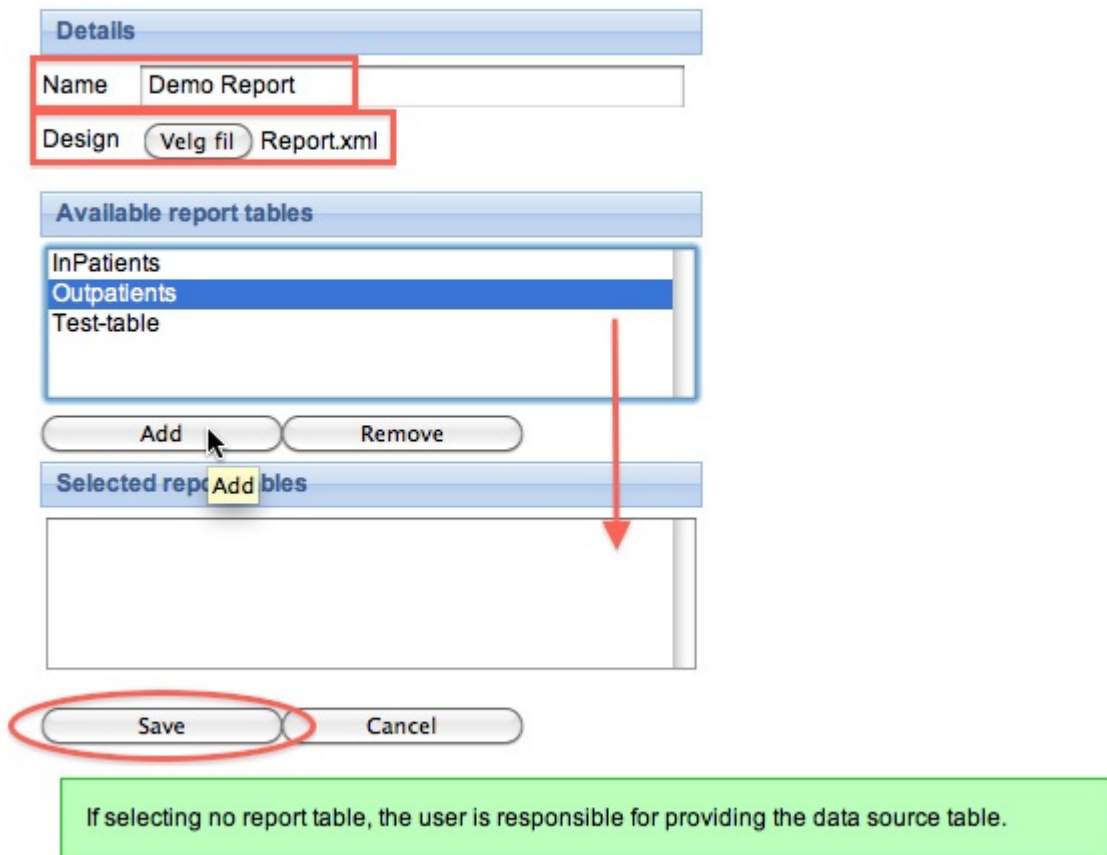


### Adding the Report to DHIS2

We can now switch to DHIS2 and import our report. Go to the Report Module in DHIS2, and select "Standard Report". In the "Standard Report" screen, click "Add new", or edit an existing one.

In the following screen, there are several actions we need to take. First, enter a name for the new "Standard Report". Second, for design, click "Choose File" and find the .jrxml-file you have edited in iReport. Then we select the report table that we used as a basis for the report in iReport. Click add, and it should move to the "Selected report tables" area. Finally, click save.

### Create new report



The report is now available as a "Standard Report" in DHIS2:

### Standard Report



### Some final guidelines

- Use the same version of iReport and DHIS2's version of Jasper reports. See the About page in DHIS2 for the Jasper version in use.
- Use report tables with cross tab dimensions as your data source for your report designs. This will make it a lot easier to design reports where you need to put specific indicators, periods, or orgunits on columns.
- Learn from others, there are many DHIS2 report designs for Jasper on launchpad, see <http://bazaar.launchpad.net/~DHIS2-devs-core/DHIS2/trunk/files/head:/resources/>

## Designing SQL based standard reports

A standard report might be based on SQL queries. This is useful when you need to access multiple tables in the DHIS2 database and do custom selects and joins.

- This step is optional, but handy when you need to debug your reports and when you have direct access to the database you want to use. Click on the "report datasources" button, "New", "Database JDBC connection" and click "next". In this window you can give you connection a name and select the JDBC driver. PostgreSQL and MySQL should come included in your iReport. Then enter the JDBC connection URL, username and password. The last three refers to your database and can be retrieved from your DHIS2 configuration file (hibernate.properties). Click "save". You have now connected iReport to your database.

- Go to standard reports and click "add new", then "get report template". Open this template in iReport. This template contains a series of report parameters which can be used to create dynamic SQL statements. These parameters will be substituted based on the report parameters which we will later select and include in the standard report. The parameters are:

- periods - string of comma-separated identifiers of the relative periods
- period\_name - name of the reporting period
- organisationunits - identifier of the selected organisation units
- organisationunit\_name - name of the reporting organisation unit
- organisationunit\_level - level of the reporting organisation unit
- organisationunit\_level\_column - name of the corresponding column in the \_orgunitstructure resource table

These parameters can be included in SQL statements using the  $\$P\!\{periods\}$  syntax, where "periods" represents the parameter.

- To create a SQL query in iReport, click on the "report query" button. Write or paste your query into the textarea. An example SQL query using parameters which will create a report displaying raw data values at the fourth level in the org unit hierarchy is:

```
select district.name as district, chiefdom.name as chiefdom, ou.name as facility,
bcg.value as bcg, yellowfever.value as yellowfever, measles.value as measles
from organisationunit ou
left outer join _orgunitstructure ous
  on (ou.organisationunitid=ous.organisationunitid)
left outer join organisationunit district
  on (ous.idlevel2=district.organisationunitid)
left outer join organisationunit chiefdom
  on (ous.idlevel3=chiefdom.organisationunitid)
left outer join (
  select sourceid, sum(cast(value as double precision)) as value
  from datavalue
  where dataelementid=359706
  and periodid=$P!\{periods}
  group by sourceid) as bcg on bcg.sourceid=ou.organisationunitid
left outer join (
  select sourceid, sum(cast(value as double precision)) as value
  from datavalue
  where dataelementid=35
  and periodid=$P!\{periods}
  group by sourceid) as yellowfever on yellowfever.sourceid=ou.organisationunitid
where ous.level=4
```

```
and ous.$P!{organisationunit_level_column}=$P!{organisationunits}
order by district.name, chiefdom.name, ou.name;
```

Notice how all parameters are used in the query, along with SQL joins of resource tables in the DHIS2 database.

- Finally, back in the add new report screen, we click on "Use JDBC data source". This enables you to select any relative period and report parameters for your report. Relative periods are relative to today's date. Report parameters will cause a prompt during report creation and makes it possible to dynamically select organisation units and periods to use for your report during runtime. For the example above, we must select "reporting month" under relative periods and both "reporting month" and "organisation unit" under report parameters. Click save. This will redirect you to the list of reports, where you can click the green "create" icon next to your report to render it.

## Designing HTML based standard reports

A standard report can be designed using purely HTML and JavaScript. This requires a little bit of development experience in the mentioned subjects. The benefit of HTML based standard reports is that it allows for maximum flexibility. Using HTML you can design exactly the report you want, positioning tables, logos and values on the page according to your design needs. You can write and save your standard report design in a regular text file. To upload your HTML based standard report to DHIS2 do the following:

- Navigate to standard reports and click "Add new".
- Give the report a name.
- Select "HTML report" as type.
- If you want to you can download a report template by clicking on "Get HTML report template".
- Select desired relative periods - these will be available in JavaScript in your report.
- Select report parameters - these will be available in JavaScript in your report.

The report template, which you can download after selecting report type, is a useful starting point for developing HTML based standard reports. It gives you the basic structure and suggests how you can use JavaScript and CSS in the report. JavaScript and CSS can easily be included using standard script and style tags.

If you selected relative periods when creating the standard report you can access these in JavaScript like this:

```
var periods = dhis2.report.periods; // An array with period identifiers
var period = periods[0];
```

If you selected the organisation unit report parameter when creating the standard report you can access the selected organisation unit in JavaScript like this:

```
var orgUnit = dhis2.report.organisationUnit; // An object
var id = orgUnit.id;
var name = orgUnit.name;
var code = orgUnit.code;
```

---

When designing these reports you can utilize the analytics Web API resource in order to retrieve aggregated data in JavaScript. Have a look in the Web API chapter in this guide for a closer description. As a complete, minimal example you can retrieve analytics data after the report has been loaded and use that data to set the inner text of an HTML element like this:

```
<script type="text/javascript">
$( document ).ready( function() {
    $.get( "../api/analytics?
dimension=dx:FnyCr2EAzWS;eTDtyyaSA7f&dimension=pe:THIS_YEAR&filter=ou:ImspTQPwCqd" ,
function( json ) {
    $( "#bcg" ).html( json.rows[0][2] );
    $( "#fic" ).html( json.rows[1][2] );
    } );
} );
</script>

<div>BGG coverage: <span id="bcg"></span></div>
<div>FIC coverage: <span id="fic"></span></div>
```

A few other tips: To include graphics you can convert an image to SVG and embed that SVG content directly in the report - DHIS2 is based on HTML 5 where SVG tags are valid markup. To include charts and maps in your report you can use the charts and maps resources in the Web API. You can use the full capability of the Web API from JavaScript in your report - it may be useful to read through the Web API chapter to get an overview of all available resources.

## System settings

### General settings

#### General settings

| Setting                                    | Description   |
|--|---|
| <b>Maximum number of analytics records</b> | <p>Increase this number to provide more records from the analytics.</p> <p>The default value is 50,000.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin-top: 10px;"> <p><b>Warning</b></p> <p>Use the setting <b>Unlimited</b> carefully, it might result in a very high load on your server.</p> </div>   |
| <b>Maximum number of SQL view records</b>  | <p>Set the maximum number of records in a SQL view.</p> <p>The default value is Unlimited.</p>  |
| <b>Infrastructural indicators</b>          | <p>Defines an indicator group where the member indicators should describe data about the organisation units' infrastructure.</p> <p>You can view the infrastructural data in the <b>GIS</b> app: right-click a facility and click <b>Show information</b>.</p>  |
| <b>Infrastructural data elements</b>       | <p>Defines a data element group where the member data elements should describe data about the organisation units' infrastructure.</p> <p>Infrastructural data elements can be population, doctors, beds, Internet connectivity and climate.</p> <p>You can view the infrastructural data in the <b>GIS</b> app: right-click a facility and click <b>Show information</b>.</p>           |
| <b>Infrastructural period type</b>         | <p>Sets the frequency for which the data elements in the infrastructural data elements group are captured.</p> <p>This will typically be yearly. When viewing the infrastructural data you will be able to select the time period of the data source.</p> <p>You can view the infrastructural data in the <b>GIS</b> app: right-click a facility and click <b>Show information</b>.</p> |



| Setting                                     | Description  |
|---|--|
| <b>Default relative period for analysis</b> | Setting this value will determine which relative period is selected as the default in the analytics apps.  |
| <b>Feedback recipients</b>                  | <p>Defines a user group where the members will receive all messages sent via the feedback function in the <b>Dashboard</b> app.</p> <p>This will typically be members of the super user team who are able to support and answer questions coming from end-users.</p>   |
| <b>Max offline organisation unit levels</b> | <p>Defines how many levels in the organisation unit hierarchy will be available offline in the organisation unit tree widget.</p> <p>Under normal circumstances you can leave this on the lowest level, which is default is the default setting.</p> <p>It can be useful to set it to a higher level to reduce initial load time in cases where you have a large number of organisation units, typically more than 30 000.</p> |
| <b>Data analysis std dev factor</b>         | <p>Sets the number of standard deviations used in the outlier analysis performed on the captured data in the <b>Data Entry</b> app.</p> <p>The default value is 2. A high value will catch less outlier values than a low value.</p>   |
| <b>Phone number area code</b>               | <p>The area code for the area in which your deployment is located.</p> <p>Used for sending and receiving SMS. Typically, this is a country code.</p> <p>+260 (country code for Zambia)</p>   |
| <b>Enable multi-organisation unit forms</b> | <p>Enables support to enter data forms for multiple organisation units at the same time in the <b>Data Entry</b> app.</p> <p>If you've enabled this setting, you can in the <b>Data Entry</b> app, click on the parent organisation unit for the children that you want to enter data for, and the data set list will include data sets that are assigned to the children of that parent.</p>                                  |

| Setting                             | Description  |
|-------------------------------------|--|
| Acceptance required before approval | When this setting is selected, acceptance of data will be required first before submission to the next approval level is possible. |

## Analytics settings

### Analytics settings

| Setting                              | Description   |
|--------------------------------------|---|
| Default relative period for analysis | <p>Defines the relative period to use by default in analytics app: <b>Data Visualizer</b>, <b>Event Reports</b>, <b>Event Visualizer</b>, <b>GIS</b> and <b>Pivot Table</b> apps. The relative period will be automatically selected when you open these apps.</p> <p>Recommended setting: the most commonly used relative period among your users.</p>   |
| Hide daily periods                   | Hide daily periods in the analysis tools  |
| Hide weekly periods                  | Hide weekly periods in the analysis tools   |
| Hide monthly periods                 | Hide monthly periods in the analysis tools  |
| Hide bimonthly periods               | Hide bimonthly periods in the analysis tools  |
| Financial year relative start month  | Defines which month (April, July or October) the the relative financial year in the analytics apps should begin on.   |
| Cacheability                         | <p>Sets whether analytics data responses should be served with public or private visibility.</p> <p><b>Private:</b> Any node or server between the DHIS2 server and the end user which has the ability to cache can NOT cache the web page. This is useful if the page served can or do contain sensitive information. This means that each time you want a web page, either you get a new page from the DHIS2 server, or the DHIS2 server caches the page. No other server than the DHIS2 server are allowed to cache the page.</p> <p><b>Public:</b> Any node or server between the DHIS2 server and the end user which has the ability to cache can cache the web page. This relieves the traffic to the DHIS2 server and potentially speeds up the subsequent page loading speed.</p> |

| Setting   | Description  |
|---|--|
| <b>Cache strategy</b>   | <p>Decides for how long reports analytics responses should be cached.</p> <p>If you use the scheduled, nightly analytics update, select <b>Cache until 6 AM tomorrow</b>. This is because data in reports change at that time, and you can safely cache data up to the moment when the analytics tables are updated.</p> <p>If you are loading data continuously into the analytics tables, select <b>No cache</b>.</p>  |
| <b>Max number of years to hide unapproved data in analytics</b>             | <p>Sets whether and for how long back in time analytics should respect the approval level of the data. Typically, data which is several years old would be considered to be approved by default. In order to speed up analytics requests, you can choose to ignore the actual approval level of historical data.</p> <p><b>Never check approval:</b> no data will be hidden, irrespective of its data approval status.</p> <p><b>Check approval for all data:</b> approval status will always be checked.</p> <p>Other options, for example <b>Last 3 years:</b> approval status will be checked for data which is newer than 3 years old; older data will not be checked.</p> |
| <b>Threshold for analytics data caching</b>                                 | <p>Sets whether to enable caching data older than the specified number of years only.</p> <p>This allows for returning the most recent data directly with no caching, while serving cached version of older data for performance concerns.</p>   |
| <b>Respect category option start and end date in analytics table export</b> | <p>This setting controls whether analytics should filter data which is associated with a category option with a start and end date, but which is not associated with a period within the category options interval of validity.</p>  |

| Setting  | Description  |
|--|--|
| <b>Put analytics in maintenance mode</b>         | <p>Places the analytics and web API of DHIS2 in maintenance mode. This means that "503 Service Unavailable" will be returned for all requests.</p> <p>This is useful when you need to perform maintenance on the server, for example rebuilding indexes while the server is running in production, in order to reduce load and more efficiently carry out the maintenance.</p> |
| <b>Skip zero data values in analytics tables</b> | <p>Does not include in analytics tables any aggregate data values that are zero. This can reduce analytics tables sizes, and speed up the building and accessing of the analytics tables, if you have aggregate data values that are zero and stored (the data element is configured to store zero values).</p>  |

## Server settings

### *Server settings*

| Setting   | Description   |
|---|---|
| <b>Number of database server CPUs</b>             | <p>Sets the number of CPU cores of your database server.</p> <p>This allows the system to perform optimally when the database is hosted on a different server than the application server, since analytics in DHIS2 scales linearly with the number of available cores.</p>   |
| <b>System notifications email address</b>         | <p>Defines the email address which will receive system notifications.</p> <p>Notifications about failures in processes such as analytics table generation will be sent here. This is useful for application monitoring.</p>   |
| <b>Google Analytics (Universal Analytics) key</b> | <p>Sets the Google UA key to provide usage analytics for your DHIS2 instance through the Google Analytics platform. It should be noted that currently, not all apps in DHIS2 support Google Analytics, so certain activity of your users may not appear in this platform.</p> <p>You can read more about Google Analytics at <a href="http://google.com/analytics">http://google.com/analytics</a>.</p> |

| Setting                    | Description   |
|----------------------------|---|
| <b>Google Maps API key</b> | Defines the API key for the Google Maps API. This is used to display maps within DHIS2. |
| <b>Bing Maps API key</b>   | Defines the API key for the Bing Maps API. This is used to display maps within DHIS2.   |

## Appearance settings

### *Appearance settings*

| Setting                              | Description   |
|--------------------------------------|---|
| <b>Select language</b>               | <p>Sets the language for which you can then enter translations of the following settings:</p> <ul style="list-style-type: none"> <li>• <b>Application introduction</b></li> <li>• <b>Application title</b></li> <li>• <b>Application notification</b></li> <li>• <b>Application left-side footer</b></li> <li>• <b>Application right-side footer</b></li> </ul> |
| <b>Application title</b>             | Sets the application title on the top menu.   |
| <b>Application introduction</b>      | Sets an introduction of the system which will be visible on the top-left part of the login page.  |
| <b>Application notification</b>      | Sets a notification which will be visible on the front page under the login area.   |
| <b>Application left-side footer</b>  | Sets a text in the left-side footer area of the login page.   |
| <b>Application right-side footer</b> | Sets a text in the right-side footer area of the login page.  |

| Setting  | Description   |
|--|---|
| <p><b>Style</b></p>  | <p>Sets the style (look-and-feel) of the system.</p> <p>The user can override this setting in the <b>Settings</b> app: <b>User settings &gt; Style</b>.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin-top: 10px;"> <p><b>Note</b></p> <p>Due to technical reasons, it's not possible to change the color of the newest version of the header bar. The apps with the newest header bar will retain the blue header bar.</p> </div> |
| <p><b>Start page</b></p>   | <p>Sets the page or app which the user will be redirected to after log in.</p> <p>Recommended setting: the <b>Dashboard</b> app.</p>  |
| <p><b>Help page link</b></p>   | <p>Defines the URL which users will see when they click <b>Profile &gt;Help</b>.</p>  |
| <p><b>Flag</b></p>   | <p>Sets the flag which is displayed in the left menu of the <b>Dashboard</b> app.</p>   |
| <p><b>Interface language</b></p>   | <p>Sets the language used in the user interface.</p> <p>The user can override this setting in the <b>Settings</b> app: <b>User settings &gt; Interface language</b>.</p>  |
| <p><b>Database language</b></p>  | <p>Sets the language used in the database.</p> <p>The user can override this setting in the <b>Settings</b> app: <b>User settings &gt; Database language</b>.</p>   |
| <p><b>Property to display in analysis modules</b></p>                      | <p>Sets whether you want to display the metadata objects' names or short names in the analytics apps: <b>Data Visualizer</b>, <b>Event Reports</b>, <b>Event Visualizer</b>, <b>GIS</b> and <b>Pivot Table</b> apps.</p> <p>The user can override this setting in the <b>Settings</b> app: <b>User settings &gt; Property to display in analysis modules</b>.</p>   |
| <p><b>Default digit group separator to display in analysis modules</b></p> | <p>Sets the default digit group separator in the analytics apps: <b>Data Visualizer</b>, <b>Event Reports</b>, <b>Event Visualizer</b>, <b>GIS</b> and <b>Pivot Table</b> apps.</p>   |

| Setting  | Description  |
|--|--|
| <b>Require authority to add to view object lists</b> | If you select this option, you'll hide menu and index page items and links to lists of objects if the current user doesn't have the authority to create the type of objects (privately or publicly). |
| <b>Custom login page logo</b>                        | Select this option and upload an image to add your logo to the login page.   |
| <b>Custom top menu logo</b>                          | Select this option and upload an image to add your logo to the left in the top menu.   |

## Email settings

### Email settings

| Setting                     | Description  |
|-----------------------------|--|
| <b>Host name</b>            | Sets the host name of the SMTP server.<br><br>When you use Google SMTP services, the host name should be <i>smtp.gmail.com</i> . |
| <b>Port</b>                 | Sets the port to connect to the SMTP server.   |
| <b>User name</b>            | The user name of the user account with the SMTP server.<br><br>mail@dhis2.org  |
| <b>Password</b>             | The password of the user account with the SMTP server.   |
| <b>TLS</b>                  | Select this option if the SMPT server requires TLS for connections.  |
| <b>Email sender</b>         | The email address to use as sender when sending out emails.  |
| <b>Send me a test email</b> | Sends a test email to the current user logged into DHIS2.  |

## Access settings

### Access settings

| Setting  | Description  |
|--|--|
| <p><b>Self registration account user role</b></p>                                | <p>Defines which user role should be given to self-registered user accounts.</p> <p>To enable self-registration of users: select any user role from the list. A link to the self-registration form will be displayed on the login page.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin: 10px 0;"> <p><b>Note</b></p> <p>To enable self-registration, you must also select a <b>Self registration account organisation unit</b>.</p> </div> <p>To disable self-registration of users: select <b>Disable self registration</b>.</p> |
| <p><b>Self registration account organisation unit</b></p>                        | <p>Defines which organisation unit should be associated with self-registered users.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin: 10px 0;"> <p><b>Note</b></p> <p>To enable self-registration, you must also select a <b>Self registration account user role</b>.</p> </div>   |
| <p><b>Do not require reCAPTCHA for self registration</b></p>                     | <p>Defines whether you want to use reCAPTCHA for user self-registration. This is enabled by default.</p>   |
| <p><b>Enable user account recovery</b></p>                                       | <p>Defines whether users can restore their own passwords.</p> <p>When this setting is enabled, a link to the account recovery form will be displayed on the front page.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin: 10px 0;"> <p><b>Note</b></p> <p>User account recovery requires that you have configured email settings (SMTP).</p> </div>   |
| <p><b>Lock user account temporarily after multiple failed login attempts</b></p> | <p>Defines whether the system should lock user accounts after five successive failed login attempts over a timespan of 15 minutes.</p> <p>The account will be locked for 15 minutes, then the user can attempt to log in again.</p>  |



| Setting   | Description  |
|---|--|
| <b>Allow users to grant own user roles</b>                            | Defines whether users can grant user roles which they have themselves to others when creating new users.   |
| <b>Allow assigning object to related objects during add or update</b> | <p>Defines whether users should be allowed to assign an object to a related object when they create or edit metadata objects.</p> <p>You can allow users to assign an organisation unit to data sets and organisation unit group sets when creating or editing the organisation unit.</p>  |
| <b>Require user account password change</b>                           | <p>Defines whether users should be forced to change their passwords every 3, 6 or 12 months.</p> <p>If you don't want to force users to change password, select <b>Never</b>.</p>  |
| <b>Enable password expiry alerts</b>                                  | When set, users will receive a notification when their password is about to expire.  |
| <b>Minimum characters in password</b>                                 | <p>Defines the minimum number of characters users must have in their passwords.</p> <p>You can select 8 (default), 10, 12 or 14.</p>   |
| <b>OpenID provider</b>  | Defines the OpenID provider.   |
| <b>OpenID provider label</b>  | Defines the label to display for the specified OpenID provider.  |
| <b>CORS whitelist</b>   | Whitelists a set of URLs which can access the DHIS2 API from another domain. Each URL should be entered on separate lines. Cross-origin resource sharing (CORS) is a mechanism that allows restricted resources (e.g. javascript files) on a web page to be requested from another domain outside the domain from which the first resource was served. |

## Calendar settings

### *Calendar settings*

| Setting            | Description   |
|--------------------|---|
| <b>Calendar</b>    | <p>Defines which calendar the system will use.</p> <p>The system supports the following calendars: Coptic, Ethiopian, Gregorian, Islamic (Lunar Hijri), ISO 8601, Julian, Nepali, Persian (Solar Hijri) and Thai.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin-top: 10px;"> <p><b>Note</b></p> <p>This is a s system wide setting. It is not possible to have multiple calendars within a single DHIS2 instance.</p> </div> |
| <b>Date format</b> | Defines which date format the system will use.  |

## Data import settings

The data import settings apply to extra controls which can be enabled to validate aggregate data which is imported through the web API. They provide optional constraints on what should be considered a conflict during import. The constraints are applied to each individual data value in the import.

### Data import settings

| Setting   | Description  |
|---|--|
| <b>Require periods to match period type of data set</b>                       | Require period of data value to be of the same period type as the data sets for which the data element of data value is assigned to.                           |
| <b>Require category option combos to match category combo of data element</b> | Require category option combination of data value to be part of the category combination of the data element of the data value.                                |
| <b>Require organisation units to match assignment of data set</b>             | Require organisation unit of data value to be assigned to one or more of the data sets which the data element of data value is assigned to.                    |
| <b>Require attribute option combos to match category combo of data set</b>    | Require attribute option combination of data value to be part of the category combination of the data set which the data element of data value is assigned to. |

| Setting   | Description  |
|---|--|
| <b>Require category option combo to be specified</b>  | <p>Require category option combination of data value to be specified.</p> <p>By default it will fall back to default category option combination if not specified.</p>   |
| <b>Require attribute option combo to be specified</b> | <p>Require attribute option combination of data value to be specified.</p> <p>By default it will fall back to default attribute option combination if not specified.</p> |

## Synchronization settings

The following settings are used for both data and metadata synchronization.

### Note

For more information about how you configure metadata synchronization, refer to [Configure metadata synchronizing](#)

### Synchronization settings

| Setting                  | Description   |
|--------------------------|---|
| <b>Remote server URL</b> | <p>Defines the URL of the remote server running DHIS2 to upload data values to.</p> <p>It is recommended to use of SSL/HTTPS since user name and password are sent with the request (using basic authentication).</p> <p>The system will attempt to synchronize data once every minute.</p> <p>The system will use this setting for metadata synchronization too.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin-top: 10px;"> <p><b>Note</b></p> <p>To enable data and metadata synchronization, you must also enable jobs for <b>Data synchronization</b> and <b>Metadata synchronization</b> in the <b>Scheduler</b> app.</p> </div> |

| Setting  | Description   |
|--|---|
| <b>Remote server user name</b>                     | <p>The user name of the DHIS2 user account on the remote server to use for data synchronization.</p> <div style="border: 1px solid #add8e6; padding: 10px;"> <p><b>Note</b></p> <p>If you've enabled metadata versioning, you must make sure that the configured user has the authority "F_METADATA_MANAGE".</p> </div>  |
| <b>Remote server password</b>                      | <p>The password of the DHIS2 user account on the remote server. The password will be stored encrypted.</p>  |
| <b>Enable versioning for metadata sync</b>         | <p>Defines whether to create versions of metadata when you synchronize metadata between central and local instances.</p>  |
| <b>Don't sync metadata if DHIS versions differ</b> | <p>The metadata schema changes between versions of DHIS2 which could make different metadata versions incompatible.</p> <p>When enabled, this option will not allow metadata synchronization to occur if the central and local instance(s) have different DHIS2 versions. This apply to metadata synchronization done both via the user interface and the API.</p> <p>The only time it might be valuable to disable this option is when synchronizing basic entities, for example data elements, that have not changed across DHIS2 versions.</p> |
| <b>Best effort</b>                                 | <p>A type of metadata version which decides how the importer on local instance(s) will handle the metadata version.</p> <p><i>Best effort</i> means that if the metadata import encounters missing references (for example missing data elements on a data element group import) it ignores the errors and continues the import.</p>  |
| <b>Atomic</b>                                      | <p>A type of metadata version which decides how the importer on local instance(s) will handle the metadata version.</p> <p><i>Atomic</i> means all or nothing - the metadata import will fail if any of the references do not exist.</p>  |

---

## OAuth2 clients

You create, edit and delete OAuth2 clients in the **System Settings** app.

1. Open the **System Settings** apps and click **OAuth2 clients**.
2. Click the add button.
3. Enter **Name**, **Client ID** and **Client secret**.
4. Select **Grant types**.

| Grant type         | Description |
|--------------------|-------------|
| Password           | TBA         |
| Refresh token      | TBA         |
| Authorization code | TBA         |

5. Enter **Redirect URIs**. If you've multiple URIs, separate them with a line.

---

## Data Administration

The data administration module provides a range of functions to ensure that the data stored in the DHIS2 database is integral and that the database performance is optimised. These functions should be executed on a regular basis by a data administrator to ensure that the quality of the data stored is optimal.

### Data integrity

DHIS2 can perform a wide range of data integrity checks on the data contained in the database. Identifying and correcting data integrity issues is extremely important for ensuring that the data used for analysis purposes is valid. Each of the data integrity checks that are performed by the system will be described, along with general procedures that can be performed to resolve these issues.

#### Data elements without data set

Each data element must be assigned to a data set. Values for data elements will not be able to be entered into the system if a data element is not assigned to a data set. Choose Maintenance->Datasets->Edit from the main menu and then add the "orphaned" data element to the appropriate data set.

#### Data elements without groups

Some Data Elements have been allocated to several Data Element Groups. This is currently not allowed, because it will result in duplication of linked data records in the analytics record sets that provide aggregated data. Go to Maintenance -> Data Element Groups to review each Data Element identified and remove the incorrect Group allocations.

#### Data elements violating exclusive group sets

Some data elements have been allocated to several data element groups that are members of the same data element group set. All group sets in DHIS2 are defined as exclusive, which means that a data element can *only* be allocated to *one* data element group within that group set. Go to Maintenance -> Data elements and indicators ->Data element groups to review each data element identified in the integrity check. Either remove the data element from all groups except the one that it should be allocated to, or see if one of the groups should be placed in a different group set.

#### Data elements in data set but not in form or sections

Data elements have been assigned to a data set, but have not been assigned to any sections of the data set forms. All data sets which use section forms, should generally have all data elements in the data set assigned to exactly one section of the dataset.

#### Data elements assigned to data sets with different period types

Data elements should not be assigned to two separate data sets whose period types differ. The recommended approach would be to create two separate data elements (for instance a monthly and yearly data element) and assign these to respective datasets.

#### Data sets not assigned to organisation units

All data sets should be assigned to at least one organisation unit.

---

### **Sections with invalid category combinations**

Data sets which use section forms should only have a single category combination within each section. This violation could result from assigning a data element to a section, but then changing the category combination of this data element at a later point in time.

### **Indicators with identical formulas**

Although this rule will not affect data quality, it generally does not make sense to have two indicators with the exact same definition. Review the identified indicators and their formulas and delete or modify any indicator that appears to be the duplicate.

### **Indicators without groups**

All data elements and indicators must be assigned to at least one group, so these Indicators need to be allocated to their correct Data Element and Indicator Group. From the main menu, go to Data elements/Indicators -> Indicator Groups, and allocate each of the `Orphaned` indicators to its correct group.

### **Invalid indicator numerators**

Violations of this rule may be caused by an incorrect reference to a deleted or modified data element. Review the indicator and make corrections to the numerator definition.

### **Invalid indicator denominators**

Violations of this rule may be caused by an incorrect reference to a deleted or modified data element. Review the indicator and make corrections to the denominator definition.

### **Indicators violating exclusive group sets**

Some indicators have been allocated to several indicator groups that are members of the same indicator group set. All group sets in DHIS2 are defined as exclusive, which means that an indicator can *only* be allocated to *one* indicator group within that group set. Go to Maintenance -> Data elements and indicators -> Indicator groups to review each indicator identified in the integrity check. Either remove the indicator from all groups except the one that it should be allocated to, or see if one of the groups should be placed in a different group set.

### **Duplicate periods**

If periods have been imported from external applications, it may be possible that some periods will be duplicated. If you have any periods which appear to be duplicated here, you will need to resolve these directly in the DHIS2 database. All data which has been assigned to the duplicated period, should be moved to the correct period, and the duplicate period should be removed.

### **Organisation units with cyclic references**

Organisation units cannot be both parent and children of each other, directly nor indirectly. If this situation occurs, you will need to resolve the cyclic reference directly in the DHIS2 database in the "organisation unit" table, by reassigning the "parentid" field of the organisation units.

### **Orphaned organisation units**

All organisation units must exist within the organisation unit hierarchy. Go to Organisation- units > Hierarchy Operations and move the offending organisation unit into the proper position in the hierarchy.

---

### Organisation units without groups

All organisation units *must* be allocated to at least *one* group. The problem might either be that you have not defined any compulsory OrgUnit Group Set at all, or that there are violations of the compulsory rule for some OrgUnits . NOTE: If you have defined no compulsory OrgUnit Group Sets, then you must first define them by going to Organisation units->Organisation unit group sets and define at least one compulsory Group Set (the group set 'Type' are nearly universally relevant). If you have the relevant group sets, go to Maintenance -> OrgUnit Groups to review each OrgUnit identified and add the relevant Group allocation.

### Organisation units violating compulsory group sets

These organisation units have not been assigned to the any organisation unit group within one of the *compulsory* organisation unit group sets. When a group set is defined as compulsory, it means that an organisation unit must be allocated to at least one organisation unit group within that group set. For instance, all organisation units must belong to one of the groups in the 'Type' group set. It might belong to the `Hospital` or the `Clinic` or any other 'type' group - but it must belong to exactly one of them. Go to Organisation units->Organisation unit groups to review each organisation unit identified in the integrity check. Allocate all organisation units to exactly one compulsory group.

### Organisation units violating exclusive group sets

Some organisation units have been allocated to several organisation unit groups that are members of the same organisation unit group set. All group sets in DHIS2 are defined as exclusive, which means that an organisation unit can *only* be allocated to *one* organisation unit group within that Group Set. For instance, one organisation unit cannot normally belong to the both the 'Hospital' and 'Clinic' groups , but rather to only to one of them. Go to Organisation unit->Organisation unit groups to review each organisation unit identified in the integrity check. Remove the organisation units from all groups except the one that it should be allocated to.

### Organisation unit groups without group sets

The organisation unit groups listed here have not been allocated to a group set. Go to Maintenance->Organisation unit->Organisation unit group sets and allocate the Organisation unit group to the appropriate group set.

### Validation rules without groups

All validation rules must be assigned to a group. Go to **Maintenance** app > **Validation rule group** and assign the offending validation rule to a group.

### Invalid validation rule left side expressions

An error exists in the left-side validation rule definition. Go to **Maintenance** app > **Validation rule** and click **Edit** on the offending rule. Click **Left side** and make the required corrections.

### Invalid validation rule right side expressions

An error exists in the right-side validation rule definition. Go to **Maintenance** app > **Validation rule** and click **Edit** on the offending rule. Click **Right side** and make the required corrections.

### ProgramRules with no condition

Report will highlight all the **Program rules** not configured with **Condition**. Evaluation for rules not having condition are always evaluated as false.



**ProgramRules with no priority**

Report will highlight all the **Program rules** not configured with **Priority**. This is optional but its existence is very important when **ProgramRuleActionType** is **ASSIGN**. Rules with ASSIGN action type should have higher priority than the rest of the action types.

**ProgramRules with no action**

Report will highlight all the **Program rules** not configured with any **ProgramRuleAction**.

**ProgramRuleVariables without dataElements**

Report will highlight all the **Program rule variables** not configured with **DataElement**. Report will be based on source type configuration. DataElement should be provided when the source type of ProgramRuleVariable is **DataElement**.

**ProgramRuleVariables without attributes**

Report will highlight all the **Program rule variables** not configured with **TrackedEntityAttribute**. Report will be based on source type configuration. TrackedEntityAttribute should be provided when the source type of ProgramRuleVariable is **Attribute**.

**ProgramRuleActions with no data Objects.**

Report will highlight all the **Program rule actions** not configured with any Data object. Data object can be either **DataElement** or **TrackedEntityAttribute**. There are certain ProgramRuleActions which are responsible for assigning values to either dataElement or trackedEntityAttribute.

**ProgramRuleActions with no notification**

Report will highlight all the **Program rule actions** which have ProgramRuleActionType set to SENDMESSAGE/SCHEDULEMESSAGE where the configuration does not provide any link to notification.

**ProgramRuleActions with no section id**

Report will highlight all the **Program rule actions** which have ProgramRuleActionType set to HIDESECTION but configuration does not provide any section id.

**ProgramRuleActions with no program stage id**

Report will highlight all the **Program rule actions** which have ProgramRuleActionType set to HIDEPROGRAMSTAGE but configuration does not provide any program stage id.

**Invalid program indicator expression**

Reports all the violations in program indicator expression caused by invalid **DataElement** or invalid **TrackedEntityAttribute**.

**Invalid program indicator filter expression**

Reports all the violations in program indicator filter expression caused by invalid **DataElement** or invalid **TrackedEntityAttribute**.

**Maintenance**

*Data maintenance functions in the Data Administration app*

| Function                                    | Description  |
|---|--|
| Clear analytics tables                      | Completely empties the analytics tables. These tables are used to generate aggregate data for the pivot tables, GIS and reports.   |
| Remove zero data values                     | <p>Removes zero data values from the database. Values registered for data elements with aggregation operator average is not removed, as such values will be significant when aggregating the data, contrary to values registered for data elements with aggregation operator sum.</p> <p>Reducing the number of data values will improve system performance.</p> |
| Permanently remove soft deleted data values | <p>When a data value is deleted in DHIS2, the system will mark the corresponding database row as deleted, and not actually delete the row.</p> <p>Running this maintenance function will physically remove these data value rows from the database.</p>  |
| Prune periods                               | Removes all periods which have no registered data values. Reducing the number of periods will improve system performance.  |
| Remove expired invitations                  | Will delete users which represent user account invitations that now have gone past their expiry date.  |
| Drop SQL views                              | <p>DHIS2 lets you set up and manage SQL views as system objects with corresponding database SQL views.</p> <p>Running this maintenance function will drop underlying SQL views for all system views. Use the <b>Create SQL views</b> function to recreate these SQL views.</p>   |
| Create SQL views                            | Recreates all SQL views in the database.   |
| Update category option combinations         | Rebuilds the category option combinations. This may be required after altering the category options which belong to a given category.  |

| Function                       | Description  |
|--------------------------------|--|
| Update organisation unit paths | <p>The organisation unit table in the DHIS2 database has a column "path" which contains a concatenated string of all ancestors in the hierarchy for each organisation unit.</p> <p>Running this maintenance function will update and ensure that these values are in sync with the current organisation unit hierarchy. This column is managed by DHIS2, but a manual update might be useful when doing data loading directly in the database.</p> |
| Clear application cache        | Clears the system cache.   |
| Reload apps                    | <p>Manually reloads and detects installed DHIS2 apps.</p> <p>The installed apps are also detected when the system starts and when installing or uninstall apps.</p>  |

## Resource tables

Resource tables are supporting tables that are used during analysis of data. One would typically join the contents of these tables with the data value table when doing queries from third-party applications like Microsoft Excel. They are also used extensively by the analysis modules of DHIS2. Regeneration of the resource tables should only be done once all data integrity issues are resolved. The resource tables are also generated automatically, every time the analytics process is run by the system.

- Organisation unit structure (`_orgunitstructure`)

This table should be regenerated any time there have been any changes made to the organisational unit hierarchy. This table provides information about the organisation unit hierarchy. It has one row for each organisation unit, one column for each organisation unit level and the organisation unit identifiers for all parents in the lineage as values.

- Data element group set structure (`_dataelementgroupsetstructure`)

This table provides information about which data elements are members of which data element group sets. The table has one row for each data element, one column for each data element group set and the names of the data element group as values.

- Indicator group set structure (`_indicatorgroupsetstructure`)

This table provides information about which indicators are members of which indicator group sets. The table has one row for each indicator, one column for each indicator group set and the names of the indicator group as values.

- Organisation unit group set structure (`_organisationunitgroupsetstructure`)

This table provides information about which organisation units are members of which organisation unit group sets. The table has one row for each organisation unit, one column

---

for each organisation unit group set and the names of the organisation unit groups as values.

- Category structure (`_categorystructure`)

This table provides information about which data elements are members of which categories. The table has one row for each data element, one column for each category and the names of the category options as values.

- Data element category option combo name (`_categoryoptioncomboname`)

This table should be regenerated any time there have been changes made to the category combination names. It contains readable names for the various combinations of categories.

- Data element structure (`_dataelementstructure`)

This table provides information about all data elements and which period type (frequency) they capture data at. The period type is determined through the data set membership and hence relies on data elements to be member of data sets with similar period types to have a defined behaviour.

- Period structure (`_datapereodstructure`)

This table provides information about all periods and which period type they are associated with. For each period type with lower frequency than itself, it contains information about which period it will fall within.

- Data element category option combinations (`_dataelementcategoryoptioncombo`)

This table provides a mapping between data elements and all possible category option combinations.

## Analytics tables management

DHIS2 generates database tables which the system then uses as basis for various analytics functions. These tables are also valuable if you write advanced SQL reports. In the **Data Administration** app, you can execute the tables generation immediately. If you want to schedule them to be executed at regular intervals, this can be done in the **Scheduler** app. This means that you can refresh recent analytics on demand and see updated pivot tables without waiting for all of the past years data to re-process.

### Note

You can also generate the tables through the web API. This task is typically performed by a system administrator.

1. Open the **Data Administration** app and click **Analytics Tables**.
2. Select the parts of the analytics process you want to skip:
  - **Skip generation of resource tables**
  - **Skip generation of aggregate data and completeness data**
  - **Skip generation of event data**
  - **Skip generation of enrollment data**
3. Select **Number of last years of data to include**.

Click **Start export**.

4.

## Data statistics

The data statistics module provides an overview of the number of objects stored in the DHIS2 database.

### Data Statistics

| Object type         | Number  |
|---------------------|---------|
| Data elements       | 714     |
| Data element groups | 79      |
| Indicator types     | 5       |
| Indicators          | 59      |
| Indicator groups    | 15      |
| Data sets           | 18      |
| Organisation units  | 1332    |
| Validation rules    | 36      |
| Periods             | 57      |
| Users               | 19      |
| Data values         | 3907860 |

| Users logged in | Number |
|-----------------|--------|
| Last hour       | 1      |
| Today           | 3      |
| Yesterday       | 3      |
| Last 7 days     | 4      |
| Last 30 days    | 4      |

| Data values  | Number |
|--------------|--------|
| Today        | 0      |
| Yesterday    | 0      |
| Last 7 days  | 0      |
| Last 30 days | 0      |

The total number of each type of object is presented in a series of tables with summary statistics of each object.

## Lock exceptions

Lock exceptions provide fine-grained control over exemption from a locked data set. After the expiry of the data set, data entry will be denied by default, unless an exception has been granted through the Lock exception interface. To enable a lock exception, select the desired organization units, data sets, and time period and press "Add". By granting a lock exception, data entry will be enabled even after the expiry period of the data set has passed.

## Create new lock exception

**Organisation Unit Selection**

Select at level: Federal Governn [v] Un-select at level Unselect all

Select in group: AIDSRelief [v] Un-select in group Select children

- ng Federal Government
  - ab Abia State
    - ab Aba North Local Government Area
      - ab Abundant Life Organization
      - ab Annabelles BOGI Development Initiative
      - ab Seventh Day Hospital
    - ab Aba South Local Government Area
      - ab Arochukwu Local Government Area
    - ab Bende Local Government Area
      - ab Ikwuano Local Government Area
    - ab Isiala-Ngwa North Local Government Area
    - ab Isiala-Ngwa South Local Government Area
      - ab Isuikwuato Local Government Area
    - ab Obio Nwga Local Government Area
      - ab Ohafia Local Government Area
    - ab Osisioma Ngwa Local Government Area
      - ab Ugwunagbo Local Government Area
      - ab Ukwa East Local Government Area
    - ab Ukwa West Local Government Area

Care & Support [v]

February 2012 [v]

Add Cancel

In the example above, a data lock exception would be created for "ab Abundant Life Organization" and "ab Seventh Day Hospital" for the "Care and Support" dataset for "February 2012".

### Min-Max Value Generation

This administrative function can be used to generate min-max values, which are used as part of the data quality and validation process for specific organization units and data sets. Simply select the dataset from the left hand frame, and then select the required organisation units to generate the min-max values for from the organisational units selector on the right. Press the "Generate" button to generate or regenerate all min-max values. Press "Remove" to remove all min-max values which are currently stored in the database.

### Min-Max Value Generation

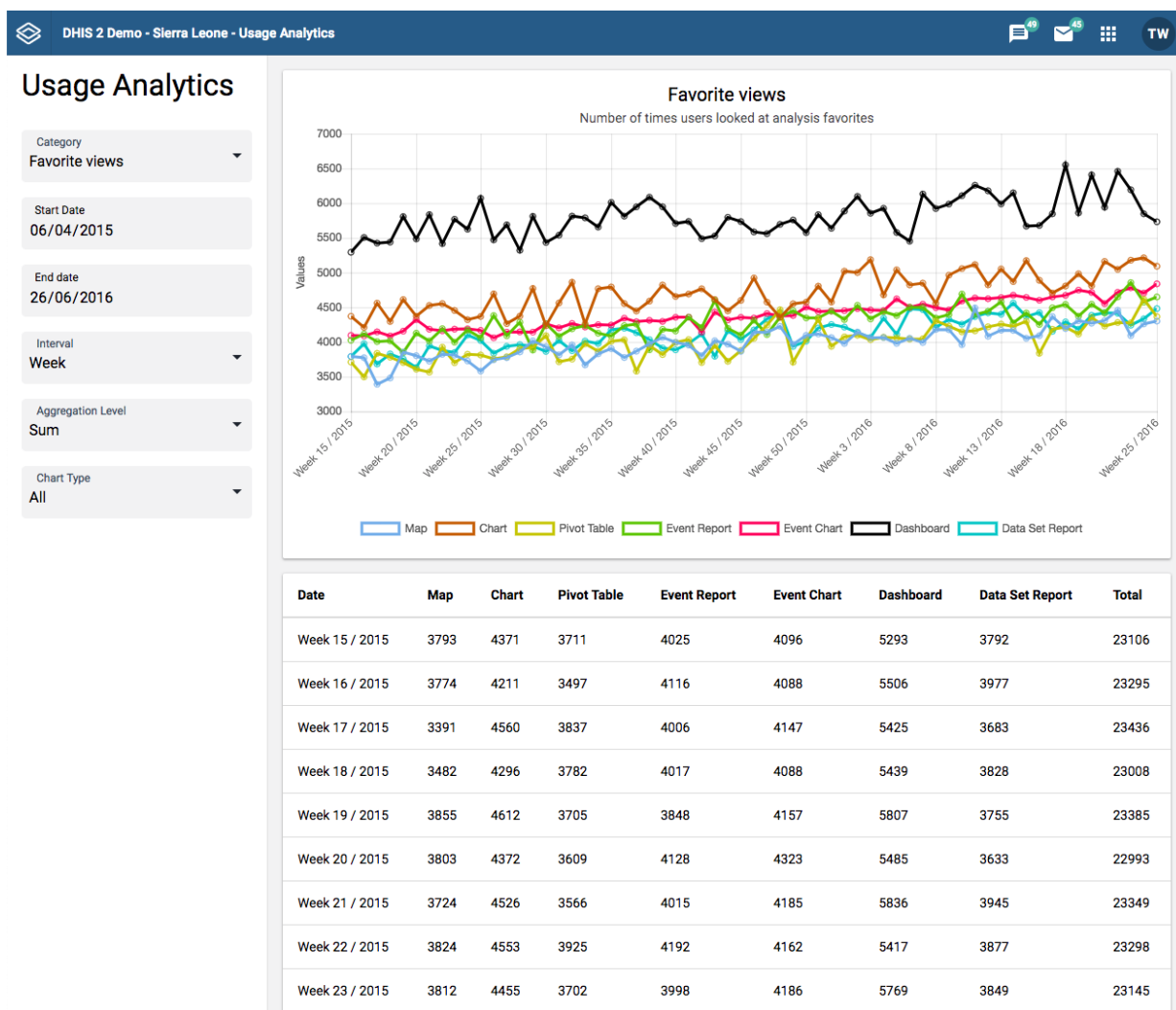
| Available data sets   | Organisation Unit Selection  |
|---|--|
| Care & Support<br>HCTesting<br>HSS Dataset<br>PMTCT<br>Prevention<br>Treatment<br>OVC Dataset | <input type="button" value="Select at level"/> Federal Governn <input type="button" value="Un-select at level"/> <input type="button" value="Unselect all"/><br><input type="button" value="Select in group"/> AIDSRelief <input type="button" value="Un-select in group"/> <input type="button" value="Select children"/><br><input type="checkbox"/> ng Federal Government<br><input type="checkbox"/> ab Abia State<br><input type="checkbox"/> ab Aba North Local Government Area<br>ab Seventh Day Hospital<br><input type="checkbox"/> ab Aba South Local Government Area<br>ab Aba Health Office<br>ab Aba IDH Hospital |

### Cache Statistics

This option is for system administrators only to use. The cache statistics shows the status of the application level cache. The application level cache refers to the objects and query results that the application is caching in order to speed up performance. If the database has been modified directly the application cache needs to be cleared for it to take effect.

# Visualize usage statistics

## About the Usage Analytics app



The **Usage Analytics** app lets you visualize statistics on how users are working with the **Dashboard**, **Pivot Table**, **GIS**, **Event Visualizer**, **Data Visualizer** and **Event Reports** apps within DHIS2. With this statistics you can answers questions such as:

- How many times people have loaded charts, pivots tables and dashboards?
- How many favorites have users created?
- How many users that are logging in versus total number of users?
- What are the most viewed favorites?

### Create a usage analytics graph

1. Open the **Usage Analytics** app.
2. Select a **Start date** and **End date**.
3. Select an **Interval**: day, week month or year.
4. Select a **Category**.



There are five analytics categories:

- **Favorite views:** Provides the number of times various types of favorites have been viewed, such as charts, pivot tables and dashboards, over time. This analysis lets you switch between all types of favorites, the total across all types and the average number of views.
- **Favorites:** Provides the number of favorites which have been created and stored in the system over time.
- **Users:** Provides the number of active as well as total number of users over time.
- **Top favorites:** Shows the most viewed favorites in the system by type.
- **Data values:** Provides the number of data values stored in the system over time.

5. Click **Update**.

## Datastore Manager

The Datastore Manager is intended for advanced-level DHIS2 users. Before you use the Datastore Manager, you can read more about the Data store here: [DHIS2 data store](#).

### Using the Datastore Manager

The Datastore Manager lets you manage the content of the web API data stores. This is helpful when managing apps and external scripts.

### Add a new namespace and key to the Datastore Manager

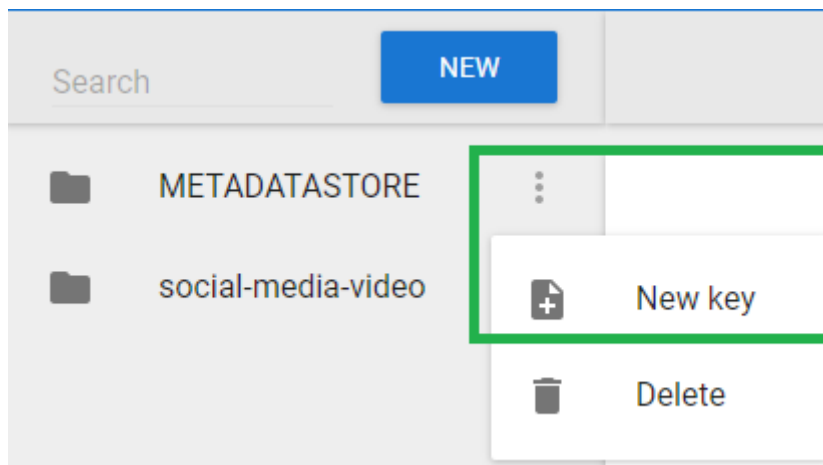
Note: You have to create a namespace before you can add a key to it.

1. Click **New**.
2. Enter a name for the namespace you want to create.
3. Enter a key name, and select **Create**. The new namespace displays in the left pane.

### Add a key to an existing namespace in the Datastore Manager

To add a new key to an existing namespace in the Datastore Manager,

1. Select the namespace you want to add a key to.
2. Click the options menu, and click **New key**.



3. Enter a key name in the New key dialog box.
4. Click **Create**. The new key is added to the namespace you selected.

### Delete a namespace or key from the Datastore Manager

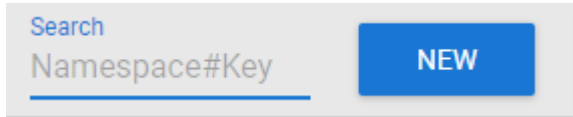
To delete a namespace, or key, click the Options menu, and then click **Delete**, and then **Delete** again. Note that if you delete the only key in a namespace, you will also delete the namespace it belongs to.

### Search for namespaces or keys

Use the search tool in the top left corner to search for namespaces and keys as follows:

- Enter a namespace name followed by # and the key name to search for a specific key in a namespace.

Enter # followed by the name of a key to search for keys only.



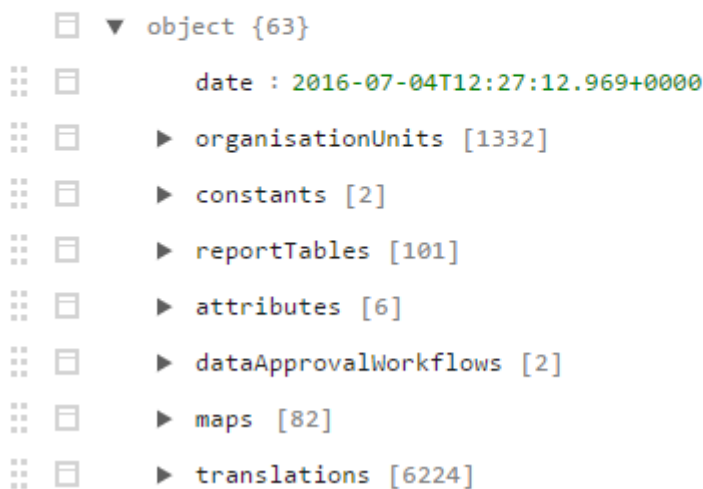
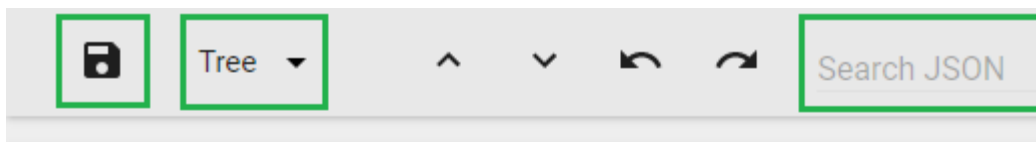
### Search your JSON library

Use the search tool in the workspace toolbar to search your JSON library.



### Edit namespaces or keys in the Datstore Manager

Use the **Search** tool to find namespaces or keys in your datastore. When you edit your content, you can toggle between the **Tree** view and the **Code** view. Use the **Tree** view to get an overview of the contents of the Datstore. Use the **Code** view to edit your code directly in the code editor. Remember to save your work by clicking the **Save** button.



In the Code view, you can edit your code. When you edit a line of code, it is highlighted in yellow.

```

1 {
2   "date": "2016-07-04T12:27:12.969+0000",
3   "organisationUnits": [
4     {
5       "code": "OU_651071",
6       "created": "2012-02-17T14:54:39.987+0000",
7       "uuid": "bf07fb5b-a1cf-4a83-b3ec-9cc42854adcf",
8       "lastUpdated": "2014-11-25T08:37:54.322+0000",
9       "name": "Adonkia CHP",
10      "id": "Rp268JB6Ne4",
11      "shortName": "Adonkia CHP",
12      "path": "/ImspTQPwCqd/at6UHUQatSo/qtr8GGlm4gg/Rp268JB6Ne4",
13      "featureType": "NONE",
14      "openingDate": "2010-01-01",
15      "parent": {
16        "id": "qtr8GGlm4gg"
17      },
18      "attributeValues": [],
19      "translations": []
20    },

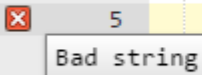
```

Any errors are marked by the editor. If you hover over the error icon, you can view a short description of the error.

```

1 {
2   "date": "2016-07-04T12:27:12.969+0000",
3   "organisationUnits": [
4     {
5       "code": "OU_651071",
6       "created": "2012-02-17T14:54:39.987+0000",
7       "uuid": "bf07fb5b-a1cf-4a83-b3ec-9cc42854adcf",
8       "lastUpdated": "2014-11-25T08:37:54.322+0000",
9       "name": "Adonkia CHP",

```



## Scheduling

The Scheduler is an application for managing background jobs in DHIS2. Background jobs can do a number of tasks, such as running analytics, synchronizing data and meta data, or sending a push analysis report. The application provides the ability to create, modify and delete such jobs.

The Scheduler comes bundled with DHIS2 and is accessed through the App Menu.

| Scheduled jobs <span>?</span>  |                            |           |   |   | Show system jobs <input type="checkbox"/> |
|--------------------------------|----------------------------|-----------|---|---|---|
| Name                           | Type                       | Status    |   | Next execution                          | Enabled                                   |
| Push analysis                  | PUSH_ANALYSIS              | SCHEDULED | ▶ | 31.01.2020 11:00                        | <input checked="" type="checkbox"/>       |
| Continuous analytics table     | CONTINUOUS_ANALYTICS_TABLE | SCHEDULED | ▶ | Runs 43200 second(s) after previous run | <input checked="" type="checkbox"/>       |
| Enrollment analytics           | ANALYTICS_TABLE            | DISABLED  |   | 01.02.2020 01:00                        | <input type="checkbox"/>                  |
| Continuous enrollment analy... | CONTINUOUS_ANALYTICS_TABLE | DISABLED  |   | Runs 86400 second(s) after previous run | <input type="checkbox"/>                  |

The start page of the Scheduler app shows an overview of existing jobs. By default, pre-defined system jobs are hidden. To view these, toggle *Show system jobs* in the top right corner.

When you create or modify a job, it will be rescheduled according to selected preferences. To run a job on demand, press the green triangle labelled "Run now". This action is only available for enabled jobs.

### Creating a job

1. Open the **Scheduler** app and click the add button in the bottom right corner.
2. Choose a suitable **Name** for the new job.
3. Select a running frequency for the job, i.e. when and how often the job should run.
  1. You can either select a predefined frequency from the drop-down menu, or
  2. You can give the job a custom **Cron expression** if you want a specific schedule, using the [Spring scheduling](#) syntax.
  3. Enabling the **Continuous execution** option will make the job run constantly. In other words, as soon as the job finishes, it will be scheduled to run again right away. Selecting this option will disable the other fields.
4. Select the **Job type** you want to schedule using the drop-down menu.
5. If the job type is customizable, a **Parameters** section will appear below. These additional options specify the details of the scheduled job, and will vary greatly depending on the job type.
6. Press the **Add job** button to confirm the job creation. The newly created job should now be listed in the job overview, given that the **Show system jobs** setting is not enabled.

← Add new job

Attributes ?

Name \*  
Push analysis

Job type \*  
Push analysis

Select frequency  
Every day at 3 AM

Cron expression  
0 0 3 ? \* \*

Parameters

Push analysis  
Immunization Key Indicators Monthly Report

ADD JOB

Jobs are enabled by default.

### Configuring a job

With the proper permissions, you can modify the details of user-created jobs. Note that for system jobs, only the schedule (cron expression) can be changed.

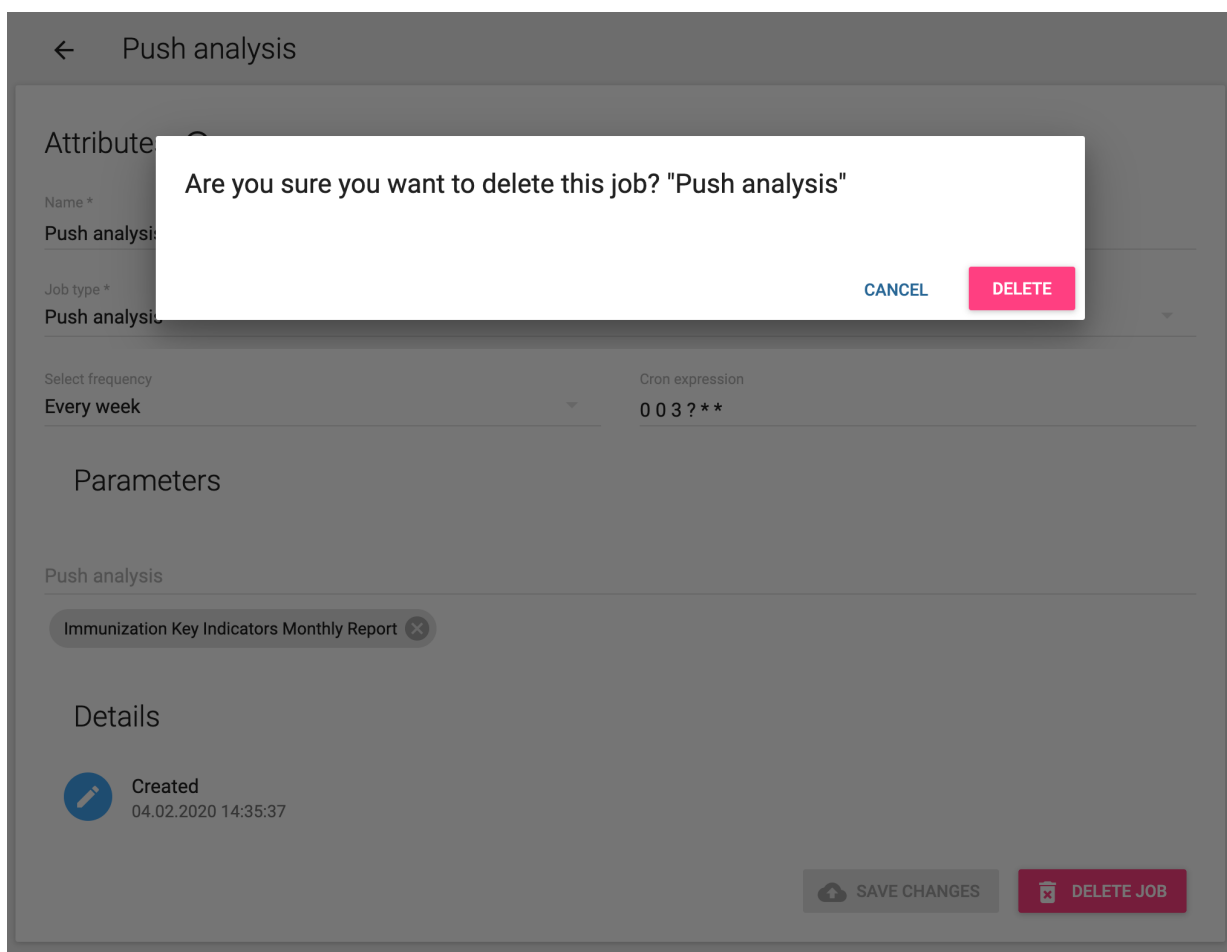
To quickly enable or disable a user created job from running, use the **Enabled** column on the landing page of the Scheduler app. System jobs are always enabled.

Further configuring a job:

1. Select a job from the landing page to unveil the **Attributes** and change them to accordingly. See the previous section for scheduling details.
2. If the job type supports extra options, the **Parameters** section will also be available.
3. When done, press the **Save changes** button to persist the changes.

### Deleting a job

1. Select the job you want to delete.
2. Press the **Delete** button in the bottom right corner.
3. Confirm by pressing **Delete** again in the pop-up window.



## Job types

The following section describes the various job types.

### Resource table

The resource table job is responsible for generating and updating the resource database tables. These tables are used by various components in DHIS 2 and is meant to simplify queries against the database.

Note that when specifying any of the analytics table jobs, resource tables can be part of the process and it is not necessary to also specify a resource table job.

### Analytics table

The analytics tables job is responsible for generating and updating the analytics tables. The analytics tables are used as basis for data analytics queries in DHIS2. Apps such as dashboard, visualizer and maps retrieve data from these tables through the DHIS2 analytics API, and they must be updated in order for analytics data to become available. You can schedule this process to run regularly through an analytics table job type.

The analytics table job will by default populate data for all years and data elements. The following parameters are available:

- **Last years:** The number of last years to populate analytics tables for. As an example, if you specify 2 years, the process will update the two last years worth of data, but not update older data. This parameter is useful to reduce the time the process takes to complete, and is appropriate if older data has not changed, and when updating the latest data is desired.

- 
- **Skip resource tables:** Skip resource tables during the analytics table update process. This reduces the time the process takes to complete, but leads to changes in metadata not being reflected in the analytics data.
  - **Skip table types:** Skip one or more analytics table types. This reduces the time the process takes to complete, but leads to those data types not being updated in analytics data.

### Continuous analytics table

The analytics tables job is responsible for generating and updating the analytics tables. The analytics tables are used as basis for data analytics queries in DHIS2. Apps such as dashboard, visualizer and maps retrieve data from these tables through the DHIS2 analytics API, and they must be updated in order for analytics data to become available. You can schedule this process to run regularly through an analytics table job type.

The continuous analytics table job is based on two phases:

- *Latest update:* Update of the latest data, where latest refers to the data which has been added, updated or removed since the last time the latest data or the full data was updated. This process will happen frequently.
- *Full update:* Update of all data across all years. This process will happen once per day.

The continuous analytics table job will frequently update the latest data. The latest data process utilizes a special database partition which is used to hold the latest data only. This partition can be quickly refreshed due to the relatively small amount of data. The partition will grow in size until a full update is performed. Once per day, all data for all years will be updated. This will clear out the latest partition.

The analytics table job will by default populate data for all years and data elements. The following parameters are available:

- **Full update hour of day:** The hour of the day at which the full update will be done. As an example, if you specify 1, the full update will be performed at 1 AM.
- **Last years:** The number of last years to populate analytics tables for. As an example, if you specify 2 years, the process will update the two last years worth of data, but not update older data. This parameter is useful to reduce the time the process takes to complete, and is appropriate if older data has not changed, and when updating the latest data is desired.
- **Skip resource tables:** Skip resource tables during the analytics table update process. This reduces the time the process takes to complete, but leads to changes in metadata not being reflected in the analytics data.

### Data synchronization

DHIS2 provides synchronisation of data between remotely distributed instances and a central instance of DHIS2. This can be useful e.g. when you have deployed multiple stand-alone instances of DHIS2 which are required to submit data values to a central DHIS2 instance. Both tracker data and aggregate data synchronization is supported.

These are the steps to enable data synchronization:

- Go to Synchronization Settings, enter the remote server URL, username and password. Press the TAB button to automatically save the new password. Refresh the page and check that the filled values are still present. Note that the password field will be empty after the refresh, since this value is encrypted, so you can consider it saved.
- Using the Scheduler app, create a new job using the "Event Programs Data Sync" and/or "Tracker Programs Data Sync" job type. Make sure it is enabled when you finish. (Note: If the "Program Data Synchronization" job, available in previous versions, was set up in



---

Scheduler app before, it was automatically replaced by the two new jobs "Event Programs Data Sync" and "Tracker Programs Data Sync" with the identical settings. )

Some aspects of the data synchronization feature to be aware of:

- The local DHIS2 instance will store the password of the user account on the remote instance encrypted in the local database. The remote account is used for authentication when transferring data. For security purposes make sure you set the *encryption.password* configuration parameter in *hibernate.properties* to a strong password.
- Deploying the remote server on SSL/HTTPS is strongly recommended as the username and password are sent in clear text using basic authentication and could be intercepted by an attacker.
- The data synchronization uses the UID property of data elements, category option combos and organisation units to match the meta-data. Hence the synchronization is dependent on these three meta-data objects being harmonized on the local and remote instance in order to work appropriately.
- The first time DHIS2 runs the synchronization job, it will include any data available. The subsequent synchronization jobs will only include data added and changed since the last successful job. A synchronization job is considered successful only if all the data was saved successfully on the remote server (Any data successfully synced will remain on the receiving instance, regardless if the job eventually fails). Whether the job was successful or not can be decided from the import summary returned from the central server.
- The initial synchronization job may take a significant amount of time, possibly slowing down your instance, depending on how much data is being synchronized. It could be a good idea to configure the job to run when there are few online users, then later change this to your own preference. If you do not want or need to synchronize all the data, there is a possibility to [skip some of the data being synchronised](#).

When DHIS2 synchronizes tracker data, it determines the set of data to synchronize based on the last time it was synchronized. Each of the tracked entity instances and events have their own records of when they were last successfully synchronized.

- The system will start a synchronization job based on the rules set in the configuration of the job. If the synchronization job starts while there is no connection to the remote server, it will retry up to three times before it aborts. The job will run again at a scheduled time.
- The server handles each set of programs separately, which means one set of programs can be synchronized successfully, while the other fails. The failure or success of one doesn't influence the other, as the last successful synchronization time is tracked individually for each item as previously mentioned.
- The attributes of TrackedEntityInstances (TrackedEntityAttribute) and the data elements of ProgramStages (ProgramStageDataElement) which have an option "Skip synchronization" turned on will not be synchronized. This feature allows you to decide to not synchronize some sensitive or not relevant data and to keep them only locally.
- The authority Ignore validation of required fields in Tracker and Event Capture (F\\_IGNORE\\_TRACKER\\_REQUIRED\\_VALUE\\_VALIDATION) should be used when there is a requirement that some mandatory attribute / data element has at the same time a "Skip synchronization" property turned on. Such a setting will lead to validation failure on the central server as the given attribute / data element will not be present in the payload.

---

The validation won't fail for the user with this authority. The authority should be assigned to the user, on the central server, that will be used for synchronization job.

- In specific cases, **the initial synchronization of all the data can be undesirable**; for example, when a database on the local instance is a fresh copy of the database present on the central instance, or when it is preferred to not synchronize old data in favor of initial synchronization taking less time.

The `syncSkipSyncForDataChangedBefore` SettingKey can be used to skip the synchronisation of all the data (data values, Event and Tracker program data, complete data set registrations) that were *last changed before the specified date*. The SettingKey is used in the synchronization job all the time. Therefore, if you need to synchronize the old data, you should change the SettingKey.

- Both Tracker Programs and Event Programs synchronization job supports paging in order to avoid timeouts and to deal with unstable network. Default page size for "Event Programs Data Sync" job is set to 60. Default page size for "Tracker Programs Data Sync" job is set to 20.

If default values do not fit your purpose, own page size can be specified via parameter in particular sync job in Scheduler app.

### Metadata Synchronization Scheduling

DHIS2 provides a feature for synchronizing meta data from a remote instance to a local instance of DHIS2. This can be useful when you have deployed multiple stand-alone instances of DHIS2 and you need to create meta data in all the local instances similar to the central DHIS2 instance.

These are the steps to enable meta data synchronization:

- Go to Settings > Synchronization, enter the remote server URL, username and password and click Save.
- Go to Metadata administration > Scheduling. Under Metadata synchronization set strategy to Enabled, select the time-period and click Start.

Some aspects of the meta data synchronization feature to be aware of:

- The local DHIS2 instance will store the password of the user account of the remote instance in its database. The remote user account is used for authentication when transferring/downloading data. For security purposes make sure you set the `encryption.password` configuration parameter in `hibernate.properties` to a strong password.
- Deploying the remote server on SSL/HTTPS is strongly recommended as the username and password are sent in clear text using basic authentication and could be intercepted by an attacker.
- Also ensure that the remote user is not having ALL authority, instead simply create a user with `F_METADATA_MANAGE` authority so that even if these details are intercepted by a hacker, one cannot have full control of the remote system.
- The meta data synchronization relies on the underlying import layer. Each meta data version is an export of meta data between two given timestamps. Each sync of meta data version is an attempt to import that meta data snapshot into the local instance. The sync of versions is incremental. The local instance will try to download the meta data versions from the central instance one after the other. Failure to sync a specific meta data version will not let the sync proceed to further versions. In case of failures, appropriate changes must be made to meta data at central to ensure that the error gets resolved. Metadata configuration

is critical and the user should be careful while rolling out the updates to the production. It's always recommended to have staging environments in place to ensure the sanity of the meta data versions and their impact thereafter. The local instance will sync the meta data from first version so that harmony is maintained and local and central instance will work appropriately.

- The system will attempt a synchronization at the scheduled time. If the local or remote server does not have a working Internet connection at the time, the synchronization will be aborted and re-attempted after as per the retry count as mentioned in the *dhis.conf* file.
- You can see the time of last successful synchronization with remote server in the scheduling screen next to the "Last success" label.

## Import/Export App

In a primary health system, the HMIS typically involves a distributed application, where the same application is running in different geographical locations (PHCs, CHCs, hospitals, districts, and state). Many of these physical locations do not have Internet connectivity, and hence they work off-line. At some point (normally at the district level), the data needs to be synchronised in order to have a consolidated database for the a particular geographical region. For this, it is important to be able to export data from one location (which is working offline, say at the health facility level) and import into another one (say at the district level). This feature of exporting and importing is thus a crucial function of a HMIS. This feature also helps us overcome the dependency on the Internet to some degree, as data updates can be transferred via USB key where there is no connectivity, or through email where there is limited Internet connectivity. DHIS2 provides robust export-import functionality to fulfil these needs.

To access the Import/Export app, search in the top header bar for Import/Export. Import/Export app offers a number of services details for which can be found below.

**Import / Export**  
Import or Export DHIS2 data.

|  |   |   |  |
|--|---|---|--|
| <p><b>Metadata Import</b></p> <p>Import metadata like data elements and organisation units using the standard DHIS 2 exchange format called DXF 2.</p> | <p><b>Data Import</b></p> <p>Import data values on the DXF 2 XML, JSON, CSV and PDF format. DXF 2 is the standard exchange format for DHIS 2.</p> | <p><b>GML Import</b></p> <p>Import geographic data for organisation units using GML format. GML is an XML grammar for expressing geographical features.</p> | <p><b>Event Import</b></p> <p>Import events for programs, stages and tracked entities in the DXF 2 format.</p>     |
| <p><b>Metadata Export</b></p> <p>Export meta data like data elements and organisation units to the standard DHIS 2 exchange format.</p>                | <p><b>Metadata Dependency Export</b></p> <p>Export metadata like data sets and programs including related metadata objects.</p>                   | <p><b>Data Export</b></p> <p>Export data values. This is the regular export function which exports data to the DHIS 2 exchange format called DXF 2.</p>     | <p><b>Event Export</b></p> <p>Export event data for programs, stages and tracked entities in the DXF 2 format.</p> |

## Importing data

### Import progress logger

No matter what you import ("Metadata", "Data", "Events" or "GML" data), you can always view the progress of the import by opening the logger at the bottom of the screen.

- To open the logger, click on the "arrow up" icon on the right side:



- To close the logger, click on the "arrow down" icon in the top-right corner:



### Import Summaries

On import request completion, we show import summaries above the import form. Any conflicts or errors are shown in a paginated table under totals.

#### Import Summary

| SUMMARY |         |         |         |       |
|---------|---------|---------|---------|-------|
| Created | Deleted | Ignored | Updated | Total |
| 0       | 0       | 66      | 0       | 66    |

**CONFLICTS**

| SUMMARIES   |        |               |   |
|-------------|--------|---------------|---|
| Reference   | Status | Type          | Description   |
| KrsbTnx097t | ERROR  | ImportSummary | Event ID KrsbTnx097t was already used. The ID is unique and cannot be used more than once |
| V9HVjkqcUcg | ERROR  | ImportSummary | Event ID V9HVjkqcUcg was already used. The ID is unique and cannot be used more than once |
| vF0YkkC3JD3 | ERROR  | ImportSummary | Event ID vF0YkkC3JD3 was already used. The ID is unique and cannot be used more than once |
| nN7gGLW5AkV | ERROR  | ImportSummary | Event ID nN7gGLW5AkV was already used. The ID is unique and cannot be used more than once |
| XGLkLlOXgmE | ERROR  | ImportSummary | Event ID XGLkLlOXgmE was already used. The ID is unique and cannot be used more than once |
| YHMjNgw3yQZ | ERROR  | ImportSummary | Event ID YHMjNgw3yQZ was already used. The ID is unique and cannot be used more than once |
| DJgiFFCU0zu | ERROR  | ImportSummary | Event ID DJgiFFCU0zu was already used. The ID is unique and cannot be used more than once |
| leOweNjLXxv | ERROR  | ImportSummary | Event ID leOweNjLXxv was already used. The ID is unique and cannot be used more than once |
| vdbUbSCFVYS | ERROR  | ImportSummary | Event ID vdbUbSCFVYS was already used. The ID is unique and cannot be used more than once |
| DhwJD1gzgOZ | ERROR  | ImportSummary | Event ID DhwJD1gzgOZ was already used. The ID is unique and cannot be used more than once |


< Page 5 of 7 >

1
2
3
4
5
6
7

### Metadata Import

Metadata Import can be accessed from the sidebar by clicking on Metadata Import.

### Metadata Import

 Choose a file to upload \*

**FORMAT**

JSON  XML  CSV

**DRY RUN**

Yes  No

**IDENTIFIER**

UID  Code  Auto

**IMPORT REPORT MODE**

Errors  Full  Debug

**PREHEAT MODE**

Reference  All  None

**IMPORT STRATEGY**

New and updates  New only  Updates only  Delete

**ATOMIC MODE**

All  None

**MERGE MODE**

Merge  Replace

**+ MORE OPTIONS**

**Import**

1. Choose a file to upload
2. Select from the available formats e.g. *JSON* , *XML* or *CSV*
3. Choose **Dry Run** . Yes will do a test import without importing any data into the database.
4. Select the appropriate settings of:
  - Identifier
  - Import report mode
  - Preheat mode
  - Import strategy
  - Atomic mode
  - Merge mode
5. Click **MORE OPTIONS** if you want to adjust one or more of the following settings before importing:
  - Flush mode
  - Skip sharing
  - Skip validation
  - Async
  - Inclusive strategy

- Click on the **Import** button which will upload the file and start the importing process.
- 6.

**Tip**

It is highly recommend to use the **Dry run option** to test before importing data; to make sure you keep control over any changes to your Metadata, and to check for problems with out-of-sync data elements or organisation unit names

**Note**

If an organisation unit e.g. Nduvuibu MCHP had a unknown reference to an object with ID aaaU6Kr7Gtpidn, it means that the object with ID aaaU6Kr7Gtpidn was not present in your imported file, and it was not found in the existing database.


You can control this using **Reference Mode** option available under **MORE OPTIONS**, to indicate if you want to allow objects with such invalid references to be imported or not. If you choose to import invalid references you will have to correct the reference manually in DHIS2 later.


**Matching Identifiers in DXF2**

The DXF2 format currently support matching for two identifiers, the internal DHIS2 identifier (known as a UID), and also using an external identifier called called a "code". When the importer is trying to search for references (like the one above), it will first go to the UID field, and then to the code field. This allows you to import from legacy systems without having a UID for every meta-data object. I.e. if you are importing facility data from a legacy system, you can leave out the ID field completely (DHIS2 will fill this in for you) and put the legacy system's own identifiers in the code field, this identifier is required to be unique. This not only works for organisation units, but for all kinds of meta-data, allowing for easy import from other systems.

**Data Import**

Data Import can be accessed from the sidebar by clicking on Data Import.

 **Data Import**

 Choose a file to upload \*

**FORMAT**

JSON  XML  ADX  PDF  CSV

**DRY RUN**

Yes  No

**STRATEGY**

New and updates  New only  Updates only  Delete

**PREHEAT CACHE**

Yes (faster for large imports)  No

+ **MORE OPTIONS**

**Import**

1. Choose a file to upload
2. Select from the available formats: *JSON*, *XML*, *PDF*, *ADX* or *CSV*
3. Choose **Dry Run** . Yes will do a test import without importing any data into the database.
4. Select the appropriate settings of:
  - Strategy
  - Preheat cache
5. Click **MORE OPTIONS** if you want to adjust one or more of the following settings before importing:
  - Data element id scheme
  - Org unit id scheme
  - Id scheme
  - Skip existing check
6. Click on the **Import** button which will upload the file and start the importing process.

**Tip**

**It is highly recommend to use the Dry run option** to test before importing data; to make sure you keep control over any changes to your Metadata, and to check for problems with out-of-sync data elements or organisation unit names

**PDF Data**

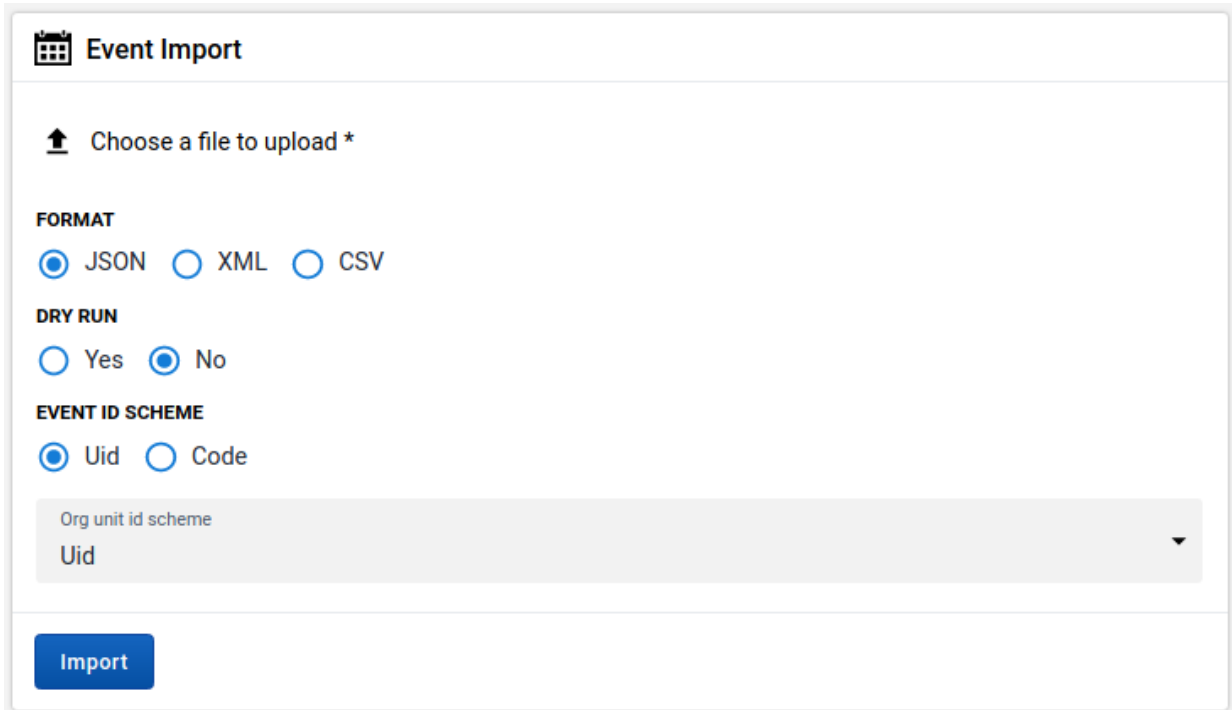
DHIS2 supports import of data in the PDF format. This can be used to import data produced by off-line PDF data entry forms. Please refer to the section **Data set management** for details on how to produce a PDF form which can be used for off-line data entry.



To import a PDF data file, navigate to the *PDF Data Import* item in the side menu. Upload the completed PDF file and click *Import*.

### Event Import

Event can be access from the sidebar by by clicking on Event import.



**Event Import**

↑ Choose a file to upload \*

**FORMAT**

JSON  XML  CSV

**DRY RUN**

Yes  No

**EVENT ID SCHEME**

Uid  Code

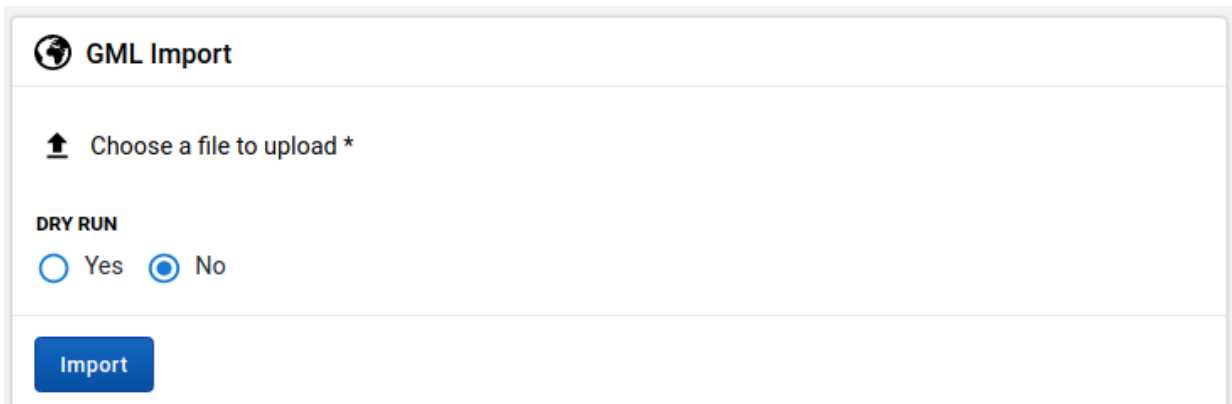
Org unit id scheme  
Uid

Import

1. Select from the available formats e.g. *JSON* , *XML* or *CSV*
2. Choose **Dry Run** . Yes will do a test import without importing any data into the database.
3. Choose **Event ID Scheme**.
4. Choose **Org Unit ID Scheme**.
5. Click on the **Import** button which will upload the file and start the importing process.

### GML Import

GML Import can be accessed from the sidebar by clicking on GML Import.



**GML Import**

↑ Choose a file to upload \*

**DRY RUN**

Yes  No

Import

1. Upload a file using the *GML* (Geographic Markup Language) format.

2. Choose **Dry Run** . Yes will do a test import without importing any data into the database.
3. Click on the **Import** button which will upload the file and start the importing process.

## Exporting data

### Metadata Export

Metadata export can be accessed from the sidebar by clicking on Metadata export.

**Meta Data Export**

|  |  |  |
|--|--|--|
| <p><b>ATTRIBUTE</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Attribute</li> <li><input checked="" type="checkbox"/> Attribute Value</li> </ul> <p><b>CATEGORY</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Category</li> <li><input checked="" type="checkbox"/> Category Combo</li> <li><input checked="" type="checkbox"/> Category Dimension</li> <li><input checked="" type="checkbox"/> Category Option</li> <li><input checked="" type="checkbox"/> Category Option Combo</li> <li><input checked="" type="checkbox"/> Category Option Group</li> <li><input checked="" type="checkbox"/> Category Option Group Set</li> <li><input checked="" type="checkbox"/> Category Option Group Set Dimension</li> </ul> <p><b>COLOR</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Color</li> <li><input checked="" type="checkbox"/> Color Set</li> </ul> <p><b>DASHBOARD</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Dashboard</li> <li><input checked="" type="checkbox"/> Dashboard Item</li> </ul> <p><b>DATA APPROVAL</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Data Approval Level</li> <li><input checked="" type="checkbox"/> Data Approval Workflow</li> </ul> <p><b>DATA ELEMENT</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Data Element</li> <li><input checked="" type="checkbox"/> Data Element Group</li> <li><input checked="" type="checkbox"/> Data Element Group Set</li> <li><input checked="" type="checkbox"/> Data Element Group Set Dimension</li> <li><input checked="" type="checkbox"/> Data Element Operand</li> </ul> <p><b>DATA SET</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Data Input Period</li> <li><input checked="" type="checkbox"/> Data Set</li> <li><input checked="" type="checkbox"/> Data Set Element</li> <li><input checked="" type="checkbox"/> Section</li> </ul> <p><b>FILERESOURCE</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> External File Resource</li> <li><input checked="" type="checkbox"/> File Resource</li> </ul> <p><b>INDICATOR</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Indicator</li> <li><input checked="" type="checkbox"/> Indicator Group</li> <li><input checked="" type="checkbox"/> Indicator Group Set</li> <li><input checked="" type="checkbox"/> Indicator Type</li> </ul> <p><b>INTERPRETATION</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Interpretation</li> <li><input checked="" type="checkbox"/> Interpretation Comment</li> </ul> <p><b>FORMAT</b></p> <p> <input checked="" type="radio"/> JSON                 <input type="radio"/> XML             </p> <p><b>COMPRESSION</b></p> <p> <input checked="" type="radio"/> Zip                 <input type="radio"/> Gzip                 <input type="radio"/> Uncompressed             </p> <p><b>SHARING</b></p> <p> <input checked="" type="radio"/> With sharing                 <input type="radio"/> Without sharing             </p> | <p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Legend</li> <li><input checked="" type="checkbox"/> Legend Set</li> </ul> <p><b>MAPPING</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> External Map Layer</li> <li><input checked="" type="checkbox"/> Map</li> <li><input checked="" type="checkbox"/> Map View</li> </ul> <p><b>NOTIFICATION</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Program Notification Template</li> <li><input checked="" type="checkbox"/> Validation Notification Template</li> </ul> <p><b>OPTION</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Option</li> <li><input checked="" type="checkbox"/> Option Group</li> <li><input checked="" type="checkbox"/> Option Group Set</li> <li><input checked="" type="checkbox"/> Option Set</li> </ul> <p><b>ORGANISATION UNIT</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Organisation Unit</li> <li><input checked="" type="checkbox"/> Organisation Unit Group</li> <li><input checked="" type="checkbox"/> Organisation Unit Group Set</li> <li><input checked="" type="checkbox"/> Organisation Unit Group Set Dimension</li> <li><input checked="" type="checkbox"/> Organisation Unit Level</li> </ul> <p><b>OTHER</b></p> <p><b>PROGRAM</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Analytics Period Boundary</li> <li><input checked="" type="checkbox"/> Program</li> <li><input checked="" type="checkbox"/> Program Data Element Dimension Item</li> <li><input checked="" type="checkbox"/> Program Indicator</li> <li><input checked="" type="checkbox"/> Program Indicator Group</li> <li><input checked="" type="checkbox"/> Program Section</li> <li><input checked="" type="checkbox"/> Program Stage</li> <li><input checked="" type="checkbox"/> Program Stage Data Element</li> <li><input checked="" type="checkbox"/> Program Stage Section</li> <li><input checked="" type="checkbox"/> Program Tracked Entity Attribute</li> <li><input checked="" type="checkbox"/> Program Tracked Entity Attribute Dimension Item</li> <li><input checked="" type="checkbox"/> Program Tracked Entity Attribute Group</li> </ul> <p><b>PROGRAM RULE</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Program Rule</li> <li><input checked="" type="checkbox"/> Program Rule Action</li> <li><input checked="" type="checkbox"/> Program Rule Variable</li> </ul> | <p><b>TRACKED ENTITY</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Tracked Entity Attribute</li> <li><input checked="" type="checkbox"/> Tracked Entity Data Element Dimension</li> <li><input checked="" type="checkbox"/> Tracked Entity Instance</li> <li><input checked="" type="checkbox"/> Tracked Entity Program Indicator Dimension</li> <li><input checked="" type="checkbox"/> Tracked Entity Type</li> <li><input checked="" type="checkbox"/> Tracked Entity Type Attribute</li> </ul> <p><b>USER</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> User</li> <li><input checked="" type="checkbox"/> User Access</li> <li><input checked="" type="checkbox"/> User Authority Group</li> <li><input checked="" type="checkbox"/> User Credentials</li> <li><input checked="" type="checkbox"/> User Group</li> <li><input checked="" type="checkbox"/> User Group Access</li> </ul> <p><b>VALIDATION</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Validation Result</li> <li><input checked="" type="checkbox"/> Validation Rule</li> <li><input checked="" type="checkbox"/> Validation Rule Group</li> </ul> |
|--|--|--|

1. Choose the list of objects you would like to export.

1. Choose export *format JSON or XML*
- 2.
3. Choose *compression type zip , gzip or uncompressed*
4. Choose option *Sharing* with or without sharing.
5. Click **Export** which will bring up the **Logger** at the bottom of the page to show the progress.
6. The exported file is downloaded to your local computer.

### Metadata Export with Dependencies

Metadata export with dependencies lets you create canned exports for metadata objects. This type of export will include the metadata objects and the metadata object's related objects; that is, the metadata which belong together with the main object.


#### *Object types and their dependencies*

| Object type      | Dependencies included in export  |
|------------------|--|
| <b>Data sets</b> | <ul style="list-style-type: none"> <li>Data elements</li> <li>Sections</li> <li>Indicators</li> <li>Indicator types</li> <li>Attributes</li> <li>Data entry forms</li> <li>Legend sets</li> <li>Legends</li> <li>Category combinations</li> <li>Categories</li> <li>Category options</li> <li>Category option combinations</li> <li>Option sets</li> </ul> |

| Object type          | Dependencies included in export   |
|----------------------|---|
| Programs             | <ul style="list-style-type: none"> <li>Data entry form</li> <li>Tracked entity</li> <li>Program stages</li> <li>Program attributes</li> <li>Program indicators</li> <li>Program rules</li> <li>Program rule actions</li> <li>Program rule variables</li> <li>Program attributes</li> <li>Data elements</li> <li>Category combinations</li> <li>Categories</li> <li>Category options</li> <li>Category option combinations</li> <li>Option sets</li> </ul> |
| Category combination | <ul style="list-style-type: none"> <li>Category combinations</li> <li>Categories</li> <li>Category options</li> <li>Category option combinations</li> <li>Attributes</li> </ul>   |
| Dashboard            | <ul style="list-style-type: none"> <li>Dashboard items</li> <li>Charts</li> <li>Event charts</li> <li>Pivot tables</li> <li>Event reports</li> <li>Maps</li> <li>Reports</li> <li>Resources</li> </ul>  |

| Object type         | Dependencies included in export   |
|---------------------|---|
| Data element groups | Data elements<br>Category combinations<br>Categories<br>Category options<br>Category option combinations<br>Option sets<br>Attributes<br>Legend sets<br>Legends |
| OptionSets          | Option  |

---

 **Metadata Export with Dependencies**

---

**OBJECT TYPE**

Data sets ▾

**OBJECT**

ART monthly summary ▾

**FORMAT**

JSON  XML

**COMPRESSION**

Zip  Gzip  Uncompressed

**SHARING**

With sharing  Without sharing

---

**EXPORT**

---

**Metadata Export with Dependencies**

**OBJECT TYPE**

- Data sets
- Programs
- Category combination
- Dashboard
- Data element groups
- Option sets**

Uncompressed

**SHARING**

With sharing  Without sharing

**EXPORT**

1. Select an **Object type** : **Data sets** , **Programs** , **Category combination** , **Dashboard** , **Data element groups** or **OptionSets**.
2. Select an **Object**.
3. Select a format: **XML** or **JSON**.
4. Select **Compression** : **Zip** , **Gzip** or **Uncompressed**.
5. Click **Export** which will bring up the **Logger** at the bottom of the page to show the progress.
6. The exported file is downloaded to your local computer.

### Data export

Data export can be accessed from the sidebar by clicking on Data export.

### Data Export

**ORGANISATION UNIT**  
+ Sierra Leone

**CHILDREN**  
 Include descendants of organisation unit  Selected organisation unit

**DATA SETS**  
filter data sets by name

SELECT ALL  CLEAR ALL

- ART monthly summary
- Child Health
- Clinical Monitoring Checklist
- Emergency Response
- EPI Stock
- Expenditures
- Facility Assessment
- HIV Care Monthly
- HIV Padiatric monthly summary
- IDSR Weekly
- IDSR Weekly (Start Wednesday)

**START DATE**  
2018-11-12

**END DATE**  
2018-11-12

**FORMAT**  
 JSON  XML  CSV

**COMPRESSION**  
 Zip  Gzip  Uncompressed

+ MORE OPTIONS

**EXPORT**

1. Select the *Organisation Units* .
2. Select under Children if you want export to include descendants of organisation units selected in Step 1 or only the manually selected organisation units.
3. Set the *Start and End Date* .
4. Choose the *Data Sets*
5. Select a format: **XML** or **JSON** .

- Select **Compression** : **Zip** , **Gzip** or **Uncompressed**.
- 6.
  7. Click *MORE OPTIONS* If you want to adjust Data Element ID Scheme, Org. Unit ID Scheme or ID Scheme before export.
  8. Click **Export** which will bring up the **Logger** at the bottom of the page to show the progress.
  9. The exported file is downloaded to your local computer.

### Event export

Event export can be accessed from the sidebar by clicking on Event export.

#### Event Export

**ORGANISATION UNIT**  
+ Sierra Leone

**PROGRAMS**  
Antenatal care visit ▾

**PROGRAM STAGES**  
[ All program stages ] ▾

**ID SCHEME**  
 UID  Code

**START DATE**  
2018-06-08

**END DATE**  
2018-06-08

**INCLUSION**  
 Selected organisation unit  Include children of organisation unit  Include descendants of organisation unit

**FORMAT**  
 JSON  XML  CSV

**COMPRESSION**  
 Zip  Gzip  Uncompressed

**EXPORT**

You can export event or tracker data in **XML** , **JSON** or **CSV** formats.

1. Select an organisation unit.
2. Select a program and a program stage (if applicable).
3. Select the **ID scheme** to use for export: **UID** (default) or **CODE** .

If you select **CODE** but the object's attribute does not have code, it will not be included in the return payload.

4. Select **Start date** and **End date** .



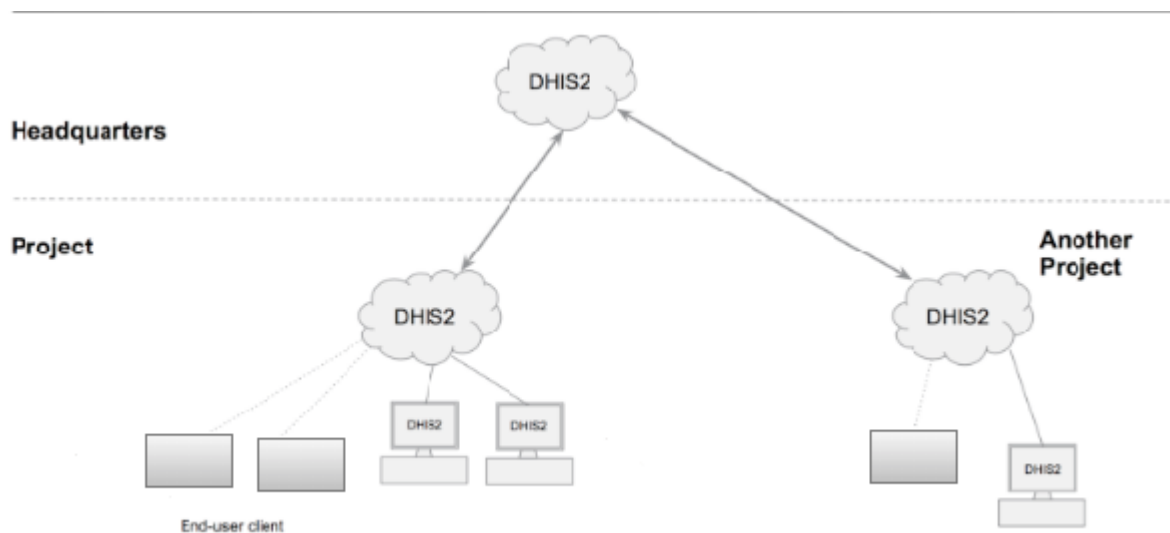
Select the **Inclusion**:

5.
  - **Selected organisation unit** : Export event data only for the selected organisation unit
  - **Include children of organisation unit** : Export event data for the children of the organisation unit as well as the selected organisation unit itself.
  - **Include descendants of organisation unit** : Export event data for the descendants of the organisation unit as well as the selected organisation unit itself.
6. Select a format: **XML** , **JSON** or **CSV**.
7. Select **Compression** : **Zip** , **Gzip** or **Uncompressed**.
8. Click **Export** which will bring up the **Logger** at the bottom of the page to show the progress.
9. The exported file is downloaded to your local computer.

## Configure metadata synchronizing

### About data and metadata synchronization

You can synchronize data and metadata between different DHIS2 instances. Given two instances in a central-local deployment strategy, metadata created at the central system can be synchronized with the local system and the data created at local system can be synchronized with the central system. This can be useful when you've multiple stand-alone instances of DHIS2 and global metadata needs to be created at all the local instances.



If metadata creation and update take place at the central system and if the metadata synchronisation task is enabled, the metadata gets synchronized down to all the local instances which are bound to the central instance. These local instances will in turn push data values, Event and Tracker program data and complete data registration sets to the central instance. Enabling or disabling versioning of metadata synchronization at local instance, will not hinder the metadata synchronization process. This is because the metadata synchronization interacts with versioning end points of the central instance and not with end points of the local instance.

Each snapshot of metadata export generated is referred to a metadata version. A new metadata version contains only the changes between the previous version and the current version, that is it's an export between two timestamps. All metadata versions are maintained in the DHIS2 database and are available to all local instances that connect to it. You can schedule each of the local instances to download new metadata versions. It is recommended to keep the metadata versions' sizes small and logical.

#### Warning

Each instance of DHIS2, whether central or local, can create metadata versions. The local instance is meant to synchronize metadata from a central system and not create metadata on its own.

If a new metadata version is created on the local instance, this instance can't receive new metadata versions from the central instance, since the content of the metadata versions will be out of synchronization.

If you've created metadata versions on a local instance, you must manually deleted these versions from the database before you can synchronize with the central instance.

Assume the central and local DHIS2 instances have identical metadata snapshots until version 10. Then the local instance creates a new snapshot called version 11. After that, the central instance creates a new snapshot called version 11. When the local instance attempts to synchronize metadata, version 11 is not downloaded. However, the content of version 11 on the local instance is not identical to the content of version 11 on the central instance.

#### Note

You can also use the **Import-Export** app to synchronize metadata manually.

### Workflow

1. On the central instance, configure metadata versioning. You should do this once the central instance contains metadata.
2. Connect local instance(s) to the central instance.
3. On local instance(s), configure automatic synchronization.

### Configure metadata versioning on central instance

#### Note

To synchronize metadata, the user account of the central system must have the following authority:

#### **F\_METADATA\_MANAGE**

Only users with this authority will then be able to create and download metadata. This is to ensure security of the central system where the metadata is created. Instead of giving the credentials of user having ALL authority to the field instances, you need to create a user having this specific authority only.

1. On the central instance, open the **System Settings** app and click **Synchronization**.
2. Go to the **Metadata versioning** section and select **Enable versioning for metadata sync**.

#### Metadata Versioning

Enable Versioning for metadata sync

#### Create new version

Best Effort

Atomic

CREATE NEW VERSION

3. (Optional) Select **Don't sync metadata if DHIS2 versions differ**.
4. Select a type of metadata version: **Best effort** or **Atomic**.
  - *Best effort* means that if the metadata import encounters missing references (for example missing data elements on a data element group import) it ignores the errors and continues the import.

---

*Atomic* means all or nothing - the metadata import will fail if any of the references do not exist.

**Note**

Each metadata entity is associated with a "User" object. If this "User" reference is missing while importing metadata version of type ATOMIC, the import will fail at the validation phase itself. This means that the user who creates metadata also needs to synchronize down to local instances to successfully import the metadata version of type ATOMIC.

5. Click **Create new version**. The new version is added to the versioning table.

**Connect local instance to central instance**

To enable metadata synchronization, you must configure the connection between the local instance and the central instance.

1. On the local instance, open the **System Settings** app and click **Synchronization**.
2. Add the central DHIS2 instance's details to the local instance:
  - **Remote server URL**
  - **Remote server user name**
  - **Remote server password**
3. Go to the **Metadata versioning** section and select **Enable versioning for metadata sync**.
4. (Optional) Select **Don't sync metadata if DHIS2 versions differ**.

The metadata schema changes between versions of DHIS2 which could make different metadata versions incompatible.

When enabled, this option will not allow metadata synchronization to occur if the central and local instance(s) have different DHIS2 versions. This apply to metadata synchronization done both via the user interface and the API.

The only time it might be valuable to disable this option is when synchronizing basic entities, for example data elements, that have not changed across DHIS2 versions.

5. (Optional) Configure email notifications to notify users about successful or unsuccessful metadata synchronization:
  1. Open the **System Settings** app and click **Email**.
  2. Enter **Host name**, **Port**, **User name**, **Password** and **Email sender**.
  3. Click **Server** and enter a **System notifications email address**.

This email address will receive notifications about the metadata synchronization status.

**Tip**

When you receive email notification about a metadata synchronization failure, check which metadata version that causes the error and resolve it. Then you avoid future errors when the system downloads new metadata versions.

## Configure automatic metadata synchronization on local instance

Once you have configured automatic metadata synchronization (scheduling) on local instance(s), the scheduler will run at that specific time and synchronize (download and import) the metadata from the central instance. No manual intervention is required from the users at the local instance(s).

After the scheduler has completed the metadata synchronization, the local instance will have the metadata exactly as created on the central system.

### Note

Passwords of users are not synchronized. They are nullified for security reasons. After metadata synchronization, the Admin user must reset these passwords.

1. On the local instance, open the **Data Administration** app and click **Scheduling**.
2. In the **Metadata Synchronization** section, select **Enabled**.
3. Select a time period: **Daily**, **Weekly**, **Monthly** or **Yearly**.

The screenshot shows the DHIS 2 Data Administration interface. The left sidebar contains a navigation menu with the following items: Data Administration, Data Browser, Data Integrity, Maintenance, Resource Table, Locale, SQL View, Data Statistics, Lock Exception, Min-Max Value Generation, Cache Statistics, and Scheduling. The main content area is titled 'DHIS 2' and displays the 'Metadata Synchronization' settings. The 'Data synchronization strategy' is set to 'Disabled'. The 'Metadata synchronization strategy' is set to 'Enabled'. Under the 'Metadata Synchronization' section, the 'Weekly' radio button is selected. The 'Every' dropdown is set to 'Sunday' and the 'At' dropdown is set to '00:00'. A 'Sync Now' button is located at the bottom of the settings area.

4. Click **Start**.

## Create a new metadata version manually on central or local instance

1. Open the **System Settings** app and click **Synchronization**.
2. Go to the **Metadata versioning** section and select **Enable versioning for metadata sync**.

- (Optional) Select **Don't sync metadata if DHIS2 versions differ**.
- 3.
- 4. Select **Best effort** or **Atomic**.
- 5. Click **Create new version**. The new version is added to the versioning table.

When the system is a *central instance*, you'll see three columns in the versioning table:

**Synchronization settings**

Remote server URL

Remote server username

Remote server password

**Metadata Versioning**

Enable Versioning for metadata sync

**Create new version**

Best Effort  Atomic CREATE NEW VERSION

**Master Version:** Version\_29

| Version    | When                  | Type        |
|------------|-----------------------|-------------|
| Version_29 | 6/23/2016, 4:02:25 PM | BEST_EFFORT |
| Version_28 | 6/23/2016, 3:59:53 PM | BEST_EFFORT |
| Version_27 | 6/21/2016, 6:21:46 PM | BEST_EFFORT |
| Version_26 | 6/21/2016, 5:59:30 PM | BEST_EFFORT |
| Version_25 | 6/21/2016, 4:51:08 PM | BEST_EFFORT |

| Object         | Description   |
|----------------|---|
| Master version | The latest version in the system.                                       |
| Version        | Name of the version. The name is automatically generated by system.     |
| When           | The timestamp of the metadata version creation at the central instance. |
| Type           | Type of metadata version.   |

When system is a *local instance*, you'll see four columns in the versioning table:

Search settings

- General
- Server
- Appearance
- Email
- Messaging
- Access
- Approval
- Calendar
- Data Import
- Synchronization
- OAuth2 Clients

Remote server URL  
**https://msfocamdsynchq.twhosted.com**

Remote server username  
**admin**

Remote server password

### Metadata Versioning

Enable Versioning for metadata sync

#### Create new version

Best Effort     Atomic    CREATE NEW VERSION

**Master Version:** Version\_35      *Last sync attempt:* Version\_30 | **Failed** | 6/23/2016, 4:05:25 PM

| Version    | When                  | Type        | Last Sync              |
|------------|-----------------------|-------------|------------------------|
| Version_29 | 6/23/2016, 4:02:25 PM | BEST_EFFORT | 6/30/2016, 10:22:15 AM |
| Version_28 | 6/23/2016, 3:59:53 PM | BEST_EFFORT | 6/30/2016, 10:22:15 AM |
| Version_27 | 6/21/2016, 6:21:46 PM | BEST_EFFORT | 6/30/2016, 10:22:12 AM |
| Version_26 | 6/21/2016, 5:59:30 PM | BEST_EFFORT | 6/30/2016, 10:22:07 AM |
| Version_25 | 6/21/2016, 4:51:08 PM | BEST_EFFORT | 6/30/2016, 10:22:05 AM |

| Object            | Description   |
|-------------------|---|
| Master version    | <p>The latest version of the central instance.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin-top: 10px;"> <p><b>Note</b></p> <p>The master version information is the central instance's latest version. This is important to look at the difference between the versions of metadata that exist at central and at local.</p> </div> |
| Last sync attempt | If the last sync attempt is a failure, this will be displayed.  |
| Version           | Name of the version. The name is automatically generated by system.   |
| When              | The timestamp of the metadata version creation at the central instance.   |
| Type              | Type of metadata version.   |

| Object    | Description   |
|-----------|---|
| Last sync | Timestamp of when the last sync happened for this version in this system. |

### Reference information: metadata synchronization configuration parameters

The process which performs metadata synchronization is called Metadata Sync Task. This task performs a series of steps before syncing of metadata:

- Push data (aggregate data and anonymous events data) from local instance to central instance.
- Gets the current metadata version of the local instance. Then uses this version information as a baseline to fetch the list of metadata versions created after the baseline.
- If there are new versions created at central instance, it performs the synchronization of metadata versions one after the other. A mail will be sent to the configured user (if any) after each successful synchronization of metadata version at the local instance.

Once the Metadata Sync Task has run at the scheduled time, the task can retry (if any of the steps fail) based on the configuration of the following parameters defined in `dhis.conf` file:

| Parameter  | Default value |
|--|---------------|
| <code>metadata.sync.retry</code>                         | 3             |
| <code>metadata.sync.retry.time.frequency.millisec</code> | 30000         |

Each retry will be made after the time (in millisecond) as specified. If the steps still fail even after all the retries, then the scheduler stops its execution and then a mail will be sent to the configured user (if any). If no values are specified then the default values will be used.

```
metadata.sync.retry = 5
```

```
metadata.sync.retry.time.frequency.millisec = 10000
```



## Mobile

This chapter covers various mobile technologies including Web, J2ME, SMS Service and SMS Command.

### DHIS2 Mobile Introduction

DHIS2 provides a range of options to allow data entry from mobile devices, including a dedicated GPRS/3G J2ME client and two versions of DHIS2 which have been optimized specifically for mobile browsers. Each of these solutions will be described in detail in the following sections. DHIS2 offers several Android clients, which are described in detail in other sections of this guide.

Collection of data in the field can be technically challenging and expensive. Mobile phone solutions have the potential to significantly reduce the complexity of deploying a distributed data collection system. Using a simple Java client installed on a mobile phone or a web browser which works on the mobile phone, field workers can report directly to the DHIS2 database through their mobile device.

While mobile phone solutions have a great potential, there are complexities with such deployments. Phones lack processing power and have a small display, they need to be charged, and often such deployments make the most sense in areas with poor or intermittent network coverage.

Each of the mobile solutions are introduced briefly below, and the discussed in separate sections in detail:

- DHIS2 Light: A mobile browser optimized data entry module for all devices

This module allows for data entry directly with the browser of the mobile device. A wide range of devices and mobile browsers are supported including: Opera mini 3 & 4 (basic and advanced) - Opera mini 4, Nokia S40 mobiles, Windows Phone 7, Windows Mobile 6, Palm Pre, Blackberry (v5 and v6), Firefox mobile, iOS devices (iPhone) and Android devices. This client does not have offline-support, and an active GPRS/3G connection is required. It does not require a new application installation on the phone to support new features, but does require a stable data connection for use. This solution is described in [Mobile browser based data entry](#)

- DHIS2 Smartphone client: A mobile browser optimized data entry module for Smartphone devices

This module allows for data entry directly with the browser of a Smartphone. Offline data entry is supported and it does not require any installation of a special client on the phone itself.

- J2ME GPRS/3G client

DHIS-mobile includes two separate J2ME clients supporting GPRS/EDGE/3G as a transport mechanism. One client supports facility aggregate reporting and the second client supports name-based program tracking. These clients are split into separate applications to make deployment easier. Some health workers may have both applications installed on their phone. Both of these clients support offline-storage of data and work on J2ME enabled devices (feature phones).

An active GPRS/3G connection is required in order to send data to the DHIS2 database, but data can be entered offline and transmitted when a connection is present. This client is intended primarily for low-end devices which support J2ME applications, although the offline-supports adds some memory requirements which limits the handset selection. While

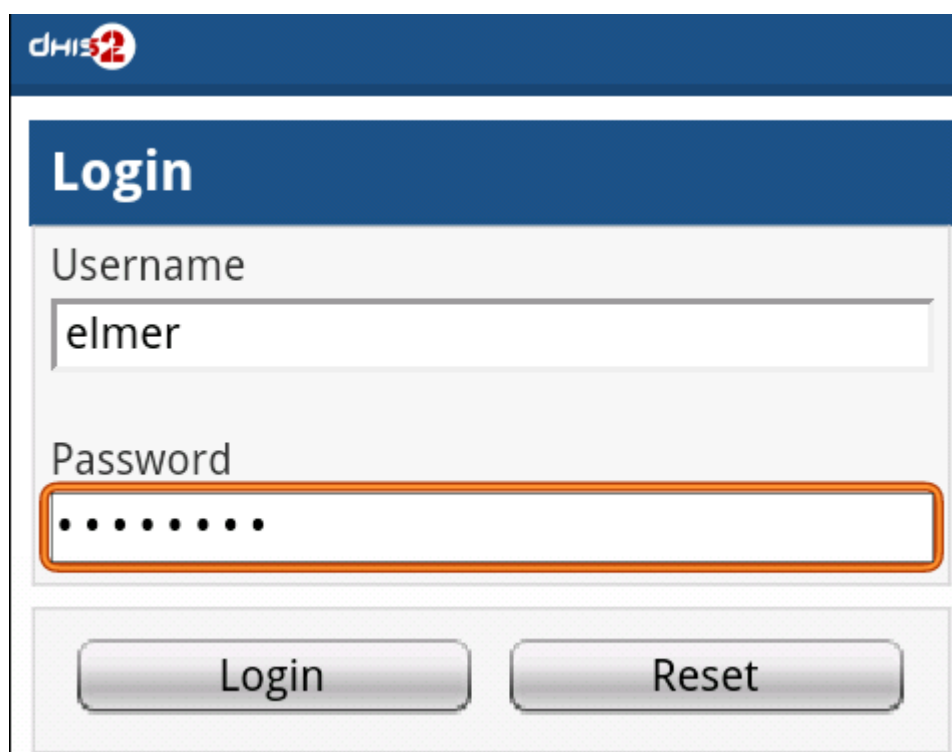
the solution is primarily tested on Nokia phones, it also works on several other J2ME capable handsets.

The facility reporting J2ME client is described in the chapter "J2ME GPRS/3G Client"

## Mobile browser based data entry

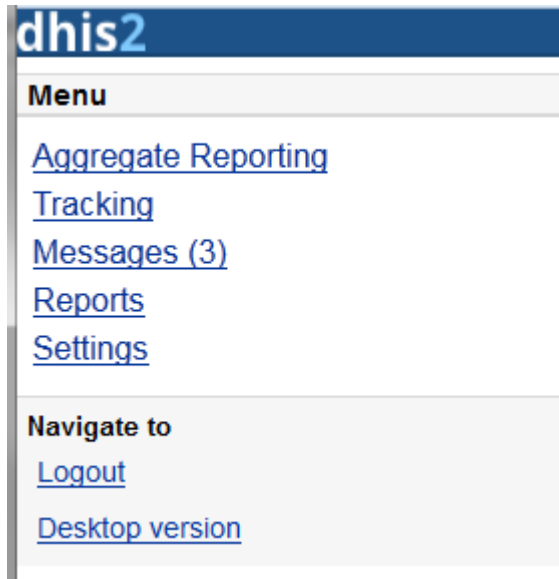
### Getting started with mobile browser data entry

This approach is for data-entry on a smart phone with a mobile browser by navigating to the URL of the DHIS2 instance, for example: the full URL link for demo on [dhis2.org http://apps.dhis2.org/dev/mobile/index.action](http://apps.dhis2.org/dev/mobile/index.action) . And your mobile browser will automatically detect the DHIS2 application where the server URL is given (e.g.: <http://apps.dhis2.org/dev>). Here is the login form to access the application with user-name and password. Click on "Login" to continue or "Reset" to reset:



The image shows a screenshot of a mobile browser interface for the DHIS2 application. At the top left, there is a blue header with the DHIS2 logo. Below the header, the word "Login" is displayed in a large, bold, white font on a dark blue background. Underneath, there are two input fields: "Username" with the text "elmer" entered, and "Password" with a series of dots representing a masked password. The password field is highlighted with a thick orange border. At the bottom of the form, there are two buttons: "Login" and "Reset", both with a light gray gradient and rounded corners.

After logging in, there are the list of functions:



- **Aggregate Reporting:** Entries for aggregate data with defined/assigned dataset by organisation-units

- **Tracking:**

- Find Person: find person based on Name, Phone Number or ID, and Organization unit.
- Activity Plan: Entries data for the persons by organisation-units, persons and programs/ program-stages
- Person Registration: Registry a new person
- Anonymous: Entries for anonymous person based on programs

- **Messages:** Manage the messages and discussions from the server. Message reply is available. User can send feedback message in Messages.

- **Reports:** The output reports from the server.

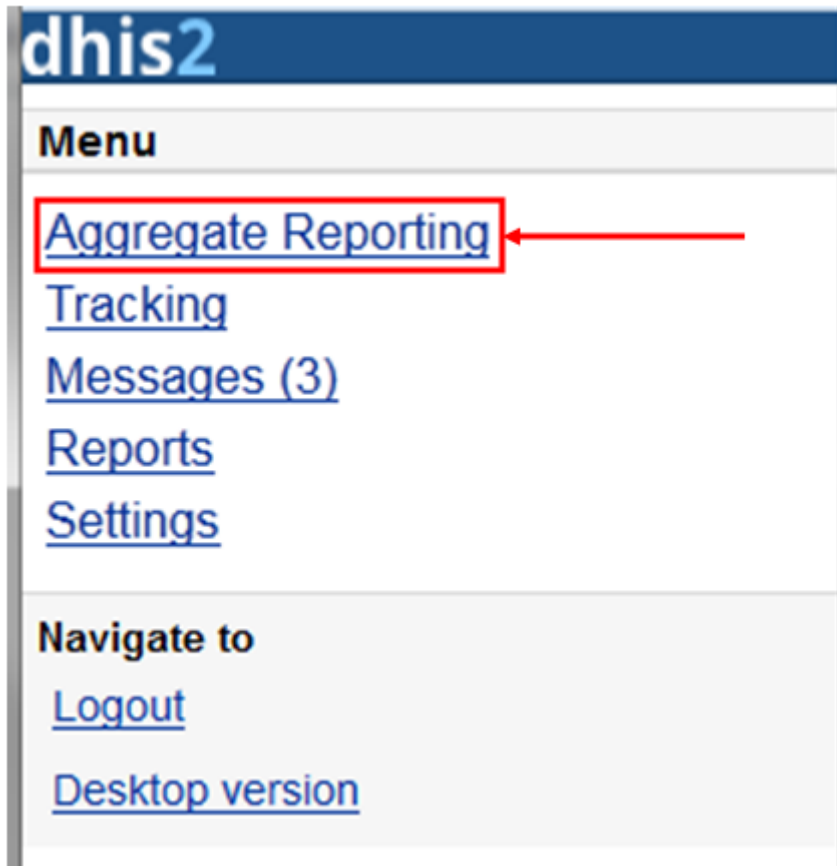
- **Settings:** User-information (e.g.: First-name, Surname, Phone number, E-mail) and the Interface language.

- **Logout:** to log out the application.

- **Desktop version:** navigate to the desktop version of DHIS2 for administration. This require a lot of resources from the client mobile, for example: the sufficient memory to load the pages. Not recommended for the normal GPRS/3G/... phones.

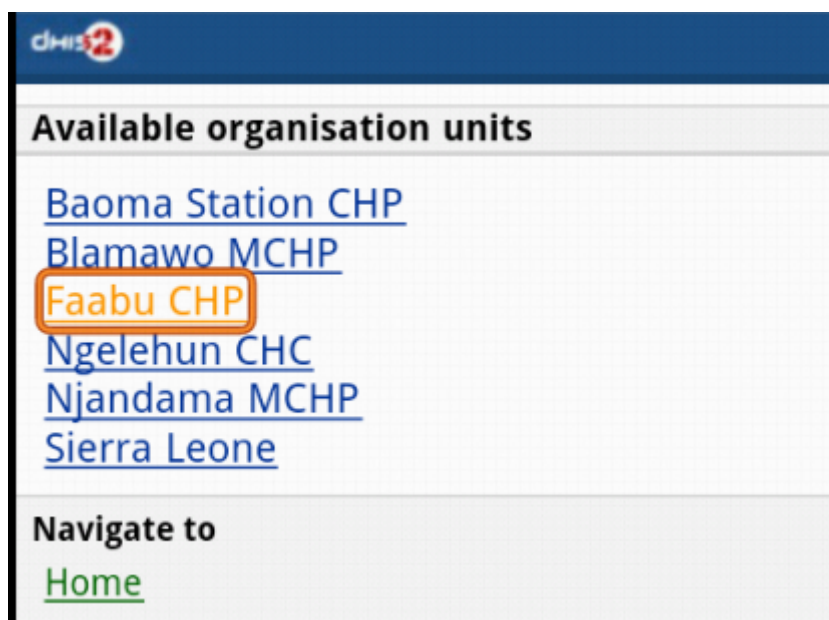
The list above will be explained in details:

1. **Aggregate Reporting:** Entries for aggregate data with defined/assigned dataset by organisation-units.

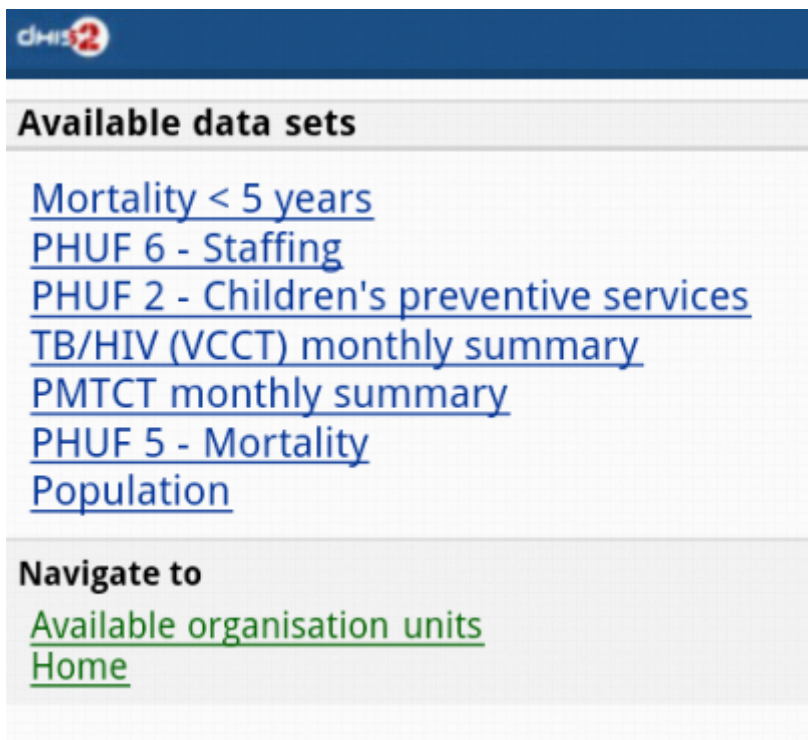


Click on the "Aggregate Reporting", then choose an Organisation Unit from the list and the list of the datasets will be appeared for entering aggregate data. See the below example:

**Step 1: Select an Organisation Unit from the list**



**Step 2: Select a Dataset (entry form) from the list**



The screenshot shows the DHIS2 mobile interface. At the top is a dark blue header with the DHIS2 logo. Below the header is a section titled "Available data sets" in bold black text. Underneath this section is a list of seven data sets, each with a blue underlined link: "Mortality < 5 years", "PHUF 6 - Staffing", "PHUF 2 - Children's preventive services", "TB/HIV (VCCT) monthly summary", "PMTCT monthly summary", "PHUF 5 - Mortality", and "Population". Below the list is a section titled "Navigate to" in bold black text, containing two green underlined links: "Available organisation units" and "Home".

Step 3: Select a period (based on the period type of the chosen dataset) from the list

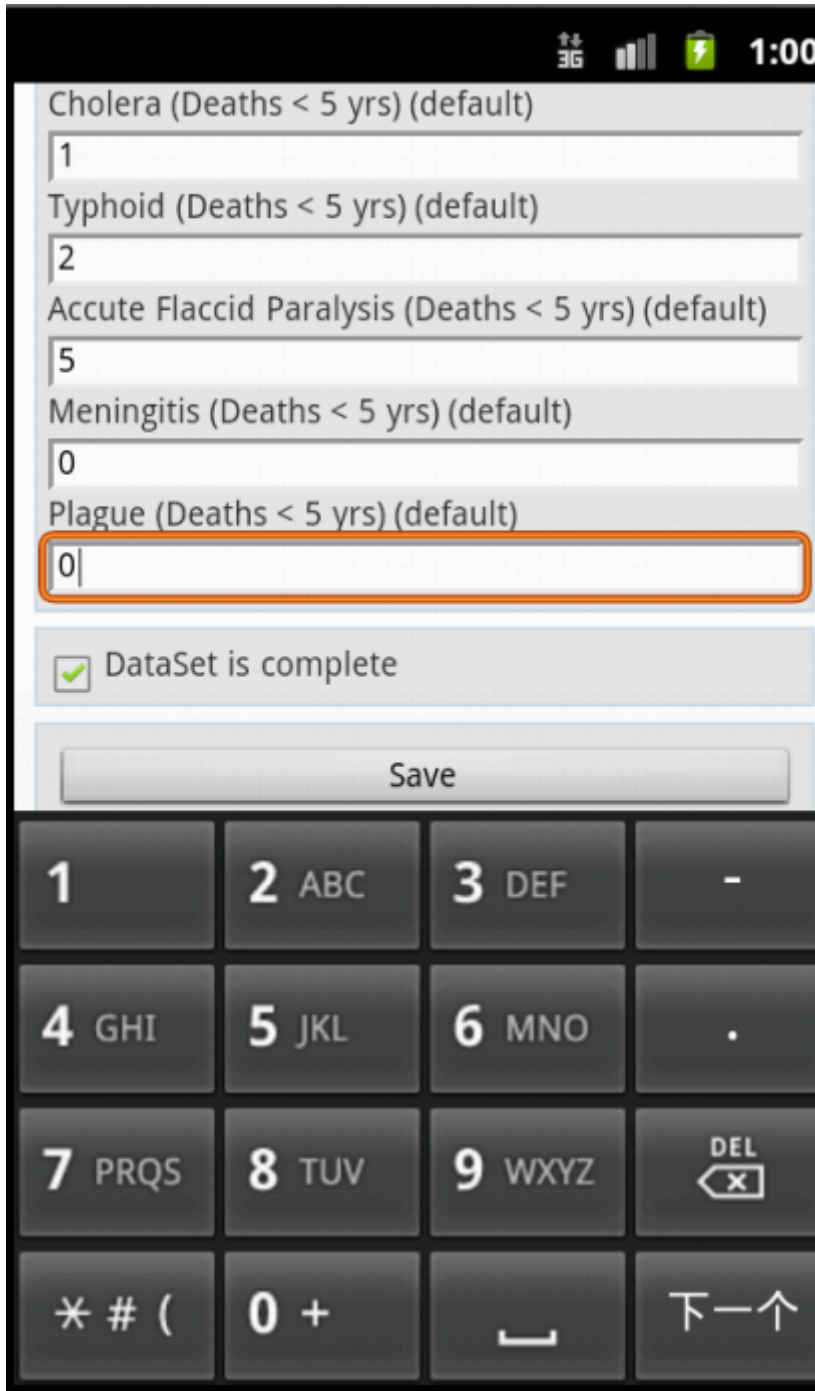


The screenshot shows the DHIS2 mobile interface. At the top is a dark blue header with the DHIS2 logo. Below the header is a section titled "Available periods" in bold black text. Underneath this section is a list of ten periods, each with a blue underlined link and a green checkmark to its right: "October 2011", "September 2011", "August 2011", "July 2011", "June 2011", "May 2011", "April 2011", "March 2011", "February 2011", and "January 2011". Below the list is a section titled "Navigate to" in bold black text, containing two underlined links: "Available data sets" (blue) and "Home" (green).

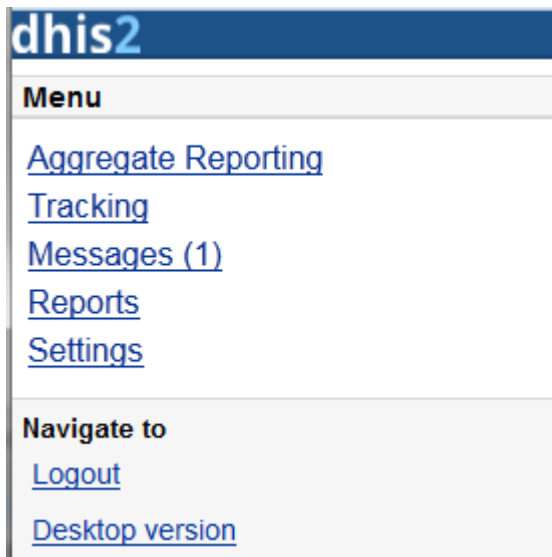
Step 4: Entering the data

The screenshot shows a mobile data entry interface for 'Mortality < 5 years'. The form has a blue header with the 'dhis2' logo. Below the header, the title 'Mortality < 5 years' is displayed. A 'Default' section contains four data entry fields. The first field, 'Measles (Deaths < 5 yrs) (default)', contains the value '433' and is highlighted with an orange border. The other fields are 'Tetanus Neonatal (Deaths < 5 yrs) (default)', 'Animal Bites - Rabid (Deaths < 5 yrs) (default)', and 'Rabies (Deaths < 5 yrs) (default)'. Below the form is a standard numeric keypad with letters on the number keys, a 'DEL' key, and navigation arrows.

Step 5: Save the data entered after completing the data, choose the option for data completeness if having.

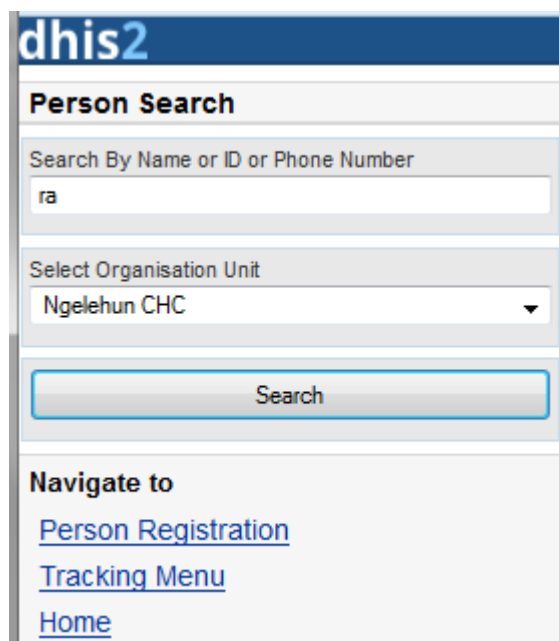


2. Tracking: Find/Add Person, Visit Schedule, Person Registration, Anonymous



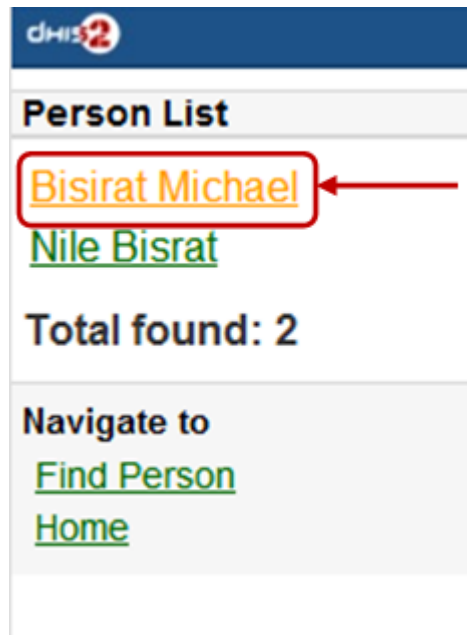
2.1 *Find/Add Person*: find person based on Name, Phone Number or ID, and Organization unit.

- Step 1: insert Name, Phone Number or ID and select the Organization Unit, then click Search.



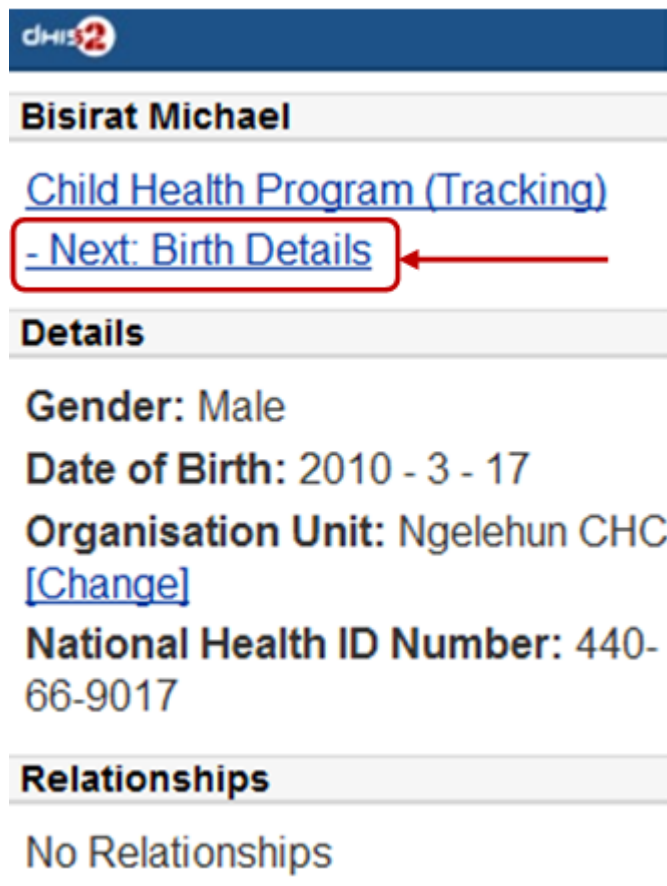
- Step 2: select a person



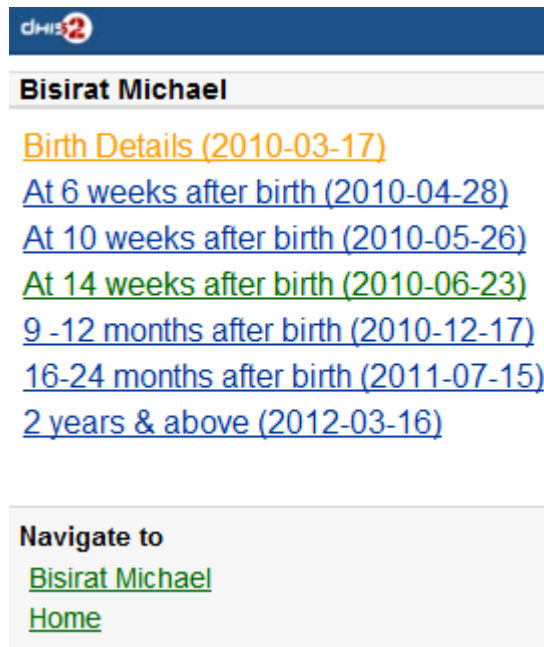


Then all the information of that person will be displayed

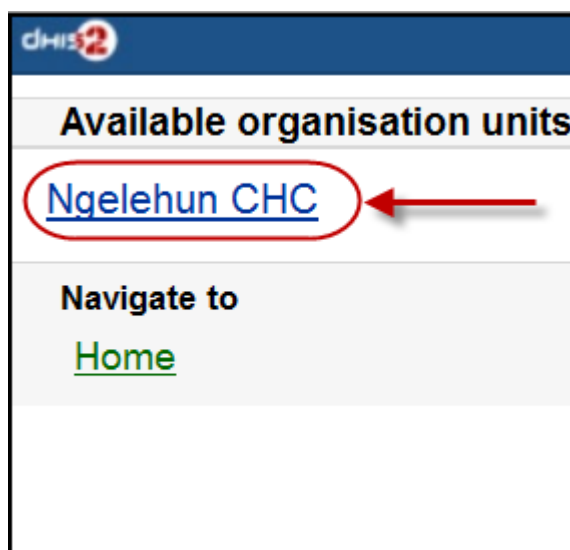
- Step 3: choose the next program stage for entering the data

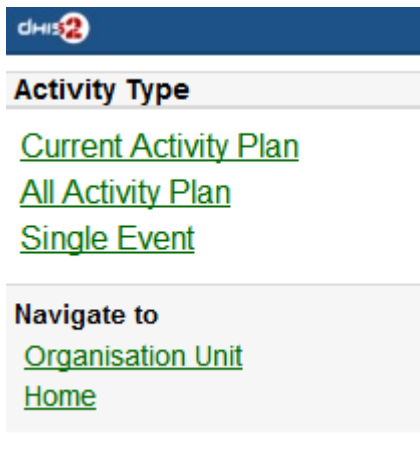


To view all the program stages, click on the name of that program (Child Health Program as the screen shot)



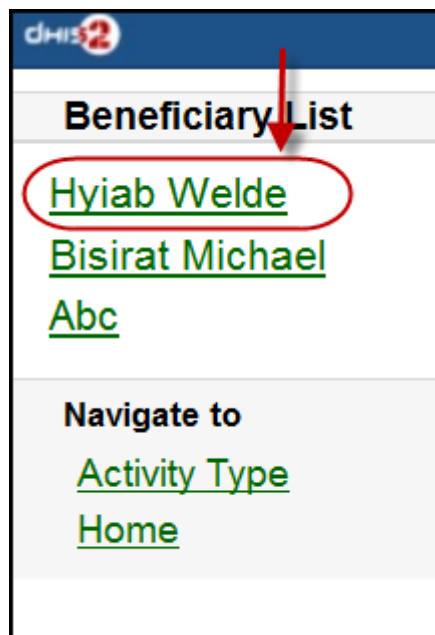
2.2: \*Visit Schedule:\*Choose An Organization Unit



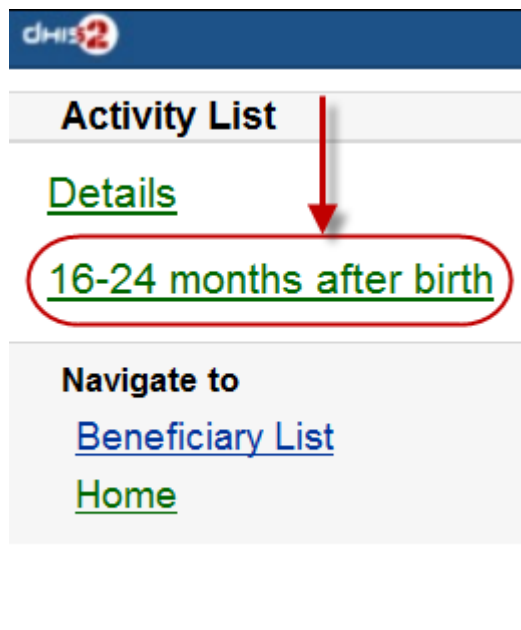


- Current Activity Plan: the list of the beneficiaries registered, enrolled, not yet finish/complete a/many program and there is at least a program-stage open for data-entry.

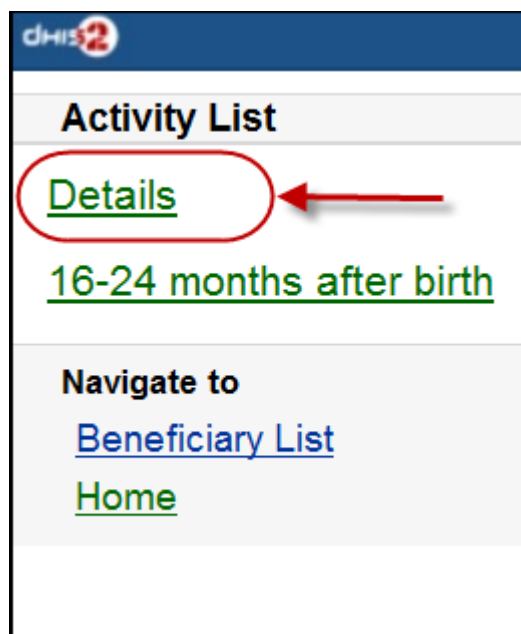
+ Step 1: Choose a Person for entry



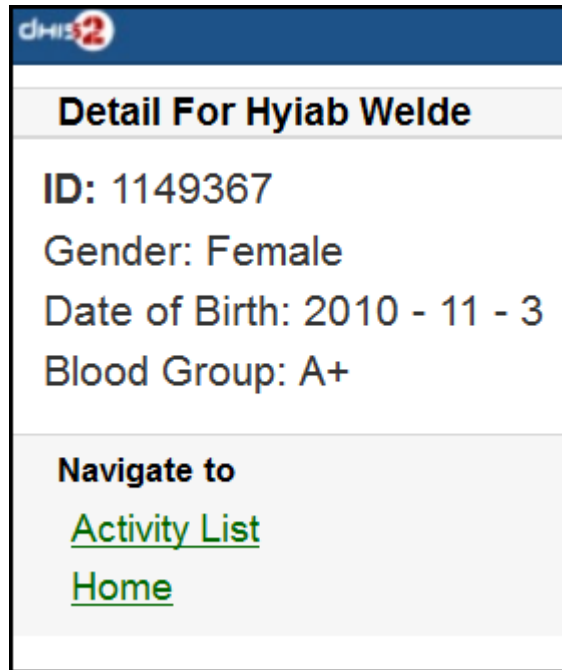
+ Step 2: Choose a current and active program-stage for entering the data



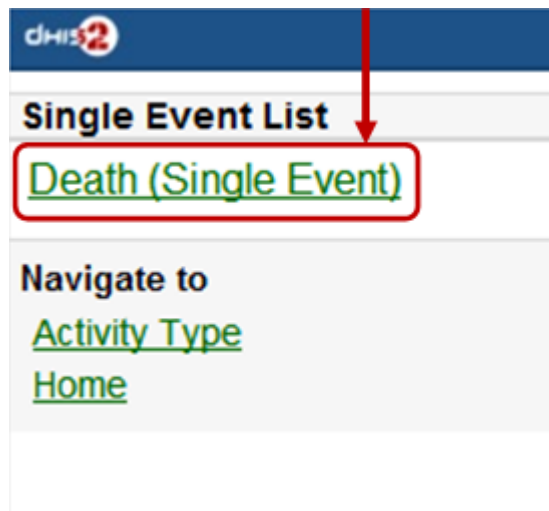
You can also see the person's information (ID, gender, Date of Birth, and Blood Group) by clicking on the Details (on top of the list appeared)



The details information of the chosen person:

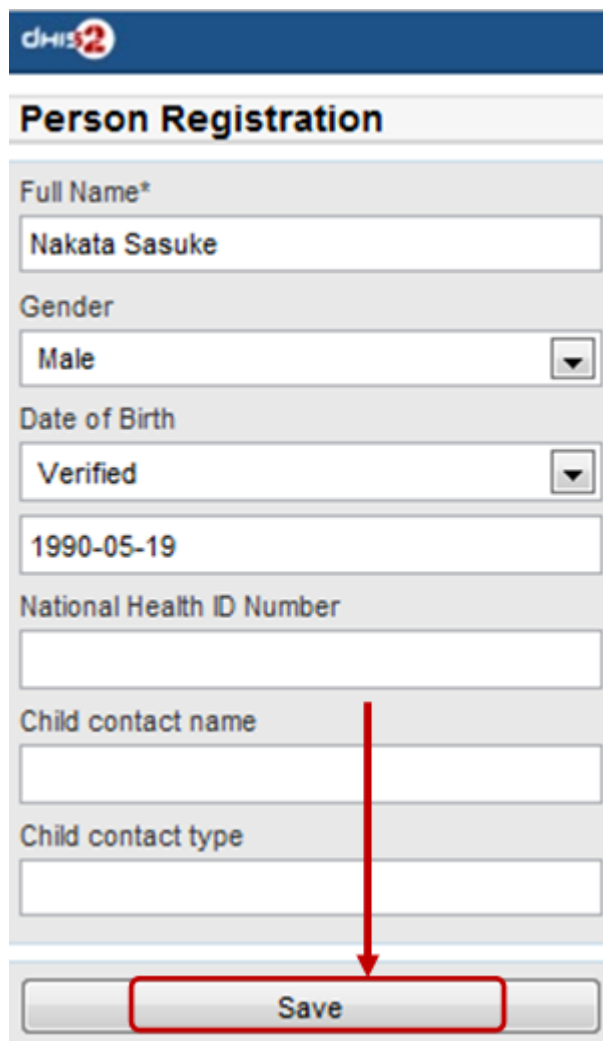


- All Activity Plan: the list of all beneficiaries registered, enrolled, not yet finish/complete a/many program.
- Single Event:



### 2.3: Person Registration: Registry a new Person

- Step 1: Entry personal information



The image shows a mobile browser interface for a 'Person Registration' form. At the top is a blue header with the 'DHIS2' logo. Below the header is the title 'Person Registration'. The form consists of several fields: 'Full Name\*' with the value 'Nakata Sasuke'; 'Gender' with a dropdown menu set to 'Male'; 'Date of Birth' with a dropdown menu set to 'Verified' and a text field containing '1990-05-19'; 'National Health ID Number' with an empty text field; 'Child contact name' with an empty text field; and 'Child contact type' with an empty text field. At the bottom of the form is a 'Save' button, which is highlighted with a red rectangular border. A red arrow points from the 'Child contact name' field down to the 'Save' button.

- Step 2: Enrol program for the person just been registered, then click "Enroll".

**dhis2**

**Nakata Sasuke**

No Enrolled Programs

**Details**

Gender: Male

Date of Birth: 1990 - 5 - 19

Organisation Unit: Ngelehun  
CHC [\[Change\]](#)

National Health ID Number:

**Enroll In Program**

Child Health Program (Tracking) ▼

Enroll

- Step 3: Entry required information for the chosen program, then click "Enroll"

**dhis2**

**Enroll Nakata Sasuke to Child Health Program (Tracking)**

Date of 1st visit [yyyy-MM-dd]

2012-08-03

Date of Birth [yyyy-MM-dd]

2012-08-03

Enroll

Navigate to

[Program List](#)

[Home](#)

Here is the result:

**dhis2**

**Nakata Sasuke**

[Child Health Program \(Tracking\)](#)  
[- Next: Birth Details](#)

**Details**

**Gender:** Male  
**Date of Birth:** 1990 - 5 - 19  
**Organisation Unit:** Ngelehun  
CHC [\[Change\]](#)  
**National Health ID Number:**

**Relationships**

No Relationships

2.4: **Anonymous:** Entries for anonymous person based on specific programs

**dhis2**

**Delivery Returns (Anonymous)**

Address

Education

Age \*  
15 - 20 ▼

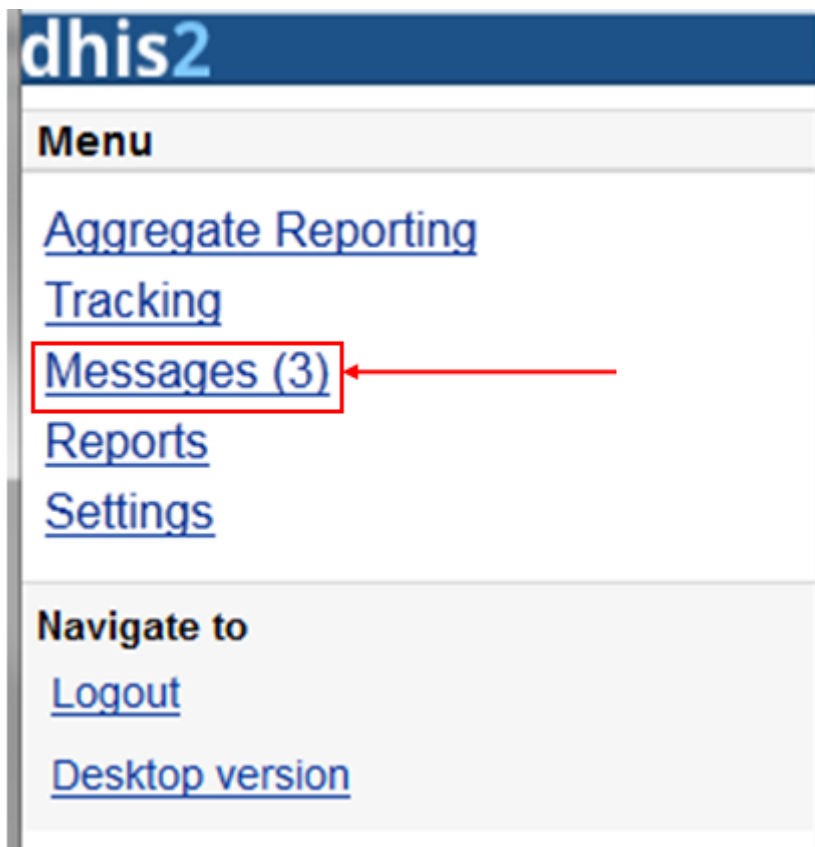
Gender  
Select Option ▼

Occupation

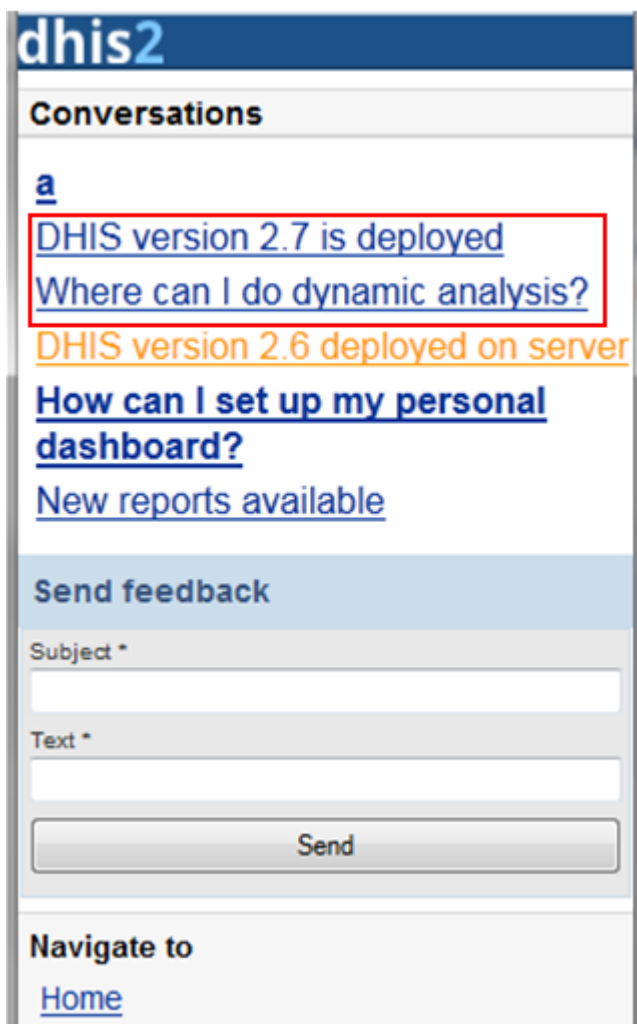
Parity

3. **Messages:** Manage the messages and discussions from the server. Message reply is available.

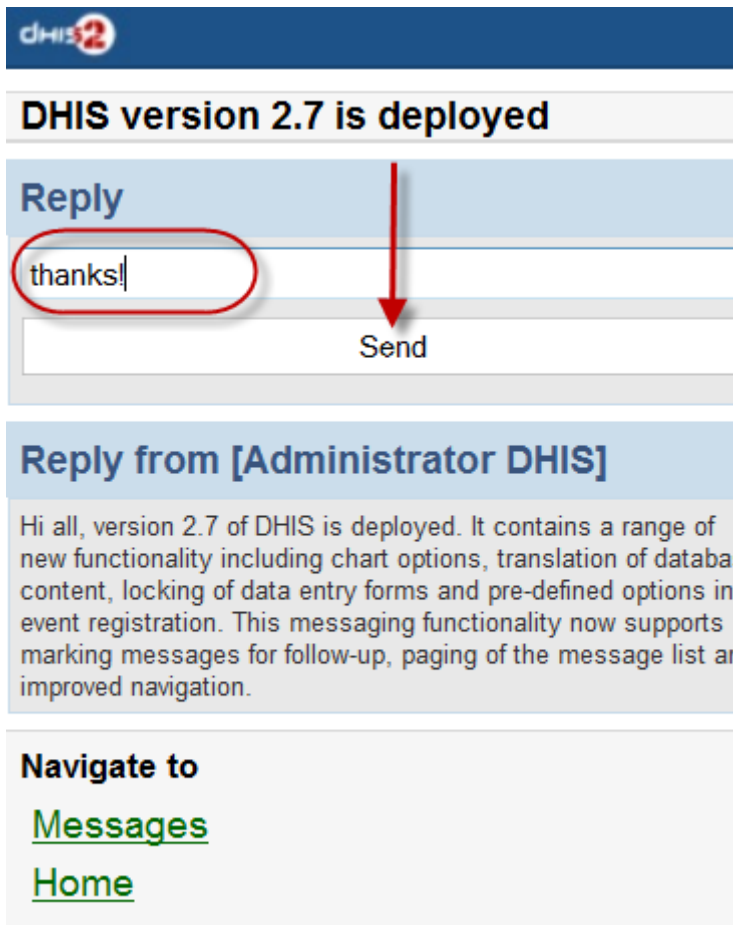




The number showed is the unread messages. Click on that to view the list of the messages (the unread messages are in bold and dark blue color):



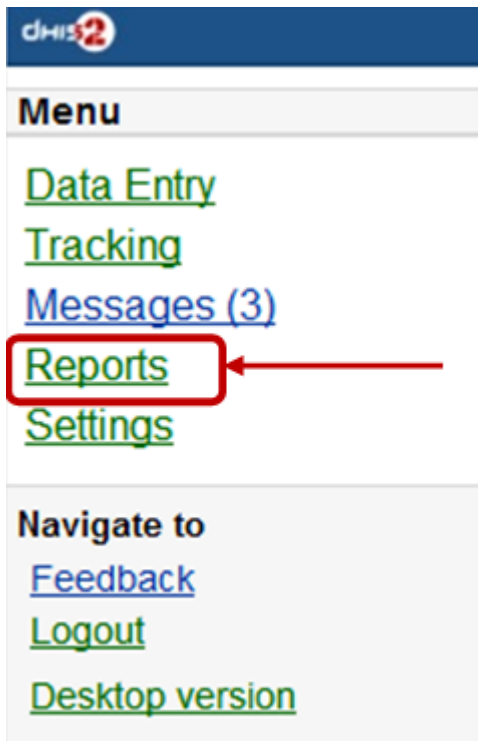
Then you can pick up the message/topic for the discussions by leaving the reply message, see this example:



The screenshot shows the DHIS2 mobile interface. At the top is the DHIS2 logo. Below it is a header "DHIS version 2.7 is deployed". A "Reply" section contains a text input field with "thanks!" and a "Send" button. A red arrow points from the input field to the button. Below the "Reply" section is a confirmation message: "Reply from [Administrator DHIS]" followed by a paragraph of text: "Hi all, version 2.7 of DHIS is deployed. It contains a range of new functionality including chart options, translation of database content, locking of data entry forms and pre-defined options in event registration. This messaging functionality now supports marking messages for follow-up, paging of the message list and improved navigation." At the bottom, there is a "Navigate to" section with links for "Messages" and "Home".

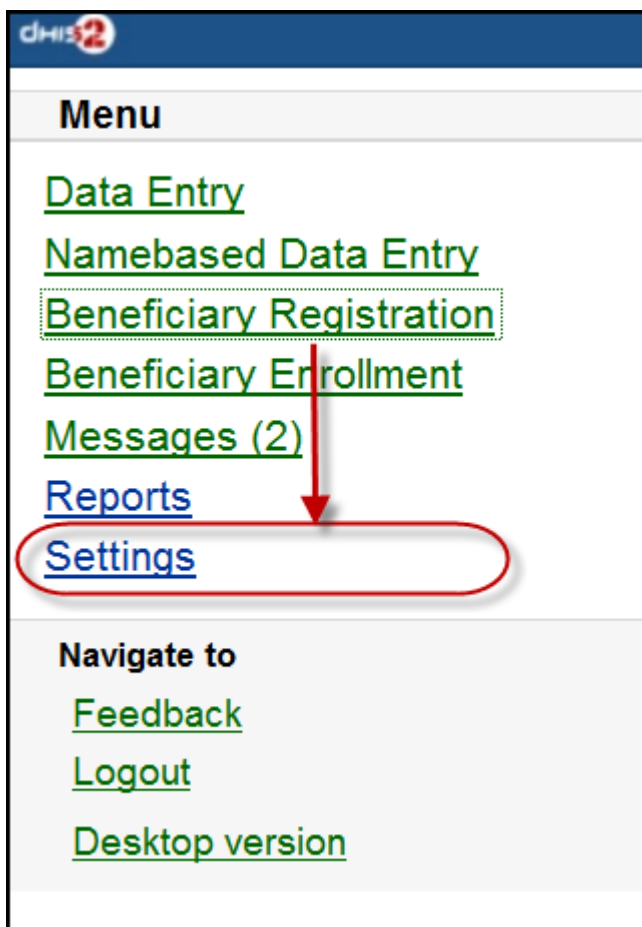
User can create and send a feedback to server in messages section. After sending out the new feedback, the message (feedback) will be listed under "Messages" for further following up.

4. **Reports:** The output reports from the server



(will be updated)

5. **Settings:** User-information (e.g.: First-name, Surname, Phone number, E-mail) and the Interface language.



Here is the form for setting the user account/access and the interface language. Click on "SAVE" for completing the settings, see the example below:

**Settings**

**Update user**

First name \*  
User

Surname \*  
Mobile

Phone number

E-mail

**Interface Language**

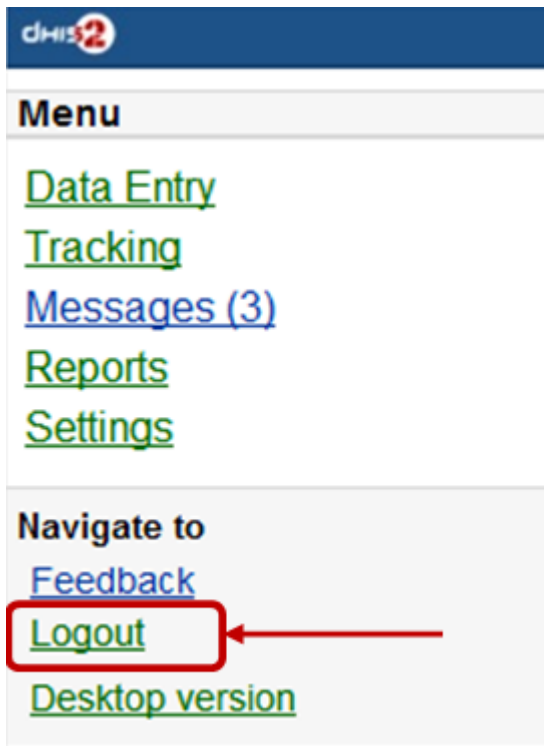
English (United Kingdom)

Save

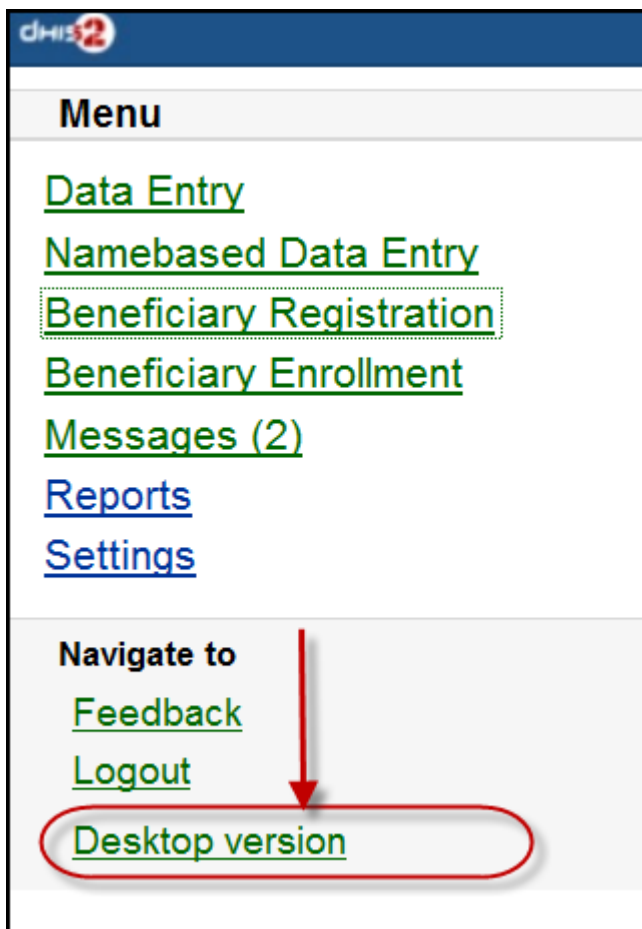
**Navigate to**

[Home](#)

6. **Logout:** to log out the application



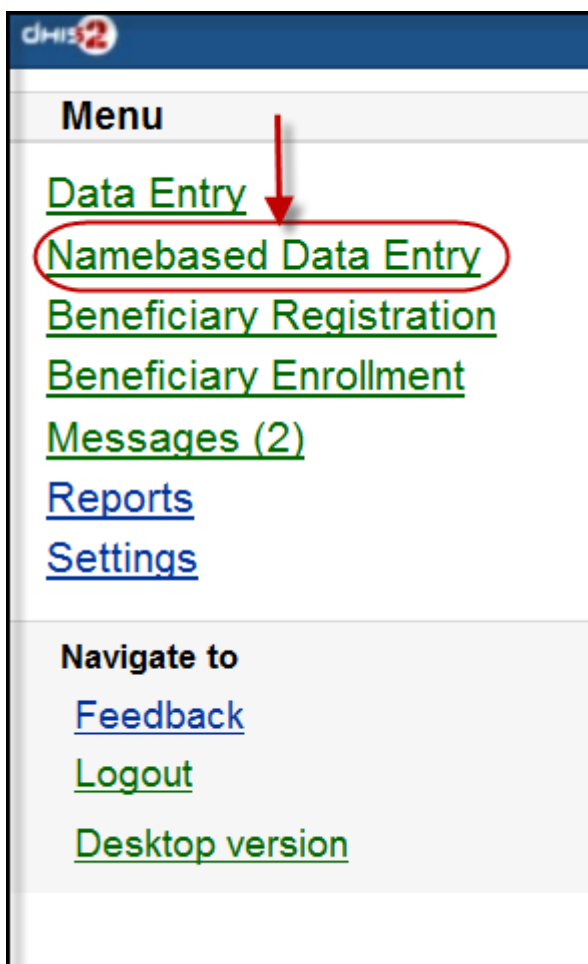
7. **Desktop version:** navigate to the desktop version of DHIS2 for administration.



Here is the GUI of the desktop version (which require much memory for loading), not recommended for normal mobile. The example with DHIS2 Demo (from [dhis2.org](http://dhis2.org))

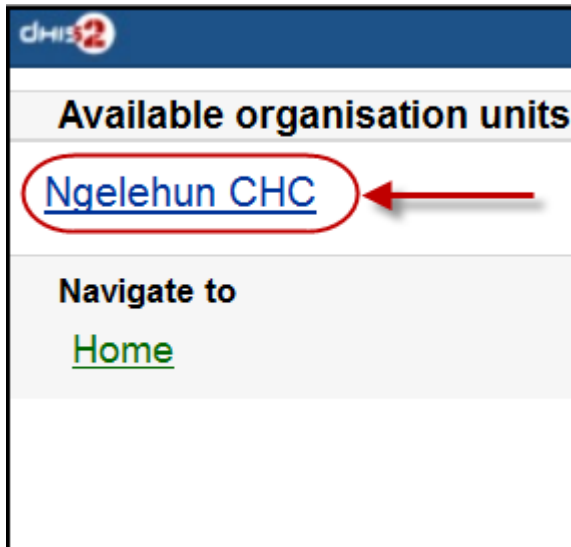


1.

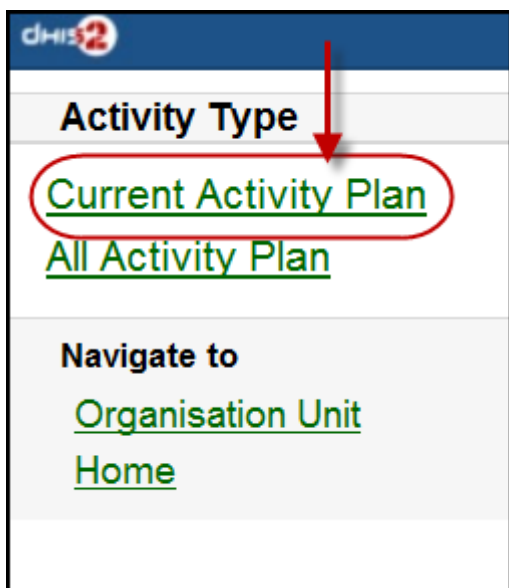


After clicking on the "Namebased Data Entry", the next will guiding to the selections in the following steps:

**Step 1: Choose an Organisation Unit**



### Step 2: Choose the Activity Type



(the screen-shot with an example with "Current Activity Plan" option)

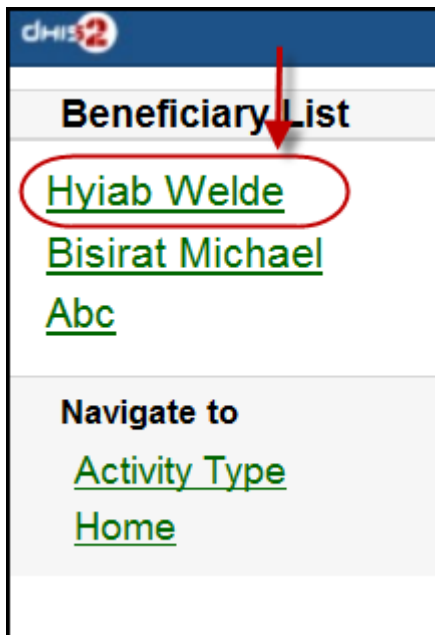
There will be normally these two type of Activity:

+ "Current Activity Plan": the list of the beneficiaries registered, enrolled, not yet finish/complete a/many program and there is at least a program-stage open for data-entry.

+ "All Activity Plan": the list of all beneficiaries registered, enrolled, not yet finish/complete a/many program.

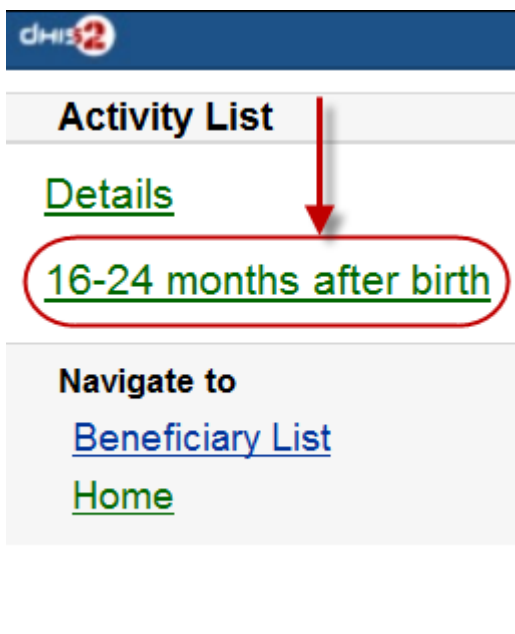
### Step 3: Choose a Beneficiary for entry





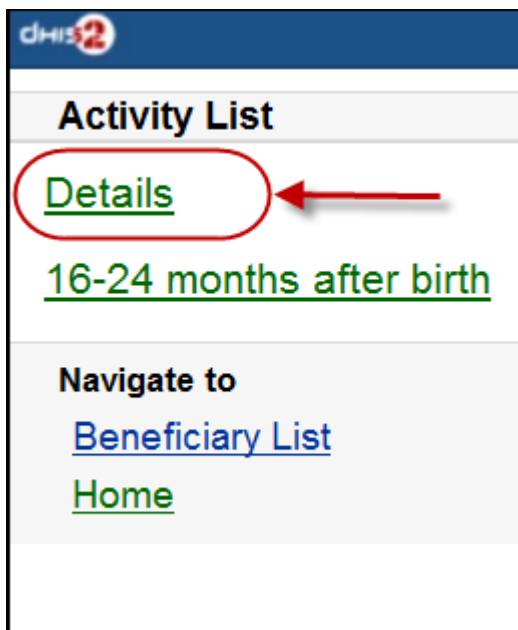
(the screen-shot with an example with "Hybia Welde" option)

**Step 4: Choose a current and active program-stage for entering the data**

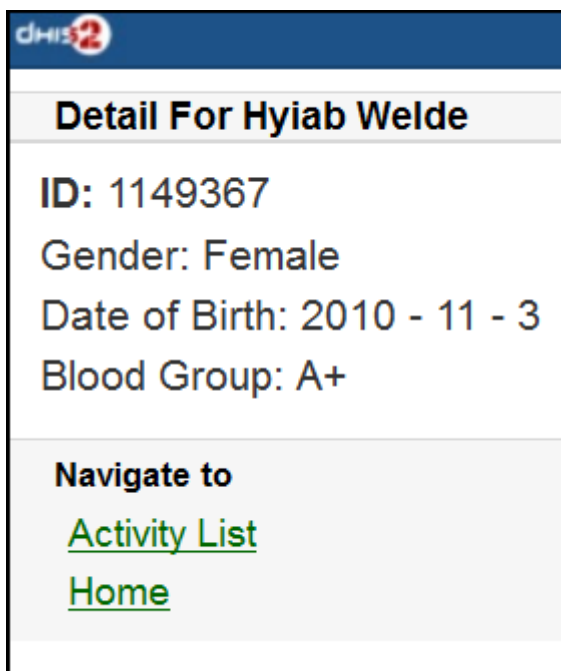


(the screen-shot with an example with "16-24 months after birth" option)

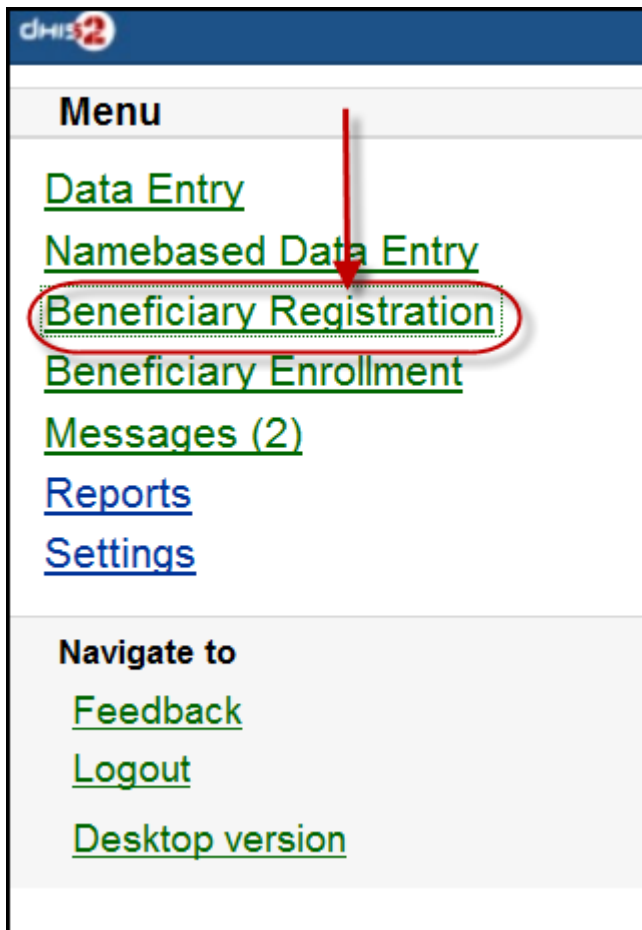
You can also see the beneficiary's information (ID, gender, Date of Birth, and Blood Group) by clicking on the Details (on top of the list appeared)



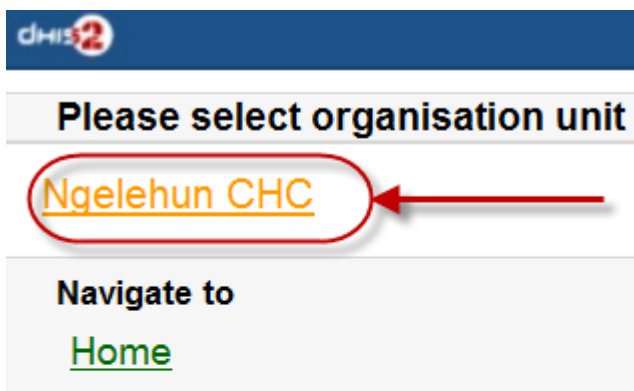
The details information of the chosen beneficiary:



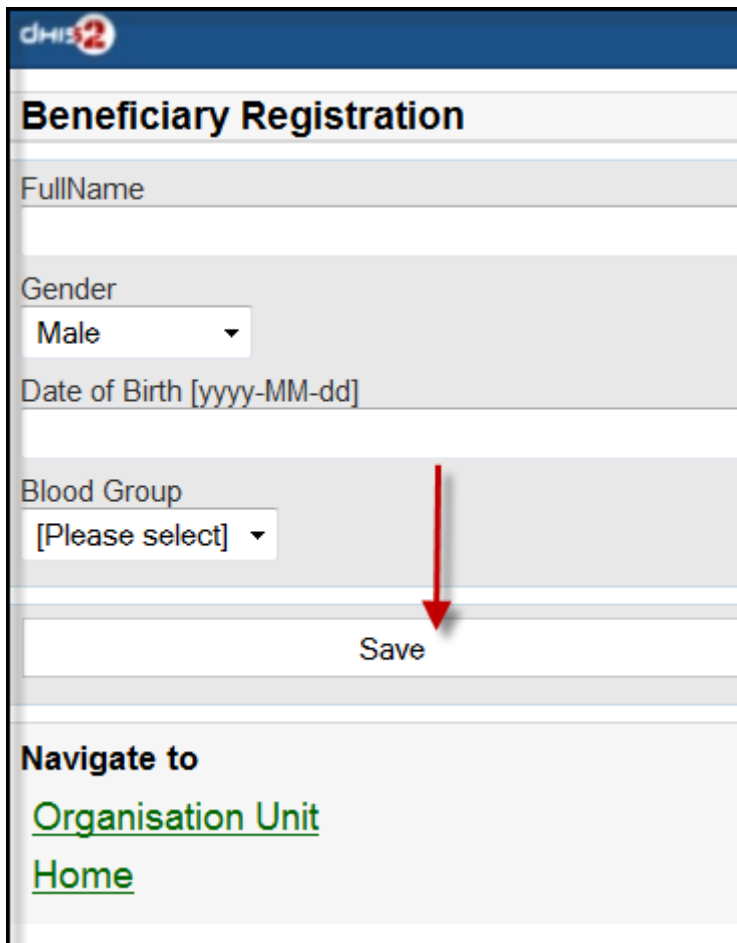
2. **Beneficiary Registration:** Registry a new beneficiary



Step 1: Choose an OrganisationUnit



Step 2: Fill in the Beneficiary Registration form



**DHIS2**

## Beneficiary Registration

FullName

Gender  
Male ▾

Date of Birth [yyyy-MM-dd]

Blood Group  
[Please select] ▾

Save

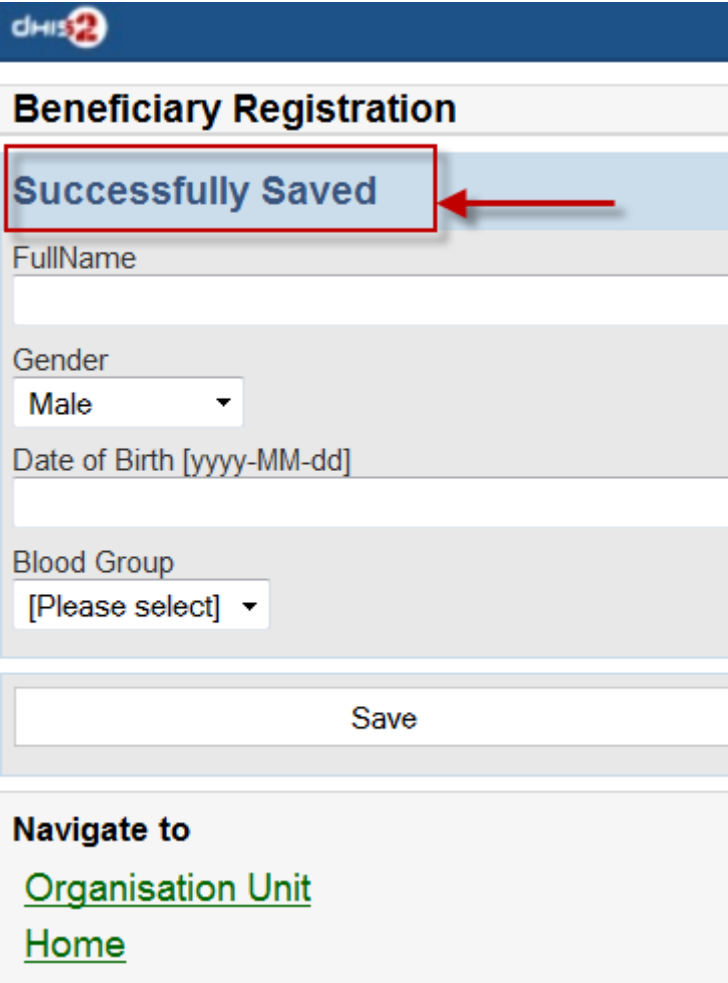
**Navigate to**

- [Organisation Unit](#)
- [Home](#)

There necessary information: Full Name, Gender, Date of Birth (and Blood Group).

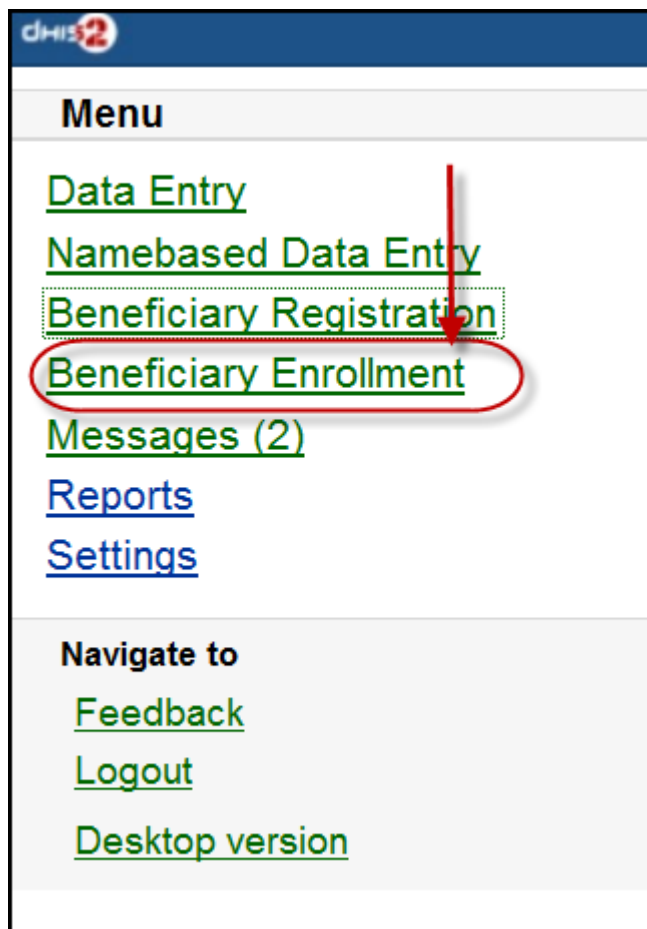
Click on "SAVE" to register a new beneficiary.

A message "Successfully Saved" will appear when the beneficiary is created/registered successfully.



The screenshot shows the DHIS2 mobile interface for beneficiary registration. At the top, the DHIS2 logo is visible. Below it, the title 'Beneficiary Registration' is displayed. A prominent message 'Successfully Saved' is shown in a blue box with a red border and a red arrow pointing to it. The form fields below include: 'FullName' (text input), 'Gender' (dropdown menu with 'Male' selected), 'Date of Birth [yyyy-MM-dd]' (text input), and 'Blood Group' (dropdown menu with '[Please select]' selected). A 'Save' button is located below the form fields. At the bottom, there is a 'Navigate to' section with links for 'Organisation Unit' and 'Home'.

3. **Beneficiary Enrollment:** Enrol a beneficiary to one or many programs



Before enrolling a beneficiary to a program, the search function for a beneficiary is provided:

If the beneficiary is found, the result will be listed. The simply click on the beneficiary name for navigating to the programs in which the beneficiary enrolled:

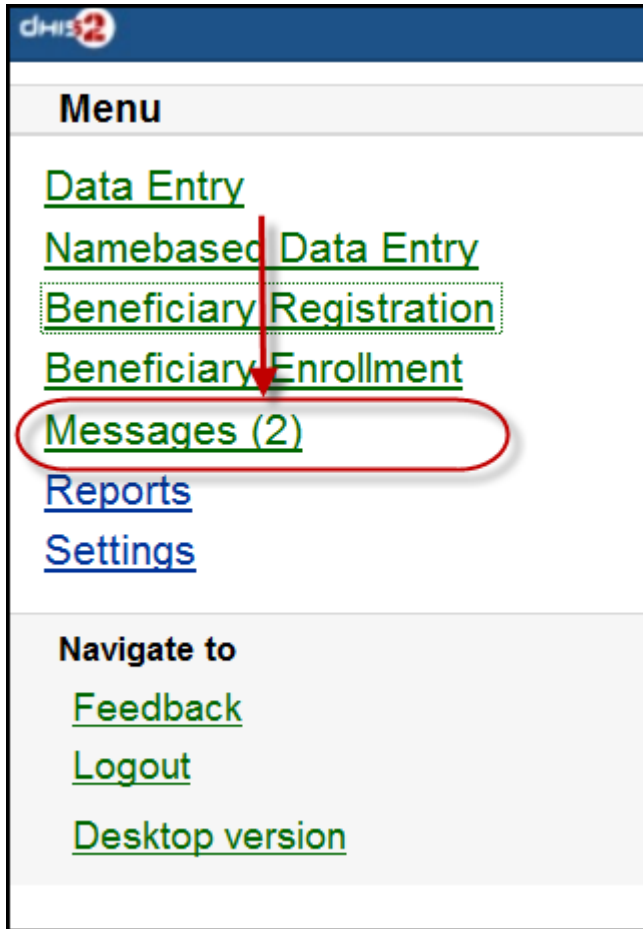
The below screen-shot example describes the beneficiary named "Nguyen Van A":

- Has not enrolled any programs before
- There is one program: "Child Health Program" available for enrolment

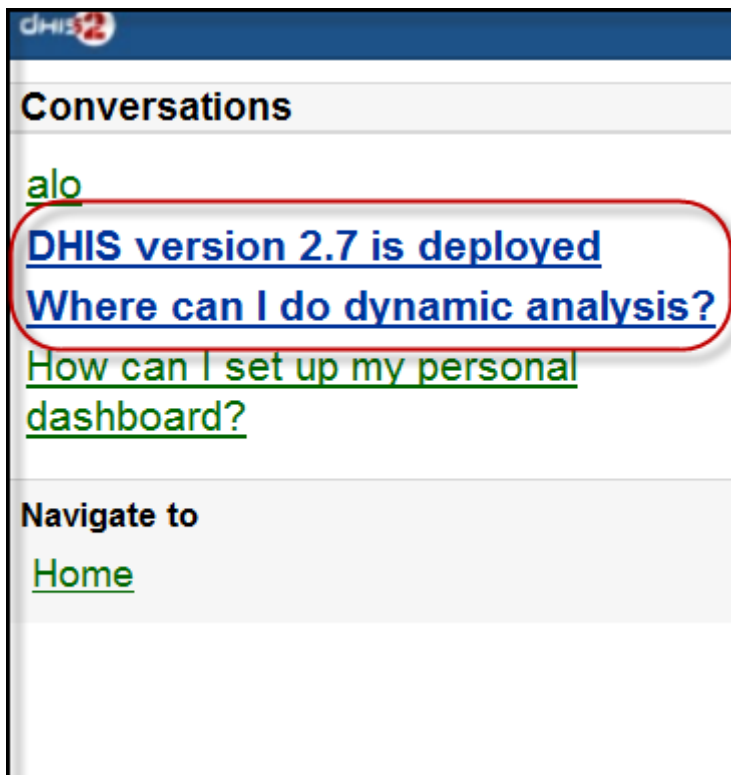
The list of the available programs for enrolment will be listed. Just click on the program for enrolment by specifying the date of enrolment and the date of incident. See the example:

After clicking on the "ENROLL" button, if successful, the program enrolled will be listed under "Enrolled Programs for" + \<Name of the beneficiary>, see the example:

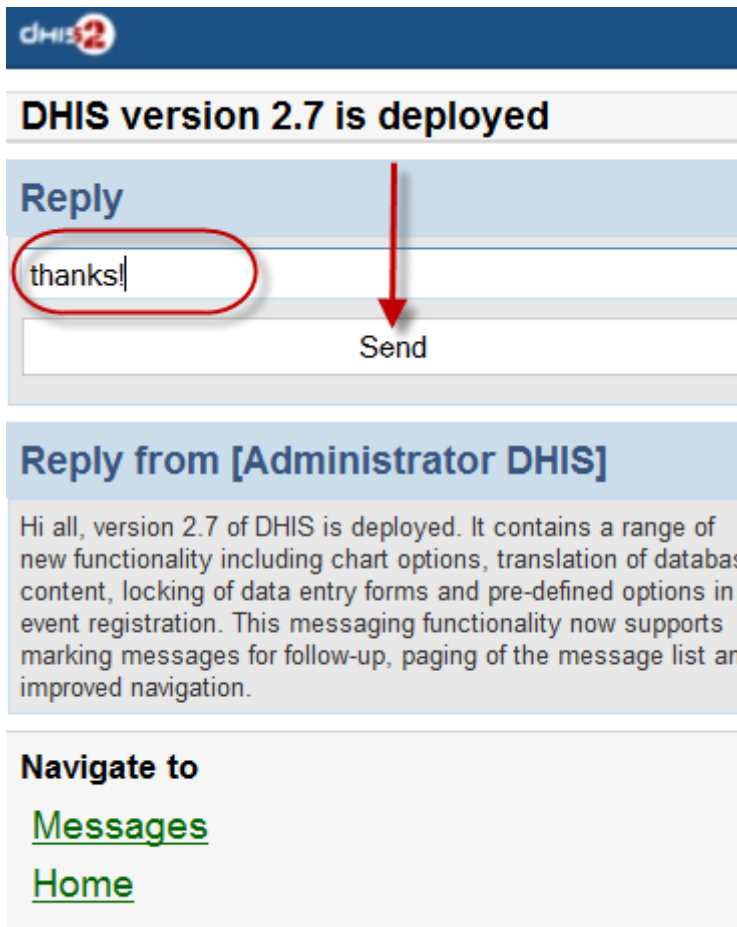
4. **Messages:** Manage the messages and discussions from the server. Message reply is available.



The number showed is the unread messages. Click on that to view the list of the messages (the unread messages are in bold and dark blue color):



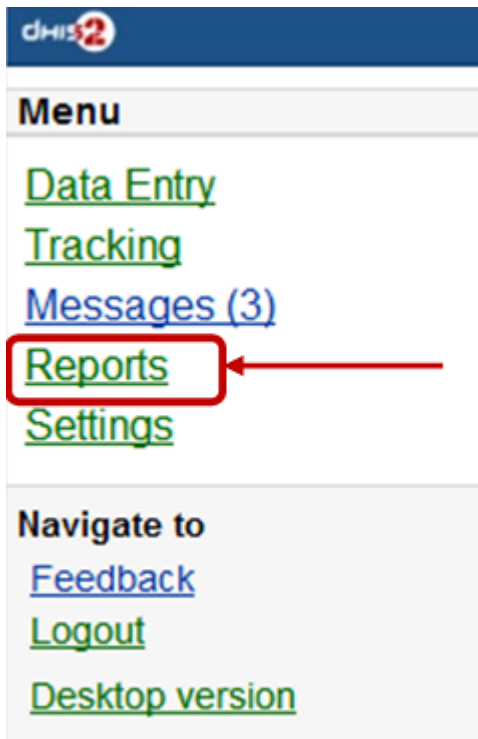
Then you can pick up the message/topic for the discussions by leaving the reply message, see this example:



The screenshot shows a mobile browser interface for a DHIS2 message. At the top is the DHIS2 logo. Below it is a header for the message: "DHIS version 2.7 is deployed". Underneath is a "Reply" section with a text input field containing "thanks!". A red circle highlights the text, and a red arrow points from the text to a "Send" button. Below the reply form is a section titled "Reply from [Administrator DHIS]" containing the message text: "Hi all, version 2.7 of DHIS is deployed. It contains a range of new functionality including chart options, translation of databases content, locking of data entry forms and pre-defined options in event registration. This messaging functionality now supports marking messages for follow-up, paging of the message list and improved navigation." At the bottom is a "Navigate to" section with two links: "Messages" and "Home".

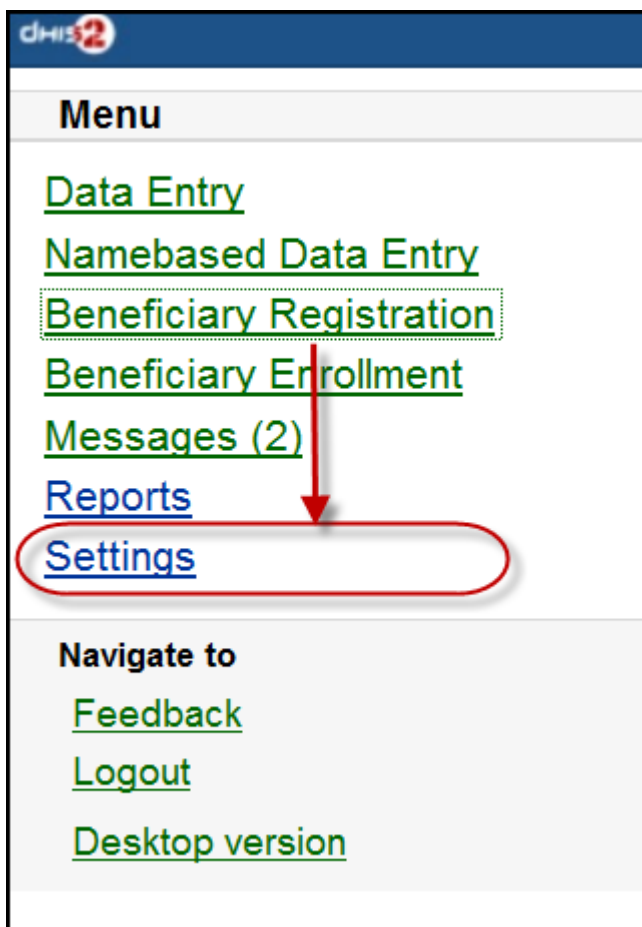
5. **Reports:** The output reports from the server





(will be updated)

6. **Settings:** User-information (e.g.: First-name, Surname, Phone number, E-mail) and the Interface language.



Here is the form for setting the user account/access and the interface language. Click on "SAVE" for completing the settings, see the example below:

**Settings**

**Update user**

First name \*  
User

Surname \*  
Mobile

Phone number

E-mail

**Interface Language**

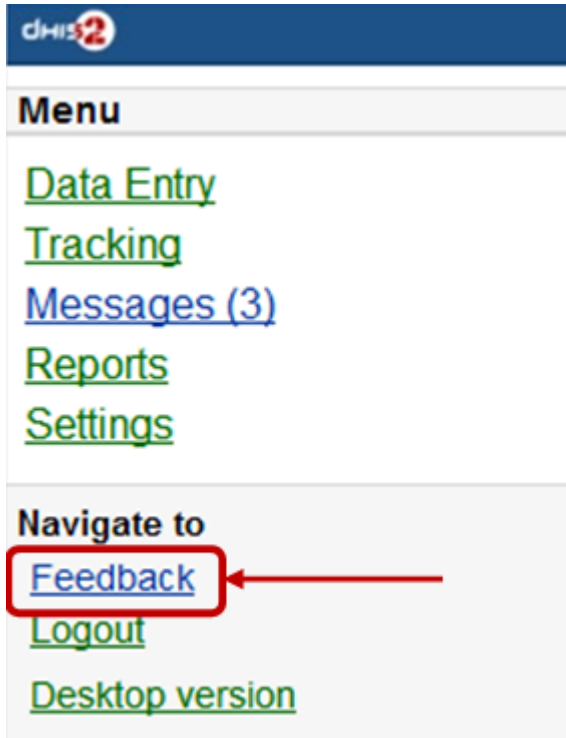
English (United Kingdom)

Save

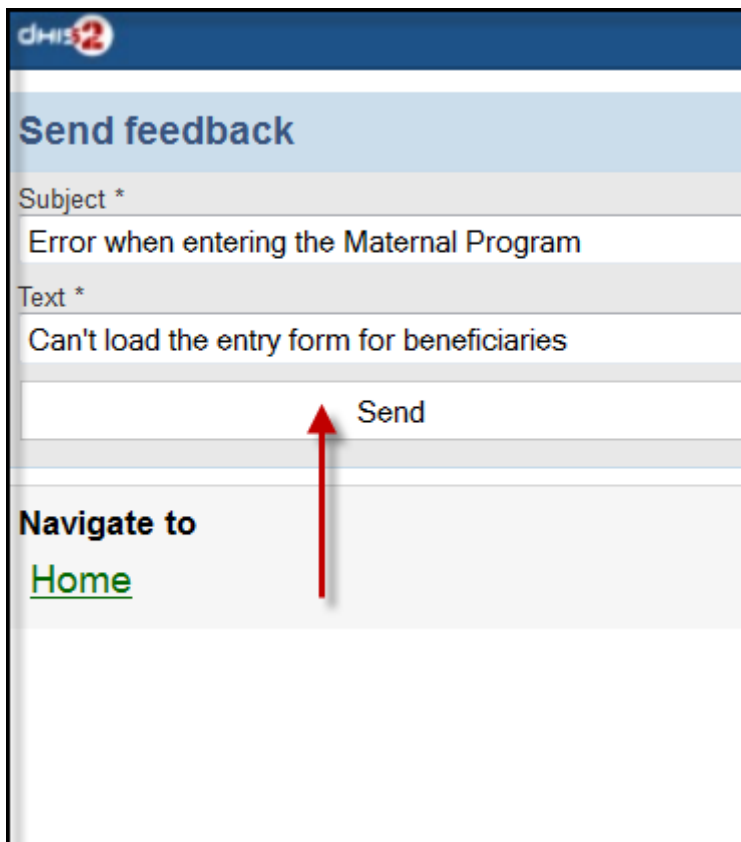
**Navigate to**

[Home](#)

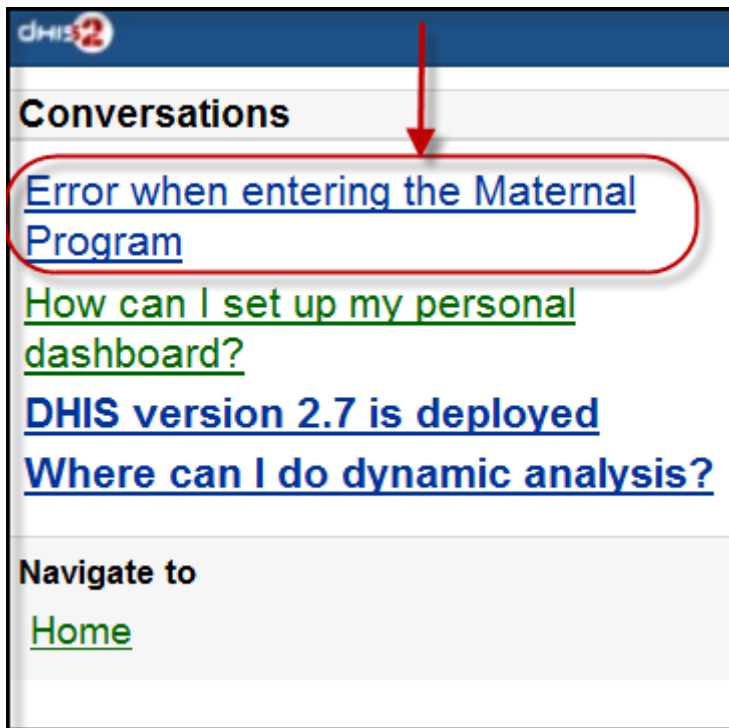
7. **Feedback:** the extra function for creating a new message to send to the server. The new created feedback from this will be listed under "**Messages**"



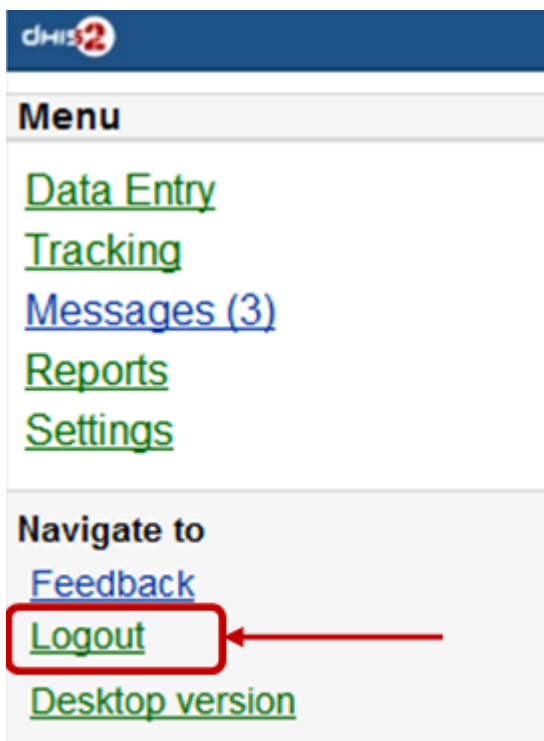
After clicking on the "Feedback", there will be a form for editing/sending out a new message/discussion. See the example below:



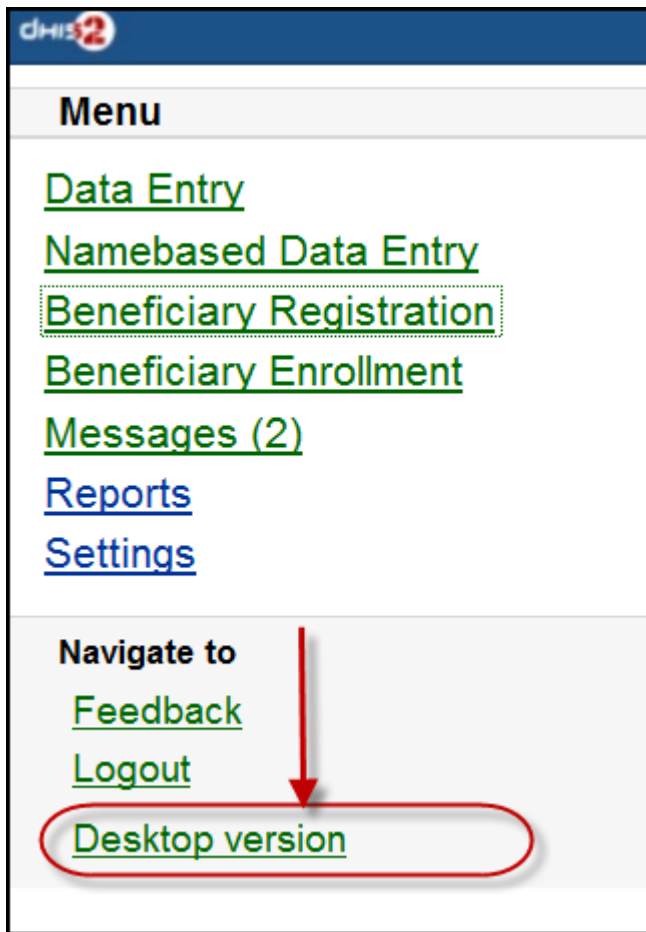
After sending out the new feedback, the message (feedback) will be listed under "Messages" for further following up.



8. **Logout:** to log out the application



9. **Desktop version:** navigate to the desktop version of DHIS2 for administration.



Here is the GUI of the desktop version (which require much memory for loading), not recommended for normal mobile. The example with DHIS2 Demo (from [dhis2.org](http://dhis2.org))



### J2ME GPRS/3G Client

The DHIS2 GPRS/3G mobile module provides a mechanism for remote clients using mobile phones to enter data directly into the DHIS2 system. There are two functions of the client, namely:

The solution relies on the mobile phone having a data connection available (i.e. GPRS, Edge, 3G), over which it communicates with a DHIS2 instance which must be publicly available on the internet, as any other web server. The client application on the phone downloads the data entry forms to the phone from the server, and the forms can therefore be updated without installing a

new application. This is also a crucial feature for community reporting, which relies on regularly downloading activity plans from the server.

- Facility reporting, for data entry and reporting of regular DHIS2 aggregate data,
- Activity reporting, for supporting individual activity reporting with the Community module.

### Data connection availability

Data connection availability can be a problem in many of the contexts where DHIS2 mobile reporting would otherwise be a good solution for getting data directly into DHIS2. If that is the case for you, you might want to consider trying the SMS based solution described in a separate document. Keep in mind that even though a data connection is currently required for communication between the server and the mobile phone, it is only required when initializing or updating the mobile application and when sending reports to the server. The phone stores all entered data locally, so it can work fine with only temporary access to a data connection on a regular basis.

### J2ME GPRS 3G facility reporting client

The server side component of the web based solution is included in the general build of DHIS2.

In order to configure the DHIS2 web-based mobile reporting, you should follow the following steps.

- Set the "Available for Mobile Reporting" flag for the data sets you want reported: Under *Maintenance->DataSet->Edit* mark the "Available for Mobile Reporting" check box and save.
- Create a user role for the mobile user. Select *Maintenance->Users->User Role->Add new*. Add a user role name and description. Add the desired data sets for the role. The mobile user role will need to have at least privileges for DHIS2 Web API. Save the user role by clicking "Save".
- Create a user which will be used by the client to login from *Maintenance->Users->User ->Add new*. Fill in all of the required details, keeping in mind that the password must be at least 8 digits long, contain one capital letter, and one digit. Assign the desired user role to the user which was created in the previous step.

#### Important

Assign the user to exactly **one** organisation unit. Each mobile reporting client will need their own user name and password.

### Detailed configuration of data sets and reporting forms

Though the previous steps is all that should be needed for testing the solution more detail configuration of the datasets may be required and are described in the following sections.

#### The mapping of data sets to form layout on the phone

By default, a data set is mapped to a single form on the phone. If the data set is divided into sections, each section is displayed as a separate page on the phone. If a data element has more than one category option combo it will be displayed as a heading with the category combination options following.

| Form design element | DHIS2 Metadata | Metadata element |
|---------------------|----------------|------------------|
|---------------------|----------------|------------------|

|                         |                       |   |
|-------------------------|-----------------------|---|
| Form title              | Data set              | Short Name if it exists, otherwise Name       |
| Page tile               | Section               | Section name (or form name if no sections)    |
| Question                | Data element          | Alternative name if it exists, otherwise Name |
| Question name if combos | Category option combo | name  |

### Sorting of forms

By default, data elements will be sorted according to the global sorting assigned in DHIS2. If sections are used, their section specific sorting order will be used. In some cases, when sections are not used, a data element might be used in multiple data sets, and conflict in the way it should be sorted in individual data sets. A work around for this situation is to wrap the whole dataset in one section (note that this will only work if the data elements have the same category option combo)

### Versioning of data sets

To make it possible to compare and update the data sets on the mobile phone with the version on the server, data sets are automatically versioned when you edit the data set structure. Some changes which occur on the DHIS2 server, will cause the mobile client to update its forms with a new version.

- Create DataSet
- Edit DataSet
- Create/edit/delete Section in DataSet
- Sort Section Order
- Update DataElement (affect many related DataSets)
- Delete DataElement (affect many related DataSets)
- Edit DataElement Category
- Edit DataElement Category Combo







### Language support

Multi-language support is available.

DataSet and DataElement are translated through web-based function. Default language on server is used on mobile in cases requested language from mobile is not available.

## Dataset management

Filter by name:

| Name                | Operations  |
|---------------------|---|
| Aggregation Dataset |       |

No. of pages: 1      No. of rows per page:       Jump to page:

« « 1 » »

## Mobile application setup

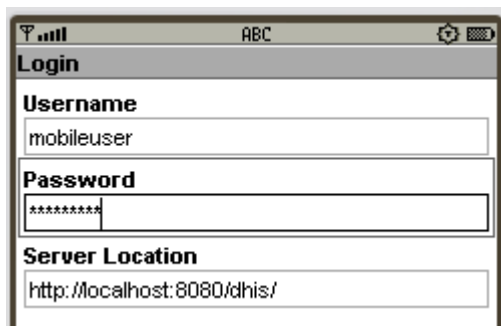
### Installation and initialization

#### Installation

Download the jar packages from the DHIS2 homepage: [www.dhis2.org/downloads](http://www.dhis2.org/downloads)

#### Initialization

Initialization should be performed before the phones are delivered end-users. Given the large variation in possible phone configurations, it is impossible to describe the exact steps which are required in order to enable the client on the phone. However, for most phones, simply copying the DHIS2 Web Mobile client "JAR" file to the phone with a USB cable or via Bluetooth is sufficient. Of course, GPRS/3G connectivity must be enabled. Contact your mobile service provider for exact details on the configuration of the phones and networks.



Once the client has been installed on the phone, an initialization process must occur by providing a user name, password and server URL.

#### 1. Logging into the server for the first time.

The first time the client logs in to the server, or if the client is reinitialized, the username, password and server URL must be entered.

If the client is unable to login, there could be several possible error messages which you see.

- Connection Not Found: The specified server URL is not correct. Check the server address, ensure that the server is actually reachable, and try again.
- Invalid User Name Or Password: the username or password is incorrect



Application not authorized to access restricted APIs : The server can be contacted,  
 ° but the user does not have the necessary permissions to access the mobile reporting module

2. Setting the PIN number: After the initial login process, a PIN number can be entered by the user. This will make the login process much easier, as the user only has to remember the four digit pin number, as opposed to typing in the user name and password each time. The PIN number can be preset if the phone is initialized prior to delivery, or it can be set by the users themselves if they have been provided with usernames and passwords.



After entering the PIN, press (Menu)->Next.

3. Download all forms: After the PIN has been specified, all forms will be downloaded from the server and stored locally on the phone..

If the user has been configured to report on aggregate datasets, a list of appropriate datasets will be displayed. If the user is responsible for community based reporting, the list of assigned activities is displayed.

*Notes:* If the Health Worker is responsible for both Facility Reporting and Community Reporting, DHIS2 server will send all forms of both Facility Reporting and Community Reporting to mobile and on mobile, there will be a screen to choose whether displaying Facility Reporting or Community Reporting.

*Errors:*

### Logging in (for regular use)

After starting the application, the PIN form is displayed.

- PIN: Enter the four digit number PIN.
- Reinitialize Command: this function will clear all data on mobile and we start from the login screen with username and password.
- Errors: Invalid PIN: If the user has entered an invalid PIN, they will need to enter the correct PIN, or reinitialize the application with the correct username and password.

### Facility Reporting Module

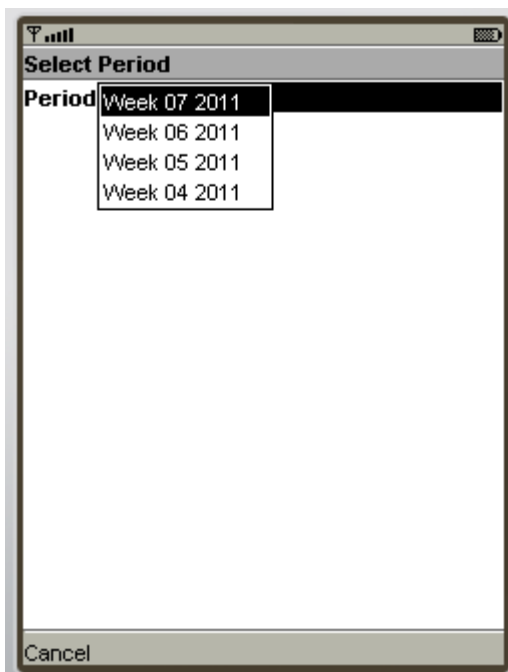
#### Entering data

After selecting an aggregate dataset from the "Select report form" window, the user will need to select an appropriate time period. A list of available time periods is automatically generated.

1. After the user has entered their PIN, they can select from a list of available datasets. Select the appropriate dataset and press "Next".



2. Choosing periods: A list of available periods will be automatically displayed to the user. They can select the appropriate period from the list.



3. Fill in values: After choosing the period, the form can be displayed in two modes, depending on the

- Form with sections

Each form section is displayed in a single screen with the name of the section in the title window.

To navigate from screen to screen, push "Next".

- Forms without section (Datasets without sections)

---

All fields are displayed on one screen with the title that is the name of DataSet

The user simply fills in each data element with the appropriate value.

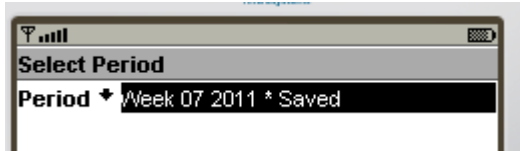
A screenshot of a mobile application interface showing a data entry form. The form is titled "Can refills" and contains several input fields with the following values: "6", "7", "832", "56", "1243", and "89". The field "Unsprayed rooms locked" is empty. At the bottom of the form, there are two buttons: "Close" and "Menu". The status bar at the top shows signal strength, the number "123", and battery level.

#### 4. Save and Complete:

After finishing data entry, the user can choose to save the data locally on the phone or to upload the data directly to the DHIS2 server.

A screenshot of the same mobile application interface as above, but with a "Menu" overlay on the right side. The menu has a title "Menu" and two options: "1 Save" and "2 Complete". The "Save" option is highlighted. The form fields and buttons are visible behind the menu.

If the user saves the data form, they can edit the form at a later point in time if they need to. When selecting a period once again, the period will be marked as "Saved" as seen in the next screen shot.



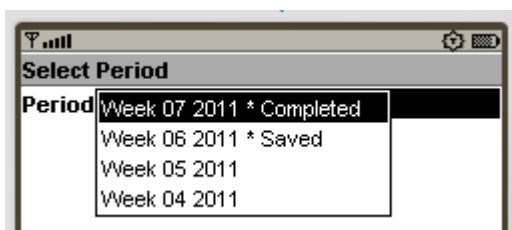
If the user selects "Complete", and the data entry form is not complete, the user will be asked if they are certain they wish to submit the form as incomplete. Once the form has been submitted, a message should be displayed informing the user that the transmission was successful.



**Notes**

1. Period list:

Periods marked with an asterisk (\*) is the period that is completed or saved, depending on the status of the data entry.



All periods that are not in period list are considered old and will be deleted automatically.

2. Storing values duration

The number of saved forms on mobile are limited only by the effective amount of storage of the mobile device.

---

Forms are saved for limited period only, depending on the frequency of collection of the particular dataset.

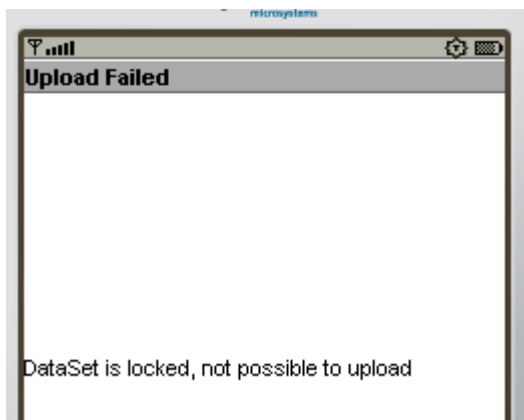
- Daily Forms: 2 months (current and previous month)
- Weekly Forms: 4 weeks (current and 3 previous week)
- Monthly Forms: 2 months (current and previous month)
- Quarterly Forms: 2 quarters (current and previous quarter)
- Yearly Forms: 2 years (current and previous year)

### 3. Completed forms - Uneditable forms

If the form has been completed, the user can view the form on their phone, but they cannot make any subsequent edits to the form. Each field is greyed out and inactive for editing.

### 4. Re-Edit completed forms

If the user wishes to edit data which has already been submitted to the server, they can do so by pressing the "Edit" button. They are allowed to do this assuming that the dataset has not been locked for the period in question. If they attempt to upload the data, the user will be informed that the dataset has been locked, and it is not possible to upload the data.



### 5. Update Forms:

This function is used to synchronize the forms on mobile and on server. The process is automatically triggered after entering PIN number.

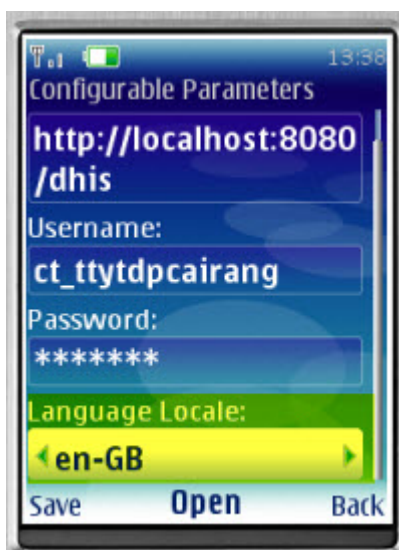
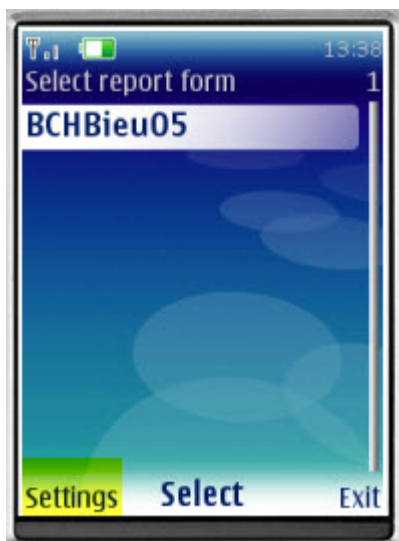
Note: Checking and downloading updated forms process run in background. After finished, prompt is displayed to ask user whether refresh form list or stay where they are.

### 6. Multi-Language Support:

This function help user to choose language of mobile's GUI (graphical user interface) and content's language (Forms).

The forms must be translated on server, otherwise, default language is used.

Default language of first login is English. Change language in Setting menu will affect both interface and content.



Multi-Language Interface: In Setting menu, there are list of supported language (downloaded from server). Language of GUI is only changed after restart application.

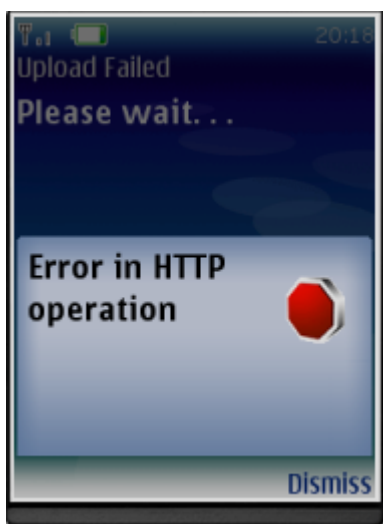
---

Multi-Language Content (forms): Form's language is change after click "Save". In case there are many forms, it take several minutes to save setting.

### Troubleshooting

- Data has been entered on the phone but does not appear on the server

This usually occurs when users enter data on the phone, but cannot send it to the server. This may be because of the configuration of the phone, lack of credit on the phone, or lack of coverage. Usually an error message is displayed as shown below.



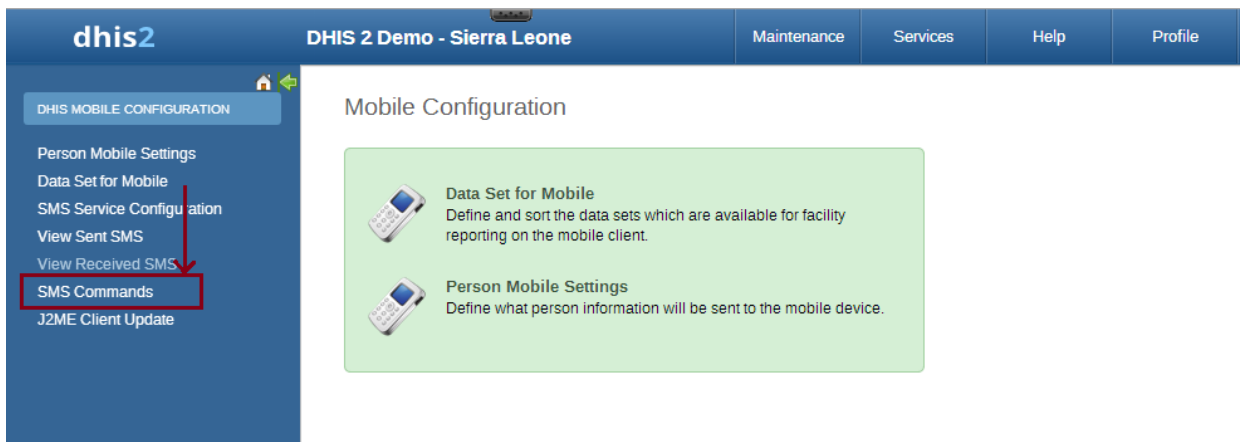
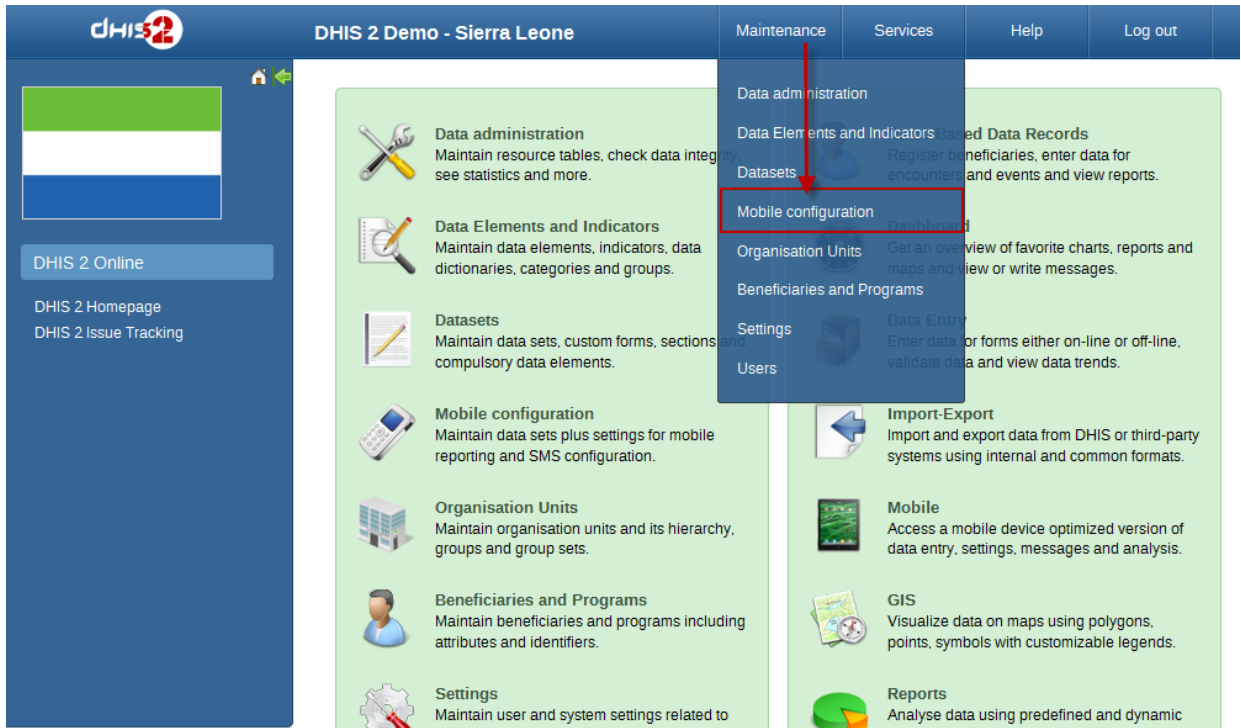
Users should be informed that if they see this error, then it means that their data has not been transmitted.

### SMS Command

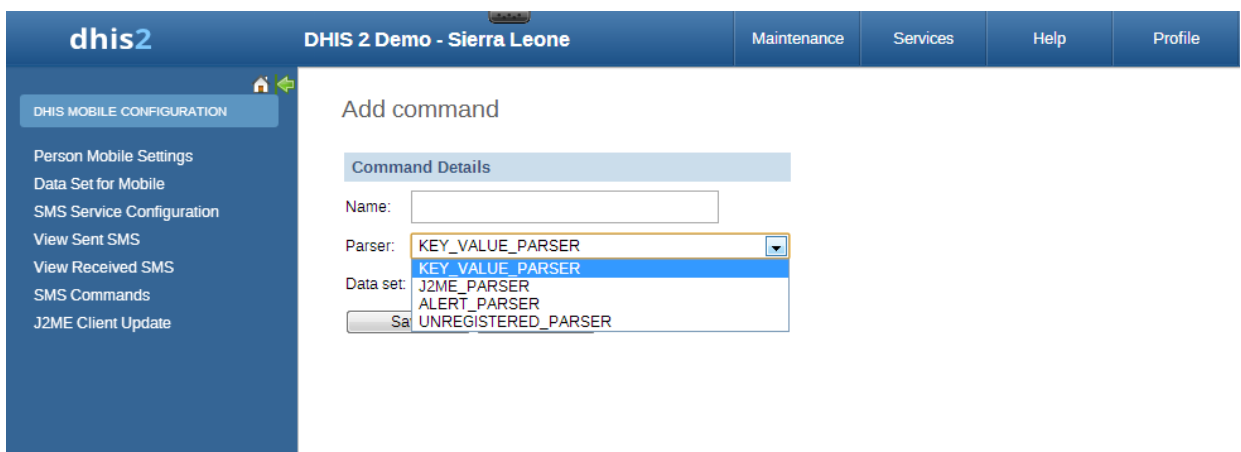
SMS command feature helps DHIS2 system receiving SMS from users, patients, or even anonymous. A SMS command is an object containing the configurations for each SMS form: reporting data from phones or j2me apps, alerting users, registering patient or user, etc.

#### Set up SMS command

This is where you can create a new SMS command

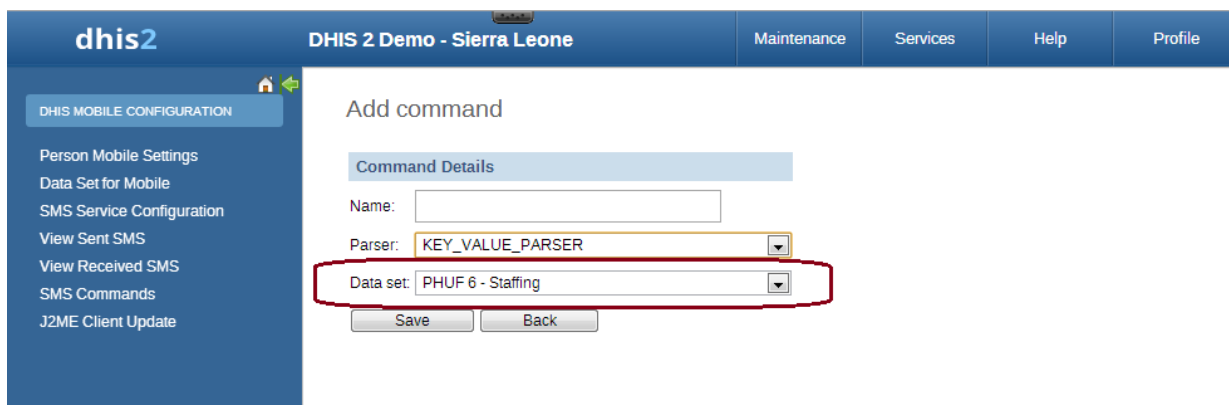


Usually each SMS command has its own property, then the setting up process may be different from each other. Currently, we have 4 types of SMS command:

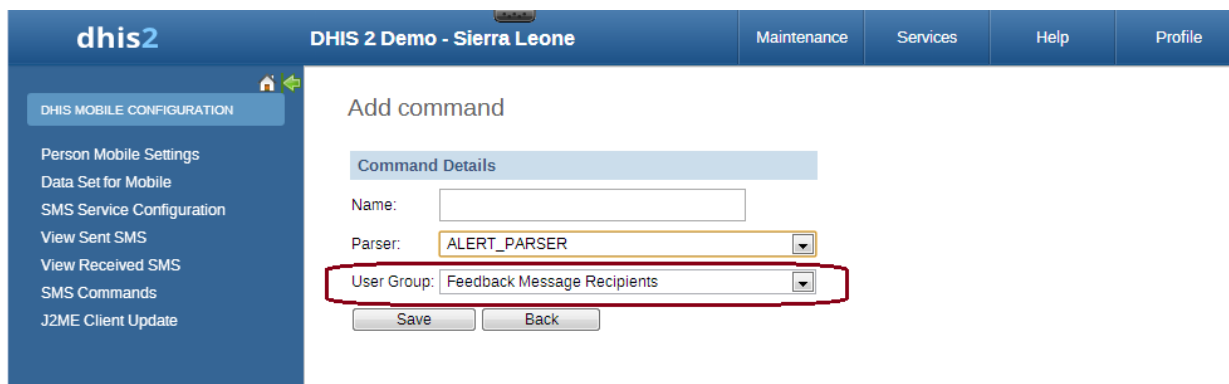




With KEY\_VALUE\_PARSER and J2ME\_PARSER, the SMS command will have dataset because those are used for reporting data. If data is reported for a Period which is already approved then SMS response will be sent back containing information about approval status of the period.



With ALERT\_PARSER and UNREGISTERED\_PARSER, the SMS command will have user group because those are used for sending message such as SMS, DHIS2 conversation, email.



There are certain parameters which are common to all SMS Command types. These parameters have default values configured in the system, if user does provide any value to these parameters then those default ones will be used. Here is the list of those parameters

**Common Parameters**

| Parameter   | Type   | Description  |
|---|--------|--|
| Code Value Separator                                  | String | To provide custom code value separator. Default is "="                                   |
| Field Separator                                       | String | To provide custom field separator. Default is " "  |
| Reply message if no codes are sent (only the command) | String | To provide message if no code is found in SMS text input. Default is "Parameter missing" |

| Parameter                                    | Type   | Description  |
|--|--------|--|
| Wrong format message                         | String | To provide message if command is not formatted correctly. Command should be formatted as per code value separator. This message will also be sent back if any mandatory parameter is missing.                              |
| No user message                              | String | To provide message if sending phone number is not registered in DHIS2.   |
| User belong to more than one OrgUnit message | String | Certain SMS command types require user ( retrieved from sending phone number ) to be associated with only one organization unit. This message can be configured to be sent back in case that requirement is not fulfilled. |
| Success Message                              | String | To provide message that will be sent upon successful completion of the process.  |

### SMS Command Type

The SMS command is basically defined by its parser type. In other word, each SMS command has one unique parser to parse the plain text SMS, then the result will be used for the purpose of that SMS command.

### SMS Command for Reporting Data

In order to report data for example data set (aggregation), we use SMS commands which have KEY\_VALUE\_PARSER (for phone's plain text), or J2ME\_PARSER (for j2me apps)

If the command has name "report", and a list of data element with code like above. The format should be: [command's name] [code][value] [code][value] [code][value]....,the [value] of course might be changed depends on real data, so you have to prepare an SMS text like this example: **report vo2 vn5 a2 b6 z3 x1**

In case the command has a separator for instance ".", the SMS text should be:

**report vo.2.vn.5.a.2.b.6.z.3.x.1**

or report vo.2|vn.5|a.2|b.6|z.3|x.1

Moreover in SMS text input, orgUnit can be specified like this **org orgUnitCode** If no orgUnit is specified in SMS then user is retrieved first from the sending phoneNumber and then orgUnit from that user. As far as PeriodType is concerned it should be specified in this format "ddMM" for example 3108, but in case its not specified then PeriodType will be retrieved from DataSet attached to SMSCommand

With the J2ME\_PARSER, you don't need to prepare those SMS text, because the J2ME will do this job

The screenshot shows the 'Edit SMS command' interface. On the left is a navigation menu with options: DHIS Mobile Configuration, Data Set for Mobile, SMS Service Configuration, View Sent SMS, View Received SMS, SMS Commands, and J2ME Client Update. The main area is titled 'Edit SMS command' and contains the following fields:

- Name:** report
- Parser:** KEY\_VALUE\_PARSER
- Data set:** Population
- Completeness method:** Receive all data value
- Use current period for reporting:**
- Code and value Separator:** [Empty text box]
- Reply message if no codes are sent (only the command):** [Empty text box]
- Wrong format message:** [Empty text box]
- No user message:** [Empty text box]
- User belong to more than one OrgUnit message:** [Empty text box]
- Success Message:** [Empty text box]

User can set the custom response message for "Wrong format message", "No User Message", "User belong to more than one OrgUnit message" and "Success message". If no custom message is being set, system will use the default message.

### SMS Command for Entity Enrollment

TRACKED\_ENTITY\_REGISTRATION\_PARSER can be used to enrol tracked entity into the system.

The screenshot shows the 'Add command' form in the DHIS 2 Demo - Sierra Leone interface. The form is titled 'Add command' and is located under the 'DHIS Mobile Configuration' menu. The form includes the following fields and options:

- Name \***: A text input field.
- Parser**: A dropdown menu with the selected option 'Tracked entity registration parser'.
- Program \***: A dropdown menu with the selected option 'MNCH / PNC (Adult Woman)'.
- Buttons**: 'Save' and 'Cancel' buttons.

Command name will be followed by tracked entity attributes pertaining to specific program which this command is associated with. Program selection will be done while creating this command.

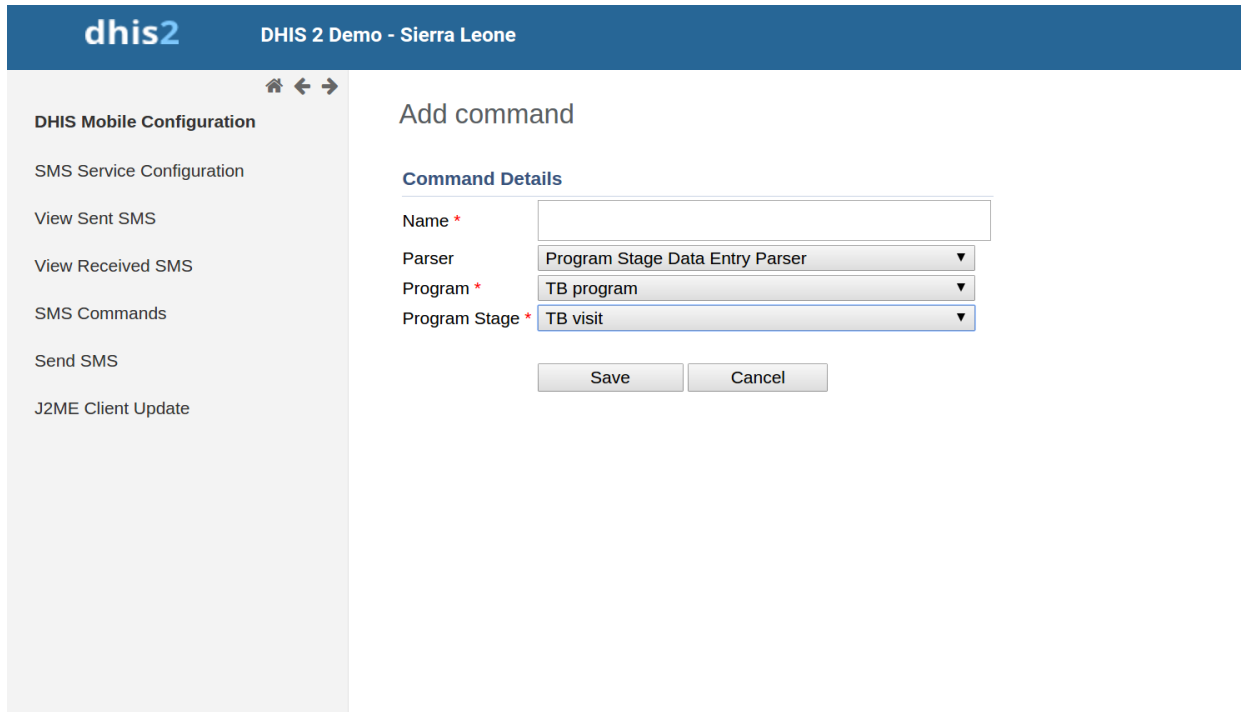
Default text pattern ( if field separator and codevalue separator is not provided ) for this parser would look like this. **childProgram fn=xmen|ln=xmen2|age=4**

In case field separator is for example "," then text would look like this. **childProgram fn=xmen,ln=xmen2,age=4**

Rest of the behavior is same as for other commands. If user does not provide those parameters then default ones will be used.

#### **SMS Command for Program Stage Data Entry**

PROGRAM\_STAGE\_DATAENTRY\_PARSER can be used to enter program stage related data for a specific tracked entity instance.



Command name will be followed by data elements pertaining to specific program stage which this command is associated with. Program and program stage selection will be done while creating this command.

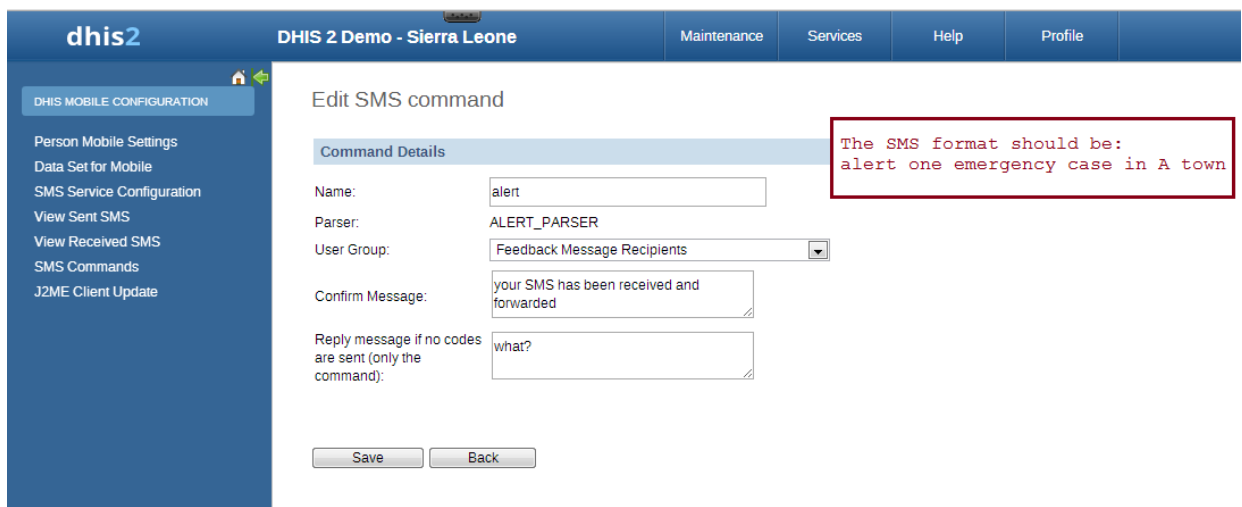
Default text pattern ( if field separator and codevalue separator is not provided ) for this parser would look like this. **programstage bcgd=1|opvd=2|wght=34**

In case field separator is for example "," then text would look like this. **programstage bcgd=1,opvd=2,wght=34**

Rest of the behavior is same as for other commands. If user does not provide those parameters then default ones will be used.

**SMS Command for Alerting, Registering**

In order to alert users, we use SMS commands which have ALERT\_PARSER (for phone's plain text), or UNREGISTERED\_PARSER (for j2me apps). UNREGISTERED\_PARSER can also be used for registering IDSR rumour.



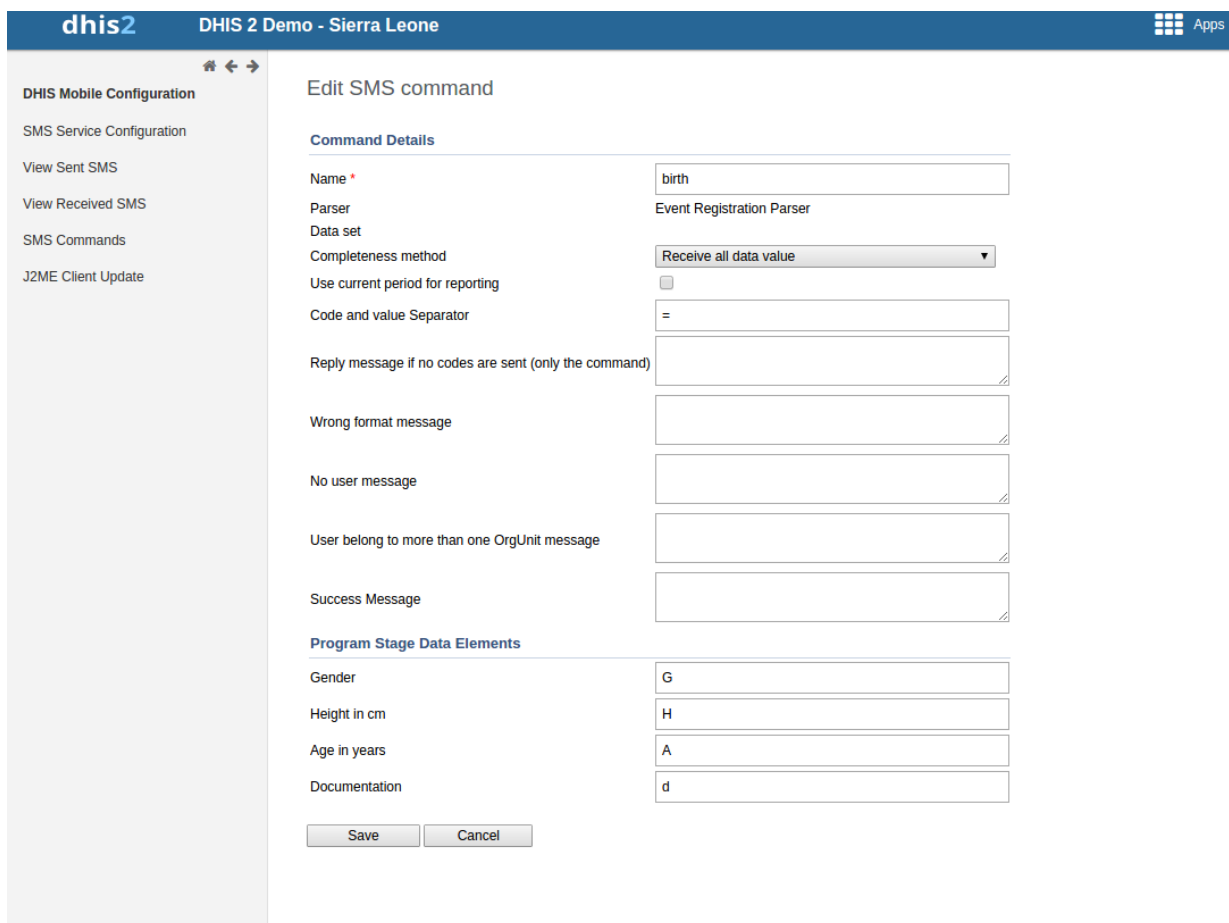
The format of those command will be: [command's name] [text], for example:

**alert one emergency case in A town**

Commands which has ALERT\_PARSER will be received from users only

**SMS Command for Event Registration**

Event Registration can be used to register anonymous event into the system based on the data collected through SMS. This command type is associated with Programs of type WITHOUT\_REGISTRATION. For example Birth events can be tracked using this parser.



The format of those command will be: [command's name] [code][separator][value], for example:

**birth A=1,B=2,G=Male**

Code/Value separator is configurable. Pipe "|" is by default taken as field separator. Commands which has EVENT\_REGISTRATION\_PARSER will be received from DHIS2 users only. Once command is successfully received then data received in SMS will be parsed and event will be registered in DHIS2.

**SMS Service**

SMS Service is a generic service used for sending/receiving SMS. Any other DHIS2 module can include this service and utilize it to send and receive SMS from users or workers in the field.

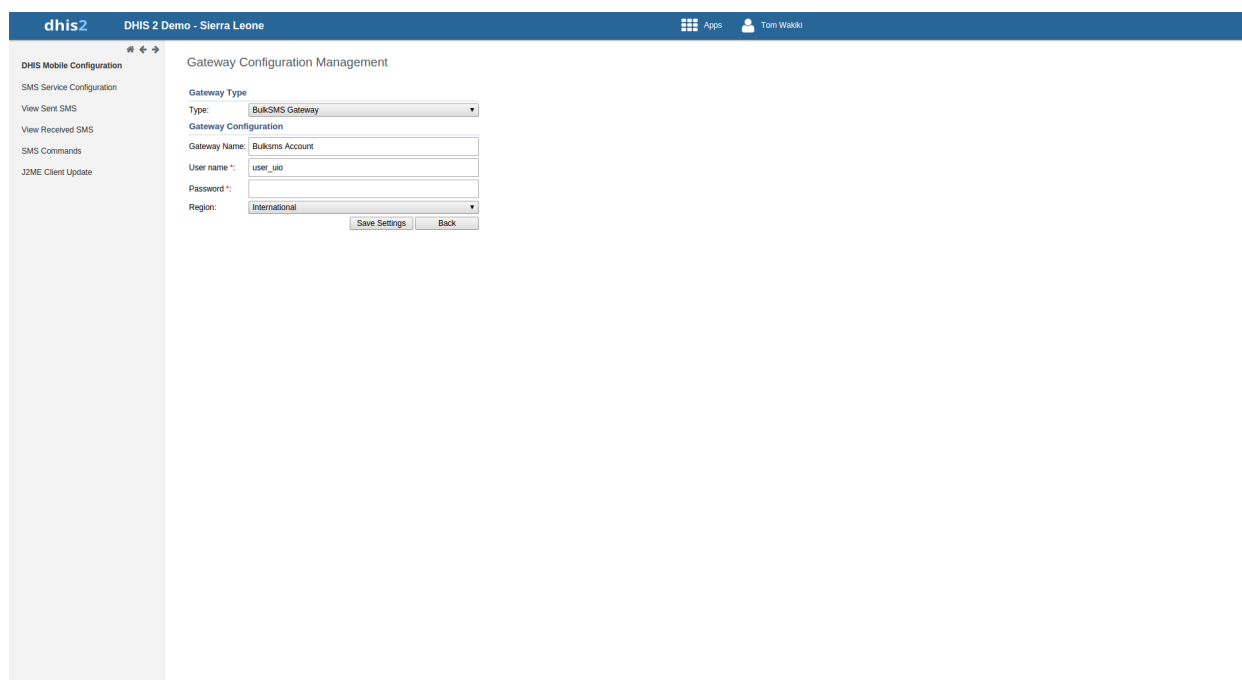
## Setting up SMS service

There are few pre-requisites in order to make this service functional. There are two ways to complete these steps. One way is to configure gateway from the GUI in Mobile Configuration Module. The other way is to use SMS Web Api.

- Configure SMS Gateway

### Configure SMS Gateway

There are five different types of Gateways supported by SMS Service. SMS can be sent if any one of the gateway is configured. If more than one gateways are present, then they will be used in round-robin fashion for load balancing. There are different parameters for different type of gateway. The Gateway can be configured in GUI in Mobile Configuration Module as shown in the figure. More information about parameters needed to configure gateway can be found in [Gateway Configurations](#)

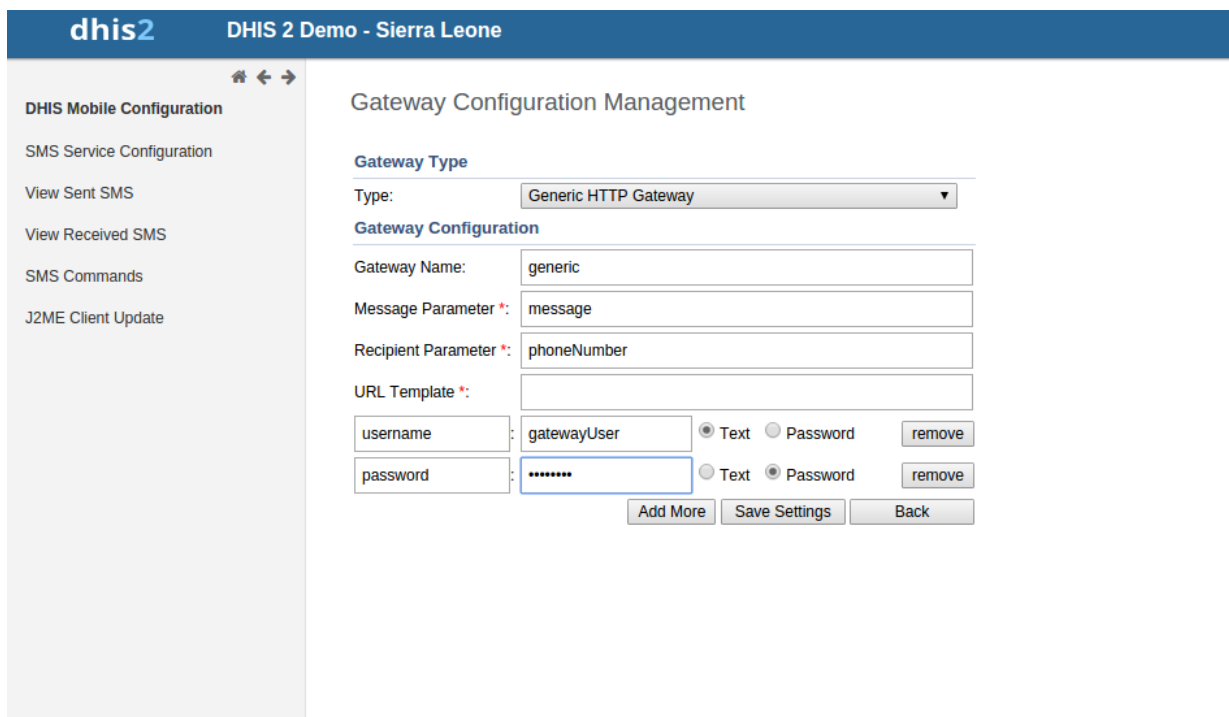


The screenshot shows the 'Gateway Configuration Management' interface in the DHIS2 mobile configuration module. The page title is 'DHIS 2 Demo - Sierra Leone'. The left sidebar contains navigation links: 'DHIS Mobile Configuration', 'SMS Service Configuration', 'View Sent SMS', 'View Received SMS', 'SMS Commands', and 'J2ME Client Update'. The main content area is titled 'Gateway Configuration Management' and contains the following fields:

- Gateway Type:** A dropdown menu with 'BulkSMS Gateway' selected.
- Gateway Configuration:**
  - Gateway Name:** A text input field containing 'Bulksms Account'.
  - User name:** A text input field containing 'user\_jio'.
  - Password:** A text input field.
  - Region:** A dropdown menu with 'International' selected.
- Buttons:** 'Save Settings' and 'Back' buttons are located at the bottom right of the form.

### Configure GenericHttp Gateway

Many DHIS2 instances are using GenericHttpGateway to connect to their local gateways. These local gateways provides HTTP APIs for sending SMS. In new GenericHttpGateway it is now possible to configure url parameters provided in their APIs. For example <http://gateway.com/sendMessage?username=AA&password=xxxxx&message=testing&msisdn=9999>. In this url username, password, message, msisdn are parameters that are required by external gateways. Now in GenericHttp these parameters are configurable which was not possible in previous releases. Making is configurable will help DHIS2 to interact with other gateways which have different url formats.



### Gateway Configurations

Below table shows the parameters required for configuring gateway.

#### Gateway Configuration Parameters

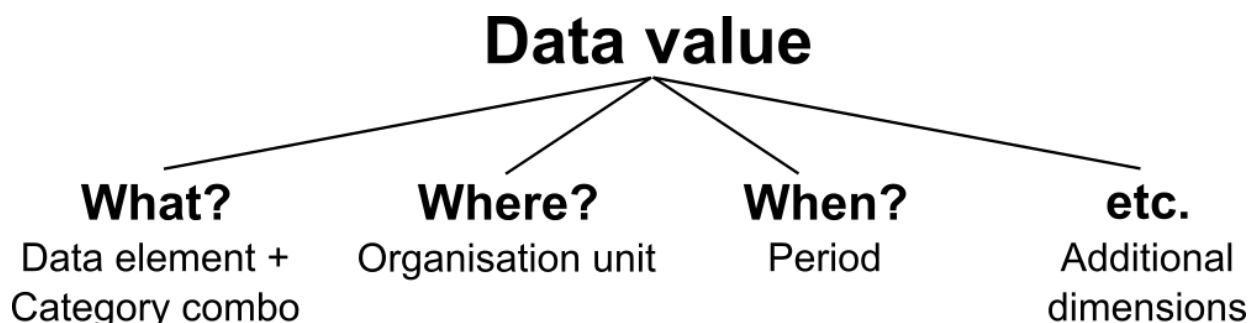
| Parameter           | BulkSMS Gateway | Clickatell Gateway             | Generic HTTP Gateway | SMPP Gateway | Description   |
|---------------------|-----------------|--------------------------------|----------------------|--------------|---|
| Gateway Name        | Optional        | Optional                       | Optional             | Optional     | Used as gateway name                                |
| User Name           | Required        | Optional (if token is used)    | Required             | Required     | Used for API authentication                         |
| Password            | Required        | Optional (if token is used)    | Required             | Required     | Used for API authentication                         |
| Auth-Token          | N/A             | Optional (if password is used) | N/A                  | N/A          | Used for API authentication                         |
| MessageParameter    | N/A             | N/A                            | Required             | N/A          | Message query parameter (e.g., message=Hi)          |
| RecipientParameter  | N/A             | N/A                            | Required             | N/A          | Recipient query parameter (e.g., phoneNumber=12345) |
| URL Template        | N/A             | N/A                            | Required             | Required     | Url Template is used to construct the gateway URL   |
| Headers             | N/A             | N/A                            | Optional             | N/A          | Header options for the gateway request              |
| useGet              | N/A             | N/A                            | Optional             | N/A          | HTTP POST method flag                               |
| systemType          | N/A             | N/A                            | N/A                  | Required     | SystemType parameter                                |
| typeOfNumber        | N/A             | N/A                            | N/A                  | Required     | TypeOfNumber parameter                              |
| numberPlanIndicator | N/A             | N/A                            | N/A                  | Required     | NumberPlanIndicator parameter                       |
| bindType            | N/A             | N/A                            | N/A                  | Required     | BindType parameter                                  |
| compressed          | N/A             | N/A                            | N/A                  | Optional     | Compressed parameter                                |



## About data dimensions

### Data dimensions: Core building blocks in DHIS2

A data value in DHIS2 is described by at least three dimensions: 1) data element, 2) organisation unit, and 3) period. These dimensions form the core building blocks of the data model.



As an example, if you want to know how many children that were immunised for measles in Gerehun CHC in December 2014, the three dimensions which describe that value are the data element "Measles doses given", the organisation unit "Gerehun CHC", and the period "December 2014". All data values have at least these three dimensions describing *what*, *where*, and *when*.

In addition to the data element, organisation unit, and period dimensions, data values may also be associated with additional data dimensions. A common use of this feature is to describe data values which are reported by multiple partners in the same location for the same data element and time period. In principle, it can be used as a "free-form" dimension, to describe multiple observations of the same phenomena at the same place and time. For more information about this, see Chapter 34: Additional data dimensions.

| Organisation Unit | Data Element        | Period | Value |
|-------------------|---------------------|--------|-------|
| Gerehun CHC       | Measles doses given | Dec-09 | 22    |
| Tugbebu CHP       | Measles doses given | Dec-09 | 18    |

### Data elements: the *what* dimension

#### Data element categories

The data element mentioned above, "Measles doses given", can be further disaggregated into by combinations of data element categories. Each system administrator of DHIS2 is free to define any data element category dimensions for data elements. There are however, certain best practices which should generally be followed.

Given the example of Measles vaccination, if you want to know whether these vaccines were given at the facility (fixed) or out in the community as part of the outreach services then you could add a dimension called e.g. "Place of service" with the two possible options "Fixed" and "Outreach". Then all data collected on measles immunisation would have to be disaggregated along these to options. In addition to this you might be interested in knowing how many of these children who were under 1 year or above 1 year of age. If so you can add an Age dimension to the data element with the two possible options "<1 y" and ">1 y". This implies further detail on the data collection process. You can also apply both categories "Place of service" and "Age" and combine these into a data element category combination e.g. called "EPI disaggregation". You would then be able to look at four different more detailed values in stead of only one as in the example above for the data element "Measles doses given": 1) "Fixed and <1 y, 2) Fixed and >1 y, 3) Outreach and <1 y, and 4) Outreach and >1 y. This adds complexity to how data is collected

by the health facilities, but at the same time opens up for new possibilities of detailed data analysis of Measles immunisation.

**Example of detailed storage of data values when using data element categories "Place of Service" and "Age" (simplified for readability compared to the actual database table)**

| Organisation Unit | Data Element           | Place of service | Age  | Period | Value |
|-------------------|------------------------|------------------|------|--------|-------|
| Gerehun<br>CHC    | Measles<br>doses given | Fixed            | <1 y | Dec-09 | 12    |
| Gerehun<br>CHC    | Measles<br>doses given | Outreach         | <1 y | Dec-09 | 4     |
| Gerehun<br>CHC    | Measles<br>doses given | Fixed            | >1 y | Dec-09 | 4     |
| Gerehun<br>CHC    | Measles<br>doses given | Outreach         | >1 y | Dec-09 | 2     |
| Tugbebu<br>CHP    | Measles<br>doses given | Fixed            | <1 y | Dec-09 | 10    |
| Tugbebu<br>CHP    | Measles<br>doses given | Outreach         | <1 y | Dec-09 | 4     |
| Tugbebu<br>CHP    | Measles<br>doses given | Fixed            | >1 y | Dec-09 | 3     |
| Tugbebu<br>CHP    | Measles<br>doses given | Outreach         | >1 y | Dec-09 | 1     |

### Data element group sets

While the data element categories and their options described above provide the level of detail (disaggregation) at the point of data collection and how data values get stored in the database, the data element group sets and groups can be used to add more information to data elements after data collection. As an example, if you are analysing many data elements at the same time in a report, you would want to group these based on some criteria. Instead of looking at all the data captured in a form for immunisation and nutrition, you might want to separate or group data elements along a programme dimension (known as a data element group set in DHIS2) where "Immunisation" (or EPI) and "Nutrition" would be the two groups.

Expanding the report to include data from other programs or larger themes of health data would mean more groups to such a group set dimension, like "Malaria", "Reproductive Health", "Stocks". For this example, you would create a data element group set called "Programme" (or whatever name you find appropriate), and to represent the different programmes in this dimension you would define data elements groups called "EPI", "Nutrition", "Malaria", "Reproductive health" and so on, and add all these groups to the "Programme" group set. To link or tag the data element "Measles doses given" to such a dimension you must (in our example) add it to the "EPI" group. Which groups you add "Measles doses given" to does not affect how health facilities collect the data, but adds more possibilities to your data analysis. So for the group set dimensions there are three levels; the group set (e.g. "Programme"), the group (e.g. "EPI"), and the data element (e.g. "Measles doses given").

Indicators can be grouped into indicator groups and further into indicator group sets (dimensions) in exactly the same way as data elements.

| Organisation Unit | Data Element        | Programme | Period | Value |
|-------------------|---------------------|-----------|--------|-------|
| Gerehun CHC       | Measles doses given | EPI       | Dec-09 | 22    |
| Gerehun CHC       | Vitamin A given     | Nutrition | Dec-09 | 16    |
| Tugbebu CHP       | Measles doses given | EPI       | Dec-09 | 18    |
| Tugbebu CHP       | Vitamin A given     | Nutrition | Dec-09 | 12    |
| Gerehun CHC       | Malaria new cases   | Malaria   | Dec-09 | 32    |
| Tugbebu CHP       | Malaria new cases   | Malaria   | Dec-09 | 23    |

### Organisation units: the *where* dimension

Organisation units in DHIS2 should typically represent a location, such as a Community Health Centre or referral hospitals, or an administrative unit like "MoHS Sierra Leone", "Bo District" or "Baoma Chiefdom". In non-health sector applications, they could be "schools" or "water points". Orgunits are represented in a default hierarchy, usually the default administrative hierarchy of a country or region, and are therefore assigned an organisational level. As an example, Sierra Leone has four organisation unit levels; National, District, Chiefdom, and PHU, and all orgunits are linked to one of these levels. An orgunit hierarchy in DHIS2 can have any number of levels. Normally data is collected at the lowest level, at the health facility, but can be collected at any level within the hierarchy, such as both the districts as well as the facility level.

When designing reports at higher levels with data aggregated at the district or province level, DHIS2 will use the hierarchy structure to aggregate all the health facilities' data for any given unit at any level. The organisation unit level capturing the data always represents the lowest level of detail that is possible to use in data analysis, and the organisational levels define the available levels of aggregation along a geographical dimension.

### Organisation unit group sets and groups

While facility level is typically the lowest geographical level for disaggregation in DHIS2, there are ways to flexibly group organisation units into any number of dimensions by using the organisation unit groups and group set functionality. As an example, if all facilities are given an official type like "Community health center" or "District Hospital, it is possible to create an organisation unit group set called "Type" and add groups with the names of the types mentioned above. In order for the group sets to function properly in analysis, each organisation unit should be a member of a single group (compulsory and exclusive) within a group set. Stated somewhat differently, a facility should not be both a "Community health center" as well as a "District hospital".

### Inherit the values of an organisation unit group set

You can improve the completeness of your aggregated data by inheriting the settings of a "parent" organisation unit in your organisation unit hierarchy. This is particularly helpful if you are aggregating the data of more than 100 organisation units. See the [Maintenance](#) app documentation for more details.

### Alternative organisation unit hierarchies - advanced use of group sets and groups

A more advanced use of organisation unit group sets is to create alternative hierarchies e.g. use administrative borders from other ministries. In Sierra Leone that could mean an alternative

hierarchy of 1:MoHS, 2:Districts, and 3: Local councils, instead of the four-level hierarchy with chiefdoms and PHUs. For instance, if all PHUs are linked to a specific local council, it would be possible to look at data aggregated by local council instead of chiefdom. Then you would first need to create a group set called "Local council" and then create one organisation unit group for every local council, and finally link all PHUs to their corresponding local council group.

| District | OrgUnit Type | Data Element        | Period | Value |
|----------|--------------|---------------------|--------|-------|
| Bo       | CHC          | Measles doses given | Dec-09 | 121   |
| Bo       | CHP          | Measles doses given | Dec-09 | 98    |
| Bo       | MCHP         | Measles doses given | Dec-09 | 87    |
| Bombali  | CHC          | Measles doses given | Dec-09 | 110   |
| Bombali  | CHP          | Measles doses given | Dec-09 | 67    |
| Bombali  | MCHP         | Measles doses given | Dec-09 | 59    |

### Best practice on the use of group sets and groups

As mentioned above, all organisation units should be a member of a single group within a group set. If an organisation unit is not present in any group or is present in multiple group members in a group set, this can lead to unexpected results in the analysis modules. DHIS2 has integrity checks to identify organisation units which are not present in any organisation unit group set member, or which is present in multiple groups.

### Period: the *when* dimension

The period dimension becomes an important factor when analysing data over time e.g. when looking at cumulative data, when creating quarterly or annual aggregated reports, or when doing analysis that combines data with different characteristics like monthly routine data, annual census/population data or six-monthly staff data.

### Period types

In DHIS2, periods are organised according to a set of fixed period types described below. The following list is for the default ISO 8601 calendar type.

1. Daily
2. Weekly: The system supports various weekly period types, with Monday, Wednesday, Thursday, Saturday and Sunday as the first day of the week. You collect data through data sets configured to use the desired weekly period type. The analytics engine will attribute weekly data to the month which contains four days or more of the week.
3. Bi-weekly: Two week periods beginning with the first week of the year.
4. Monthly: Refers to standard calendar months.
5. BiMonthly: Two-month periods beginning in January.
6. Quarterly: Standard ISO quarters, beginning in January.

- 
- SixMonthly: Six-month periods beginning in January
- 7.
  8. Yearly: This refers to a calendar year.
  9. Financial April: Financial year period beginning on April 1<sup>st</sup> and ending on March 31<sup>st</sup> of the calendar next year
  10. Financial July: Financial year period beginning on July 1<sup>st</sup> and ending on June 31<sup>st</sup> of the calendar next year
  11. Financial Oct: Financial year period beginning on October 1<sup>st</sup> and ending on September 31<sup>st</sup> of the calendar next year
  12. Six-monthly April: Six-month periods beginning on April 1<sup>st</sup> with a duration of six calendar months.

As a general rule, all organisation units should collect the same data using the same frequency or periodicity. A data entry form therefore is associated with a single period type to make sure data is always collected according to the correct and same periodicity across the country.

It is possible however to collect the same data elements using different period types by assigning the same data elements to multiple data sets with different period types, however then it becomes crucial to make sure no organisation unit is collecting data using both data sets/period types as that would create overlap and duplication of data values. If configured correctly the aggregation service in DHIS2 will aggregate the data together, e.g. the monthly data from one part of the country with quarterly data from another part of the country into a national quarterly report. For simplicity and to avoid data duplication it is advised to use the same period type for all organisation units for the same data elements when possible.

### Relative periods

In addition to the fixed period types described in the previous section, DHIS2 also support relative periods for use in the analysis modules.

When creating analytical resources within DHIS2 it is possible to make use of the relative periods functionality. The simplest scenario is when you want to design a monthly report that can be reused every month without having to make changes to the report template to accommodate for the changes in period. The relative period called "Last month" allows for this, and the user can at the time of report generation through a report parameter select the month to use in the report.

A slightly more advanced use case is when you want to make a monthly summary report for immunisation and want to look at the data from the current (reporting) month together with a cumulative value for the year so far. The relative period called "This year" provides such a cumulative value relative to the reporting month selecting when running the report. Other relative periods are the last 3,6, or 12 months periods which are cumulative values calculated back from the selected reporting month. If you want to create a report with data aggregated by quarters (the ones that have passed so far in the year) you can select "Last four quarters". Other relative periods are described under the reporting table section of the manual.

| Organisation Unit | Data Element        | Reporting month | So far this year | Reporting month name |
|-------------------|---------------------|-----------------|------------------|----------------------|
| Gerehun CHC       | Measles doses given | 15              | 167              | Oct-09               |
| Tugbebu CHP       | Measles doses given | 17              | 155              | Oct-09               |

---

## Aggregation of periods

While data needs to be collected on a given frequency to standardise data collection and management, this does not put limitations on the period types that can be used in data analysis and reports. Just like data gets aggregated up the organisational hierarchy, data is also aggregated according to a period hierarchy, so you can create quarterly and annual reports based on data that is being collected on a Monthly basis. The defined period type for a data entry form (data set) defines the lowest level of period detail possible in a report.

### Sum and average aggregation along the period dimension

When aggregating data on the period dimension there are two options for how the calculation is done, namely sum or average. This option is specified on a per data element in DHIS2 through the use of the 'aggregation operator' attribute in the Add/Edit Data Elements dialog.

Most of the data collected on a routinely basis should be aggregated by summing up the months or weeks, for instance to create a quarterly report on Measles immunisation one would sum up the three monthly values for "Measles doses given".

Other types of data that are more permanently valid over time like "Number of staff in the PHU" or an annual population estimate of "Population under 1 year" need to be aggregated differently. These values are static for all months as long as there are valid data. For example, the "Estimated population under 1", calculated from the census data, is the same for all months of a given year, or the number of nurses working in a given facility is the same for every month in the 6 months period the number is reported for.

This difference becomes important when calculating an annual value for the indicator morbidity service burden for a facility. The monthly head-counts are summed up for the 12 months to get the annual headcount, while the number of staff for the PHU is calculated as the average of the two 6-monthly values reported through the 6-monthly staff report. So in this example the data element "OPD headcount" would have the aggregation operator "SUM" and the data element "Number of staff" would have it set to "AVERAGE".

Another important feature of average data elements is the validity period concept. Average data values are standing values for any period type within the borders of the period they are registered for. For example, an annual population estimate following the calendar year, will have the same value for any period that falls within that year no matter what the period type. If the population under 1 for a given facility is 250 for the year of 2015 that means that the value will be 250 for Jan-15, for Q3-15, for Week 12 of 2015 and for any period within 2015. This has implications for how coverage indicators are calculated, as the full annual population will be used as denominator value even when doing monthly reports. If you want to look at an estimated annual coverage value for a given month, then you will have the option of setting the indicator to "Annualised" which means that a monthly coverage value will be multiplied by a factor of 12, a quarterly value by 4, in order to generate an effective yearly total. The annualised indicator feature can therefore be used to mimic the use of monthly population estimates.

## Data collection vs. data analysis

### Data collection and storage

Datasets determine what raw data that is available in the system, as they describe how data is collected in terms of periodicity as well as spatial extent. Data sets define the building blocks of the data to be captured and stored in DHIS2. For each data dimension we decide what level of detail the data should be collected at namely 1) the data element (e.g. diagnosis, vaccine, or any event taking place) and its categories (e.g. age and gender), 2) the period/frequency dimension, and 3) the organisation unit dimension. For any report or data analysis you can never retrieve more detailed data than what is defined in the data sets, so the design of the datasets and their

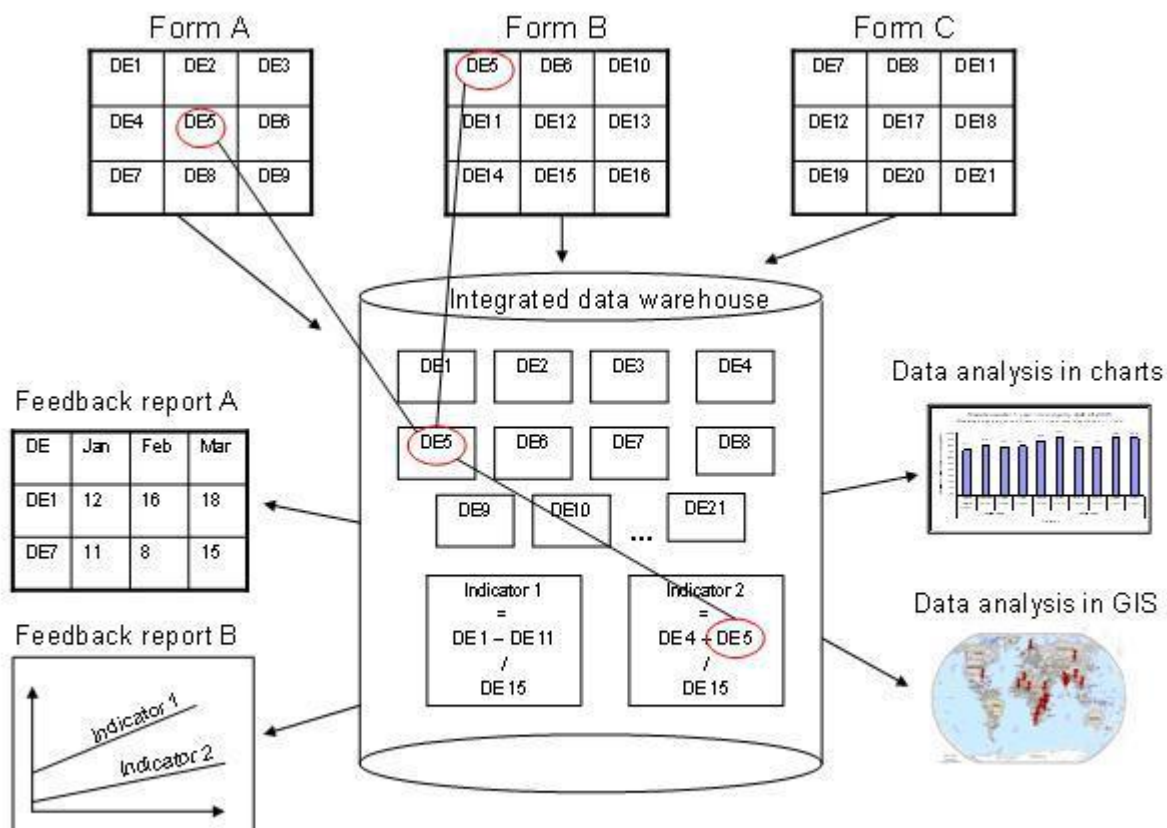
---

corresponding data entry forms (the data collection tools) dictate what kind of data analysis will be possible.

**Input does not equal Output**

It is important to understand that the data entry forms or datasets themselves are not intrinsically linked to the underlying data value and that the meaning of data is only described by the data element (and its categories). This makes it perfectly safe to modify datasets and forms without altering the data (as long as the data elements stay the same). This loose coupling between forms and data makes DHIS2 flexible when it comes to designing and changing new forms and in providing exactly the form the users want.

Another benefit of only linking data to data elements and not to forms, is the flexibility of creating indicators and validation rules based on data elements, and also in providing any kind of output report (in pivot tables, charts, maps etc.) that can combine data individually or across forms, e.g. to correlate data from different health programs. Due to this flexibility of enabling integration of data from various programs (forms) and sources (routine and semi permanent (population, staff, equipment)) a DHIS2 database is used as an integrated data repository for many or all parts of the aggregated data in a larger HIS. The figure below illustrates this flexibility.



In this example, we see that data elements from multiple forms can be combined to create a given indicator. As a more concrete example, one might collect "Population under one year of age" in an annual data set by district, and then collect a data element like "Fully immunized children" by month at the facility level. By annualizing the population, we can generate an approximation of the effective monthly population, and combining this with the aggregate total of the number of fully immunized children by month, it would be possible to generate an indicator "Fully immunized coverage", consisting of the aggregated total of children who are fully immunized, divided by the effective monthly population.

---

**Extended examples of data elements and forms**

The table below combines data element the two group sets Diagnosis (all the diseases) and Morbidity/Mortality (New cases, Follow-ups, Referrals, Deaths) with the data element category PHU/Community. Deaths are captured in a separate form with other dimensions (e.g. the PHU/Community) than morbidity.

| Diagnosis                               | New cases | Follow-up    | Referrals | Deaths        |                  | Total     |
|---|-----------|--------------|-----------|---------------|------------------|-----------|
|   |           |              |           | <i>PHU</i>    | <i>Community</i> |           |
| <b>Malaria</b>                          | <b>19</b> | <b>9</b>     |           |               | <sup>1</sup>     | <b>29</b> |
| <b>Anaemia</b>                          | <b>1</b>  | <b>1</b>     | <b>4</b>  |               | <sup>23</sup>    | <b>29</b> |
| <b>All Others</b>                       | <b>1</b>  | <b>1</b>     | <b>6</b>  | <b>5</b>      | <b>5</b>         | <b>18</b> |
| <b>Diarrhoea With Blood (Dysentery)</b> | <b>13</b> |              |           |               | <sup>1</sup>     | <b>14</b> |
| <b>Yellow Fever</b>                     | <b>3</b>  | <b>3</b>     |           | <sup>7</sup>  |                  | <b>13</b> |
| <b>Wounds/Trauma</b>                    |           |              |           | <sup>11</sup> |                  | <b>11</b> |
| <b>Tetanus</b>                          |           |              |           |               | <sup>11</sup>    | <b>11</b> |
| <b>Lassa Fever</b>                      |           |              |           | <sup>11</sup> |                  | <b>11</b> |
| <b>Measles</b>                          |           | <sup>1</sup> | <b>5</b>  | <b>2</b>      |                  | <b>8</b>  |
| <b>Etc. etc.</b>                        |           |              |           |               |                  |           |

This output table combines the two data element categories HIV\_Age and Gender with the data element group set ART Group. The group enables subtotals for staging and entry points summing up the data elements in that group. Subtotals for either age groups and gender would be other possible columns to easily include here.



| ART enrollment                |                               | Female |        |        |      | Male |       |       |     | Tot |
|-------------------------------|-------------------------------|--------|--------|--------|------|------|-------|-------|-----|-----|
| ART Group                     | Data Element                  | <15y   | 15-24y | 25-49y | >49y | <15  | 15-24 | 25-49 | >49 |     |
| <b>ART staging</b>            | ART enrollment stage 1        | 1      | 8      | 3      | 11   | 1    | 1     | 2     | 1   | 28  |
|                               | ART enrollment stage 2        | 1      | 2      | 15     | 2    | 2    | 1     | 3     | 1   | 27  |
|                               | ART enrollment stage 3        | 11     | 4      | 8      | 1    | 1    | 2     | 12    | 2   | 41  |
|                               | ART enrollment stage 4        | 11     | 1      | 1      | 1    | 1    | 1     | 11    | 1   | 28  |
| <b>ART staging total</b>      |                               | 24     | 15     | 27     | 15   | 5    | 5     | 28    | 5   | 124 |
| <b>ART entry points</b>       | ART entry point: Old patients | 1      | 10     | 10     | 1    | 1    | 1     | 15    | 2   | 41  |
|                               | ART entry point: Other        | 1      | 11     | 1      | 1    | 1    | 1     | 5     | 11  | 32  |
|                               | ART entry point: Transfer in  | 11     | 1      | 3      | 1    | 1    | 11    | 4     | 1   | 33  |
|                               | ART entry point: Walk in      | 1      | 3      | 15     | 3    | 2    | 1     | 7     | 3   | 35  |
|                               | ART entry point: PMTCT        | 1      | 1      | 1      | 1    | 1    | 1     | 1     | 1   | 8   |
|                               | ART entry point: transfer out | 1      | 1      | 1      | 1    | 11   | 1     | 1     | 1   | 18  |
| <b>ART entry points total</b> |                               | 16     | 27     | 31     | 8    | 17   | 16    | 33    | 19  | 167 |

### How this works in pivot tables

When doing data analysis in Excel pivot tables or any other OLAP based tool the dimensions become extremely powerful in providing many different views into the data. Each data element category or group set become a pivot field, and the options or groups become values within each of these fields. In fact categories and groupsets are treated exactly the same way in pivot tables, and so are orgunits, periods, and data elements. All these become dimensions to the data value that can be used to rearrange, pivot, filter, and to drill down into the data. Here we will show some examples of how the data dimensions are used in pivot tables.

Using the example of morbidity and mortality data, a pivot table can show how the dimensions can be used to view data for different aggregation levels.

The completely aggregated number is viewed when none of the pivot fields are arranged in the table area, as column or row fields, but are listed above the table itself as page field (filter).

|                          |         |
|--------------------------|---------|
| Country                  | (All)   |
| District                 | (All)   |
| Chiefdom                 | (All)   |
| year                     | (All)   |
| month                    | (All)   |
| referrals_age            | (All)   |
| mortality_age            | (All)   |
| phucommunity             | (All)   |
| morbidity_age            | (All)   |
| dataelement              | (All)   |
| MorbidityMortalityGroups | (All)   |
| diagnosis                | (All)   |
| Sum of value             |         |
| main_de_groups           | Total   |
| Morbidity                | 2084600 |

Here we have selected to look at the Morbidity total. The various data elements on morbidity have been ordered into the main\_de\_groups Morbidity (we will get back to Mortality later). The fields above the table itself are all set to "All", meaning that the totals in the table will contain data from all Countries, Districts, Chiefdom, ou\_type, year, months, the various categories as listed in the red fields, and all data elements in the Morbidity group.

As we have seen, this is not a very useful representation, as Morbidity is organized into new cases, follow-ups, referrals, and then again in age groups. Also, we do not see the various diagnoses. The first step is to include the diagnoses field (which is a group set), which is done by dragging the "diagnosis" field down to be a row field, as shown in the figure below, and to add the group set called "morbiditymortality" in the column field to display new cases, follow-up, and referrals.

|                |  |                          |           |           |             |
|----------------|--|--------------------------|-----------|-----------|-------------|
| Country        | (All)                                    |                          |           |           |             |
| District       | (All)                                    |                          |           |           |             |
| Chiefdom       | (All)                                    |                          |           |           |             |
| year           | (All)                                    |                          |           |           |             |
| month          | (All)                                    |                          |           |           |             |
| referrals_age  | (All)                                    |                          |           |           |             |
| mortality_age  | (All)                                    |                          |           |           |             |
| phucommunity   | (All)                                    |                          |           |           |             |
| morbidity_age  | (All)                                    |                          |           |           |             |
| dataelement    | (All)                                    |                          |           |           |             |
| Sum of value   |  | MorbidityMortalityGroups |           |           |             |
| main_de_groups | diagnosis                                | New cases                | Follow-up | Referrals | Grand Total |
| Morbidity      | Acute Flaccid Paralysis (AFP)            | 269                      | 12        | 1         | 282         |
|                | All Others                               | 628441                   | 3         | 2         | 628446      |
|                | Anaemia                                  | 14                       | 4         | 2         | 20          |
|                | ARI Treated With Antibiotics (Pneumonia) | 352274                   | 4         | 2         | 352280      |
|                | ARI Treated Without Antibiotics (Cough)  | 4                        | 14        |           | 18          |
|                | Burns                                    | 4                        | 4         | 2         | 10          |
|                | Cholera                                  | 319                      |           |           | 319         |
|                | Clinical Malnutrition                    | 93091                    | 34        | 2         | 93127       |
|                | Diarrhoea With Blood (Dysentery)         | 29341                    | 4         | 12        | 29357       |
|                | Diarrhoea With Severe Dehydration        | 102812                   | 4         | 2         | 102818      |

Contrast this figure above to the one below.

|                |  |                          |           |           |             |
|----------------|--|--------------------------|-----------|-----------|-------------|
| Country        | (All)  |                          |           |           |             |
| District       | (All)  |                          |           |           |             |
| Chiefdom       | (All)  |                          |           |           |             |
| year           | (All)  |                          |           |           |             |
| month          | (All)  |                          |           |           |             |
| referrals_age  | (All)  |                          |           |           |             |
| mortality_age  | (All)  |                          |           |           |             |
| phucommunity   | (All)  |                          |           |           |             |
| morbidity_age  | (All)  |                          |           |           |             |
| diagnosis      | (All)  |                          |           |           |             |
| Sum of value   |  | MorbidityMortalityGroups |           |           |             |
| main_de_groups | dataelement  | New cases                | Follow-up | Referrals | Grand Total |
| Morbidity      | Acute Flaccid Paralysis (AFP) follow-up            |                          | 12        |           | 12          |
|                | Acute Flaccid Paralysis (AFP) new                  | 269                      |           |           | 269         |
|                | Acute Flaccid Paralysis (AFP) referrals            |                          |           | 1         | 1           |
|                | All other follow-ups                               |                          | 3         |           | 3           |
|                | All other new                                      | 628441                   |           |           | 628441      |
|                | All other referrals                                |                          |           | 2         | 2           |
|                | Anaemia follow-up                                  |                          | 4         |           | 4           |
|                | Anaemia new  | 14                       |           |           | 14          |
|                | Anaemia referrals                                  |                          |           | 2         | 2           |
|                | ARI treated with antibiotics (pneumonia) follow-up |                          | 4         |           | 4           |
|                | ARI treated with antibiotics (pneumonia) new       | 4                        |           |           | 4           |
|                | ARI treated with antibiotics (pneumonia) referrals |                          |           | 2         | 2           |
|                | ARI treated without antibiotics (cough) follow-up  |                          |           | 14        | 14          |
|                | ARI treated without antibiotics (cough) new        | 4                        |           |           | 4           |

They both show the same data (some of the rows have been cut in the screenshot due to image size), albeit in a different way.

- The "dataelement" field, used in the bottom figure, displays each diagnosis as three elements; one follow-up, one new, and one referrals. This is the way the data elements have been defined in DHIS2, as this makes sense for aggregation. You would not like to aggregate follow-ups and new, thus these have not been made as categories, the whole point of is to ease aggregation and disaggregation.
- The "diagnosis" group set has instead been made to lump these three (follow-up, new, referrals) together, which can then be split with another group set, namely the one called "morbiditymortality". This allows us to organize the data as in the first of the two figures, where we have the single diagnosis per row, and the groups new, follow-up, referrals as rows.

The idea of using group sets is that you can combine, in any set, different data elements. Thus, if we add the mortality data (by checking it from the drop-down menu of the main\_de\_groups field, and moving this field out of the table) we can see also the deaths, since the mortality data elements have been included as a "death" group in the "morbiditymortality" group set. The result is shown below.

|  |                          |           |           |        |  |
|--|--------------------------|-----------|-----------|--------|--|
| Country                                  | (All)                    |           |           |        |  |
| District                                 | (All)                    |           |           |        |  |
| Chiefdom                                 | (All)                    |           |           |        |  |
| year                                     | (All)                    |           |           |        |  |
| month                                    | (All)                    |           |           |        |  |
| referrals_age                            | (All)                    |           |           |        |  |
| mortality_age                            | (All)                    |           |           |        |  |
| phucommunity                             | (All)                    |           |           |        |  |
| morbidity_age                            | (All)                    |           |           |        |  |
| main_de_groups                           | (Multiple Items)         |           |           |        |  |
| dataelement                              | (All)                    |           |           |        |  |
| Sum of value                             | MorbidityMortalityGroups |           |           |        |  |
| diagnosis                                | New cases                | Follow-up | Referrals | Deaths |  |
| Acute Flaccid Paralysis (AFP)            | 269                      | 12        | 1         |        |  |
| All Others                               | 628441                   | 3         | 2         | 1553   |  |
| Anaemia                                  | 14                       | 4         | 2         | 30     |  |
| ARI Treated With Antibiotics (Pneumonia) | 352274                   | 4         | 2         | 353    |  |
| ARI Treated Without Antibiotics (Cough)  | 4                        | 14        |           |        |  |
| Burns                                    | 4                        | 4         | 2         |        |  |
| Cholera                                  | 319                      |           |           |        |  |
| Clinical Malnutrition                    | 93091                    | 34        | 2         | 176    |  |
| Diarrhoea With Blood (Dysentery)         | 29341                    | 4         | 12        | 79     |  |
| Diarrhoea With Severe Dehydration        | 102812                   | 4         | 2         | 208    |  |
| Diarrhoea Without Severe Dehydration     | 4                        | 4         |           |        |  |
| Eye Infection                            | 4                        | 4         | 2         |        |  |

The result is a much more user-friendly pivot table. Now, another figure shows the relationship between the group sets and elements (these are fake data values).

This small detail of the pivot table show how the actual data elements link to the group sets:

- The four data elements, as defined in DHIS2, are Measles death, Measles follow-up, Measles new, and Measles referrals
- They all belong to the group set "diagnosis", where they have been lumped together in the group Measles
- The group set "morbiditymortality" contains the groups New cases, Follow-up, Referrals, and Deaths.
- Only the data element Measles deaths has data related to the group Deaths, thus this is where the data value (20) is shown, at the upper right corner. The same for Measles new; the value (224) is shown at the intersection of the data element Measles new and the group New cases (in the group set morbiditymortality)
- All the intersections where the data element does not link with the groups in morbiditymortality are left blank. Thus in this case we would get a nice table if we excluded the data element from the table, and just had diagnosis and the group set morbiditymortality, as in the figure shown earlier

Now lets see how the data element categories can be used. In the data entry form for Morbidity the new cases and follow-ups use one age category, the referral data another,, and the mortality data a third age breakup, so these are available as three individual age group fields in the pivot tables called morbidity\_age, referrals\_age and mortality\_age. It doesn't make sense to use these while looking at these data together (as in the examples above), but e.g. if we only want to look at the only the new cases we can put the MobidityMortalityGroups field back up as a page field and there select the New cases group as a filter. Then we can drag the Morbidity\_age field down to the column area and we get the following view:

|  |               |       |        |       |        |
|--|---------------|-------|--------|-------|--------|
| Country                                  | (All)         |       |        |       |        |
| District                                 | (All)         |       |        |       |        |
| Chiefdom                                 | (All)         |       |        |       |        |
| year                                     | (All)         |       |        |       |        |
| month                                    | (All)         |       |        |       |        |
| referrals_age                            | (All)         |       |        |       |        |
| mortality_age                            | (All)         |       |        |       |        |
| phucommunity                             | (All)         |       |        |       |        |
| main de groups                           | (All)         |       |        |       |        |
| dataelement                              | (All)         |       |        |       |        |
| MorbidityMortalityGroups                 | New cases     |       |        |       |        |
| Sum of value                             | morbidity_age |       |        |       |        |
| diagnosis                                |               | 0-11m | 12-59m | 5-14y | 15y+   |
| Acute Flaccid Paralysis (AFP)            |               | 1     | 76     | 29    | 163    |
| All Others                               |               | 1     | 129705 | 53752 | 444983 |
| Anaemia                                  |               | 1     | 1      | 11    | 1      |
| ARI Treated With Antibiotics (Pneumonia) |               | 1     | 204517 | 45752 | 102004 |
| ARI Treated Without Antibiotics (Cough)  |               | 1     | 1      | 1     | 1      |
| Burns                                    |               | 1     | 1      | 1     | 1      |
| Cholera                                  |               |       | 88     | 104   | 127    |
| Clinical Malnutrition                    |               | 1     | 71259  | 11970 | 9861   |
| Diarrhoea With Blood (Dysentery)         |               | 1     | 6868   | 4334  | 18138  |
| Diarrhoea With Severe Dehydration        |               | 1     | 56345  | 15375 | 31091  |

The following table illustrates the benefits of reusing data element categories across datasets and category combinations. The VCCT, ART and PMTCT data are collected in three different datasets, the first two with both gender and age breakdown, and the PMTCT only age (gender is given). All three share the same age groups and therefore it is possible to view data elements from all these three datasets in the same table and use the age dimension. In the previous example with morbidity and mortality data this was not possible since new cases, referrals and deaths all have different age groups.

| Country                                       | (All)  |         |        |        |       |             |
|---|--|---------|--------|--------|-------|-------------|
| District                                      | (All)  |         |        |        |       |             |
| Chiefdom                                      | (All)  |         |        |        |       |             |
| year  | (All)  |         |        |        |       |             |
| month   | (All)  |         |        |        |       |             |
| anc_age                                       | (All)  |         |        |        |       |             |
| pmtct   | (All)  |         |        |        |       |             |
| Gender  | (All)  |         |        |        |       |             |
| Sum of value                                  |  | hiv_age |        |        |       |             |
| main_de_groups                                | dataelement  | <15y    | 15-24y | 25-49y | >49y  | Grand Total |
| ART   | ART enrollment stage 1   |         | 7      | 3      |       | 10          |
|   | ART enrollment stage 2   | 1       | 2      | 7      | 1     | 11          |
|   | ART enrollment stage 3   |         | 6      | 23     | 2     | 31          |
|   | ART new clients started on ARV                                   |         | 6      | 24     | 4     | 34          |
|   | ART treatment stopped due to death                               |         |        | 5      |       | 5           |
|   | ART treatment stopped due to loss to follow-up                   |         |        | 5      | 1     | 6           |
|   | ART enrollment stage 4   |         |        | 1      |       | 1           |
|   | ART clients with new adverse clinical event                      |         |        | 1      | 2     | 3           |
|   | ART entry point: No walk in                                      | 1       | 3      | 13     | 5     | 22          |
|   | ART No started Opportunist Infection prophylaxis                 |         | 8      | 16     | 3     | 27          |
|   | ART entry point: No diagnostic testing                           |         | 3      | 11     |       | 14          |
|   | ART entry point: No transfer in                                  |         |        | 5      |       | 5           |
|   | ART entry point: No old patients                                 | 6       | 9      | 27     | 1     | 43          |
|   | ART entry point: No other  |         |        | 4      |       | 4           |
|   | ART No clients who stopped TRT due to TRT failure                |         |        | 2      |       | 2           |
| PMTCT   | PMTCT HIV positive w. received ART for own health                | 1       | 136    | 118    | 1     | 256         |
|   | PMTCT HIV positive women received ZDV at ANC                     | 1       | 199    | 193    |       | 393         |
|   | PMTCT male partners tested for HIV                               | 30      | 1292   | 1277   | 25    | 2624        |
|   | PMTCT male partners tested HIV positive                          | 1       | 74     | 82     | 1     | 158         |
|   | PMTCT No HIV women who delivered in the health facility (Normal) |         | 57     | 86     |       | 143         |
|   | PMTCT reported mother death                                      |         | 4      | 5      |       | 9           |
|   | PMTCT women counselled for infant feeding                        | 246     | 20791  | 15992  | 143   | 37172       |
|   | PMTCT women HIV positive   | 3       | 339    | 275    |       | 617         |
|   | PMTCT women HIV1   | 2       | 302    | 242    | 2     | 548         |
|   | PMTCT women HIV1 and HIV2  |         | 26     | 29     |       | 55          |
|   | PMTCT women HIV2   |         | 13     | 9      | 2     | 24          |
|   | PMTCT women lost to contact                                      | 4       | 71     | 67     | 6     | 148         |
|   | PMTCT women received complete ARV for PMTCT                      |         | 77     | 93     |       | 170         |
|   | PMTCT women received NVP during labour                           |         | 55     | 75     |       | 130         |
|   | PMTCT women received post test counselling and result            | 197     | 14901  | 10647  | 86    | 25831       |
| PMTCT women received ZDV & 3CT after delivery |  | 96      | 118    |        | 214   |             |
| PMTCT women seen for 1st ANC                  | 262  | 15838   | 11376  | 173    | 27649 |             |
| PMTCT women tested for HIV                    | 228  | 15000   | 10813  | 78     | 26119 |             |
| VCCT  | VCCT No positive test HIV1 and HIV2                              | 3       | 11     | 24     | 4     | 42          |
|   | VCCT No positive test HIV1 only                                  | 18      | 127    | 333    | 35    | 513         |
|   | VCCT No positive test HIV2 only                                  |         | 4      | 9      |       | 13          |
|   | VCCT No receiving positive test results                          | 36      | 374    | 710    | 88    | 1208        |
|   |  | 810     | 3678   | 5009   | 683   | 10380       |

In the table below PMTCT data has been removed from the table and the gender category added to the column area so that you can analyse the data for VCCT and ART by age and gender. An optional subtotal for gender has also been added, as well as a grand total for all age and gender.



and which to represent as categories, or even as groups as we have seen above. Here are some general lessons learned from working with data element and category combinations:

- Design your dimensions with data use in mind, not data collection. This means that disaggregation of data values at collection time should be easily aggregated up along the various dimensions, as in adding up to a meaningful total.
- Reuse dimensions as much as possible as this increases the ability to compare disaggregated data (e.g. age groups, fixed/outreach, gender).
- Disaggregation dimensions should add up to a total. In certain cases, data elements may be collected a subsets of each other. In this case, use of categories to disaggregate the data element should not be used. As an example, we might collect "Number of confirmed malaria cases" and disaggregate this by "Under 5" and "Over 5". A third data element "Number of confirmed malaria cases under 1" might also exist on the form. It would seem reasonable then to create three age groups : Under 1, Under 5 and Over 5, to describe the disaggregation. However, the Under 1 is actually a subset of the Under 5 group, and when totalled, would result in duplication. Thus, categories should be generally be composed of mutually exclusive category options, such that the sum of individual category options results in a coherent total.
- Different levels of dimensions; 1) disaggregation and 2) grouping. Disaggregation dimensions dictate how you collect and how detailed you store your data, so plan these carefully. The group dimension is more flexible and can be changed and added to even after data collection (think of it as tagging).
- It is best to think of how the data would be used in an integrated data repository and not how it will actually be collected on forms or by programs when designing the meta-data model. Ideally, the same type of disaggregation should be used across forms and datasets for data elements which will be analysed together, or used to build indicators. Reuse definitions so that the database can integrate even though the forms themselves might be duplicated (which in practice, is often the case).

In order to better explain the approach and the possibilities we present an example paper form and will walk through it step by step and design data elements, categories, category options and category combinations.



**MINISTRY OF HEALTH AND SANITATION**

**PHU MONTHLY SUMMARY OF REPRODUCTIVE HEALTH SERVICES - PHUF3**

District:..... Name of PHU:..... Chiefdom:.....

Reporting Officer:..... Signature:..... Month:..... Year:.....

| ANC (refer to tally sheets PHUT3) |       |           | DELIVERY (refer to tally sheets PHUT4) |         |         |              |         |
|-----------------------------------|-------|-----------|--|---------|---------|--------------|---------|
|                                   | FIXED | OUT-REACH | Deliveries assisted by                 | In PHU  |         | In community |         |
|                                   |       |           |  | L/Birth | S/Birth | L/Birth      | S/Birth |
| 1st ANC visit                     |       |           |  |         |         |              |         |
| 2nd ANC visit                     |       |           | MCH Aides                              |         |         |              |         |
| 3rd ANC visit                     |       |           | SECHN                                  |         |         |              |         |
| 4th or more ANC visits            |       |           | Midwives                               |         |         |              |         |
| LLITN given at ANC                |       |           | CHO                                    |         |         |              |         |
| Iron Folate given at ANC          |       |           | Trained TBA                            |         |         |              |         |
| Albendazole given at ANC          |       |           | Untrained TBA                          |         |         |              |         |
| 1st IPT dose given at PHU         |       |           | Complicated Deliveries                 |         |         |              |         |
| 1st IPT dose given by TBA         |       |           | Low Birth Weight                       |         |         |              |         |
| 2nd IPT dose given at PHU         |       |           | LLITN given after delivery             |         |         |              |         |
| 2nd IPT dose given by TBA         |       |           |  |         |         |              |         |

| POST-NATAL CARE (PHUT5)      |       |           |  |
|------------------------------|-------|-----------|--|
|                              | FIXED | OUT-REACH |  |
| 1st Contact (within 1wk)     |       |           |  |
| 2nd contact (at 6wks)        |       |           |  |
| Vitamin A given at postnatal |       |           |  |

| TT for Pregnant Women (PHUT3) |  |  | TT for Non-Pregnant Women (PHUT6) |  |  | In Sch (PHUT5) |
|-------------------------------|--|--|-----------------------------------|--|--|----------------|
| TT1                           |  |  | TT1                               |  |  |                |
| TT2                           |  |  | TT2                               |  |  |                |
| TT3                           |  |  | TT3                               |  |  |                |
| TT4                           |  |  | TT4                               |  |  |                |
| TT5                           |  |  | TT5                               |  |  |                |

| COMPLICATIONS OF EARLY PREGNANCY (refer to tally sheets PHUT3) |                |          |                 |                       |
|--|----------------|----------|-----------------|-----------------------|
| Complication   | Managed at PHU | Referred | Deceased in PHU | Deceased in Community |
| Malaria in 1st trimester (treat with oral quinine)             |                |          |                 |                       |
| Malaria in 2nd or 3rd trimester (treat with ACT)               |                |          |                 |                       |
| Anaemia  |                |          |                 |                       |
| Hypertension   |                |          |                 |                       |
| Abortion   |                |          |                 |                       |
| STI  |                |          |                 |                       |
| Other (hyperemesis, UTI, etc)                                  |                |          |                 |                       |

| COMPLICATIONS OF LATE PREGNANCY (>22 WKS) AND LABOUR (refer to tally sheets PHUT4) |                |          |                 |                       |
|--|----------------|----------|-----------------|-----------------------|
| Complication   | Managed at PHU | Referred | Deceased in PHU | Deceased in Community |
| Pre-eclampsia/Eclampsia/Hypertension   |                |          |                 |                       |
| Ante-partum haemorrhage  |                |          |                 |                       |
| Obstructed labour  |                |          |                 |                       |
| Post-partum sepsis   |                |          |                 |                       |
| Post-partum haemorrhage  |                |          |                 |                       |
| Retained Placenta  |                |          |                 |                       |
| Malpresentation  |                |          |                 |                       |
| Other maternal complications (anaemia, etc...)                                     |                |          |                 |                       |

| FAMILY PLANNING SERVICES (refer to tally sheets PHUT5) |                   |                    |
|--|-------------------|--------------------|
| METHOD   | Number of clients |                    |
|  | New clients       | Continuing clients |
| Oral contraceptive pills                               |                   |                    |
| Male Condoms   |                   |                    |
| Female Condoms   |                   |                    |
| IUD  |                   |                    |
| Injectables  |                   |                    |
| Implants   |                   |                    |
| Spermicide   |                   |                    |

This form has many tables and each of them potentially represent a data element category combination (from now on referred to as a catcombo). As such there is no restriction on a dataset to only have one set of dimensions or catcombo, it can have many and as we see above this is necessary as the dimensions are very different from table to table. In the following paragraphs, we will analyse how to break down this form into its component pieces and suggest an implementation pathway in DHIS2.

**ANC table.** This table in the top left corner is one the simpler ones in this form. It has two dimensions, the first column with the ANC activity or service (1<sup>st</sup> visit, IPT 2<sup>nd</sup> dose etc) and the

second and third column which represent the place where the service was given with the two options "Fixed" and "Outreach". Since the ANC service is the key phenomena to analyse here, and often there is a need for looking at the total of "ANC 1<sup>st</sup> visits" no matter where they actually took place, it makes a lot of sense to use this dimension as the data element dimension.

Thus, all items on the first column from "1<sup>st</sup> ANC" visit to "2<sup>nd</sup> IPT dose given by TBA" are represented as individual data elements. The "where" dimension is represented as a data element category (from now on referred to as category) with the name "fixed/outreach" with the two data element category options (from now on catoptions) "fixed" and "outreach". There is no other dimension here so we add a new catcombo with the name "Fixed/Outreach" with one category "Fixed/Outreach". Strictly speaking there is another dimension in this table, and that is the at PHU or by TBA dimension which is repeated for the two doses of IPT, but since none of the other ANC services listed have this dimension it does not seem like a good idea to separate out two data elements from this table and give them another catcombo with both fixed/outreach and at PHU/by TBA. reusing the same catcombo for all the ANC services makes more sense since it will be easier to look at these together in reports etc. and also the fact that there is not much to lose by repeating the at PHU or by TBA information as part of the data element name when it is only for four data elements in a table of eleven data elements.

**DELIVERY table.** This table is more tricky as it has a lot of information and you can see that not all the rows have the same columns (some columns are merged and a one field is greyed out/ disabled.). If we start by looking at the first column "Deliveries assisted by" that seems to be one dimension, but only down to the "Untrained TBA" row, as the remaining three rows are not related to who assisted the delivery at all. Another dimension is the place of delivery, either In PHU or in Community as stated on the top column headings. These deliveries are further split into the outcome of the delivery, whether it is a live or still birth, which seems to be another dimension. So if we disregard the three bottom rows for a moment there seems to be 3 dimensions here, 1) assisted by, 2) place of delivery, and 3) delivery outcome. The key decision to make is what to use as the data element, the main dimension, the total that you will most often use and want easily available in reports and data analysis.

In this case, the outcome dimension as "Total live births" is a very commonly used value in many indicators (maternal mortality ratio, births attended by skilled health personnel etc.). In this case the "Assisted By" dimension could also have been used without any problem, but the added value of easily getting the total live births information was the decisive point for us. This means that from this table (or sub-table of row 1 to 6) there are only two data elements; "Live births" and "Still births".

Next, there are two more dimensions, the "PHU/Community" with its two options and a "Births attended by" with options ("MCH Aides", "SECHN", "Midwives", "CHO", "Trained TBA", "Untrained TBA"). These two categories make up the catcombo "Births" which is assigned to the two data elements "Live births" and "Still births". Considering the final three rows of the delivery table we can see that "Complicated Deliveries" does not have the assisted by dimension, but has the place and the outcome. "Low birth weight" also does not have the assisted by dimension and not the outcome either. The LLITN given after delivery does not have any additional dimension at all. Since not any of the three rows can share catcombo with any other row we decided to represent these fields as so called flat data elements, meaning data elements with no categories at all, and simply adding the additional information from the column headings to the data element name, and therefore ended up with the following data elements with the default (same as none) catcombo; "Complicated deliveries in PHU live birth", "Complicated deliveries in PHU still births", "Complicated deliveries in community live birth", "Complicated deliveries in community still births", "Low birth weight in PHU", "Low birth weight in community", and "LLITN given after delivery".

**POST-NATAL CARE table** This table is simple and we used the same approach as for the ANC table. 3 data elements listed in the first column and then link these to the catcombo called "fixed/

---

outreach". Reusing the same category fixed/outreach for these data elements enables analysis on fixed/outreach together with ANC data and other data using the same category.

**TT table** This table is somewhat more complex than the previous examples. We decided to use "TT1", "TT2" ... "TT5" as data elements which makes it easy to get the total of each one of these. There is fixed/outreach dimension here, but there is also the "In school place" that is only applied to the Non-Pregnant, or more correctly to any of the two as the school immunisation is done whether the girls are pregnant or not. We consulted the program people behind the form and found out that it would be OK to register all school TT immunisations as non-pregnant, which simplifies the model a bit since we can reuse the "TT1" to "TT5" data elements. So we ended up with a new category called "TT place" with the three options (Fixed, Outreach, In School), and another category called "Pregnant/Non-pregnant" with two options. The new catcombo "TT" is then a combination of these two and applied to the 5 TT data elements. Since we agreed to put all In Schools immunisations under Non-pregnant in means that the combination of options (Pregnant+In School) will never be used in any data entry form, and hence become a possible optioncombo, which is OK. As long as the form is custom designed then you can choose which combinations of options to use or not, and therefore it is not a problem to have such passive or unused catoptions. Having school as one option in the TT place category simplifies the model and therefore we thought it was worth it. The alternative would be to create 5 more data elements for "TT1 in school" ... "TT5 in school", but then it would be a bit confusing to add these together with the "TT1" ... "TT5" plus TT catcombo. Having school as a place in the TT place category makes it a lot easier to get the total of TT1.. TT5 vaccines given, which are the most important numbers and most often used values for data analysis.

**Complications of early and late pregnancy and labour tables** We treat these two tables as one, and will explain why. These two tables are a bit confusing and not the best design. The most important data coming out of these tables are the pregnancy complications and the maternal deaths. These data elements contain further detail on the cause of the complication or death (the first column in both tables), as well as a place of death (in PHU or community), and an outcome of the complication (when its not a death) that can be either "Managed at PHU" or " Referred". We decided to create two data elements for these two tables; "Pregnancy complications", and "Maternal Deaths", and two category combinations, one for each of the data elements. For the Pregnancy Complications data element there are two additional dimensions, the cause of the complication (the combined list of the first column in the two tables) and the outcome (managed at PHU or Referred), so these are the categories and options that make up that category combination. For the "Maternal deaths" data element the same category with the different causes are used and then another category for the place of death (in PHU or In community). This way the two data elements can share one category and it will be easy to derive the total number of pregnancy complications and maternal deaths. While the list of complications on the paper form is divided into two (early and late/labour) you can see that e.g. the malaria in 2<sup>nd</sup> and 3<sup>rd</sup> trimester are listed under early, but in fact are for a later phase of the pregnancy. There is no clear divide between early and late complications in the form, and therefore we gave up trying to make this distinction in the database.

**Family Planning Services table** This table has 2 dimensions, the family planning method (contraceptive) and whether the client is new or continuing. We ended up with one data element only "Family planning clients" and then added two categories "FP method" with all the contraceptives as options, and another category "FP client type" with new or continuing as options. This way it will be easy to get the total number of family planning clients which is the major value to look at in data analysis, and from there you can easily get the details on method or how many new clients there are.

**Step-by-step approach to designing datasets**

1. Identify the different tables (or sub datasets) in the paper form that share the same dimensions
2. For each table identify the dimensions that describe the data fields
3. Identify the key dimension, the one that makes most sense to look at in isolation (when the others are collapsed, summed up). This is your data element dimension, the starting point and core of your multidimensional model (sub dataset). The data element dimension can be a merger of two or more dimensions if that makes more sense for data analysis. The key is to identify which total that makes most sense to look at alone when the other dimensions are collapsed.
4. For all other/additional dimensions identify their options, and come up with explanatory names for dimensions and their options.
5. Each of these additional dimensions will be a data element category and their options will be category options.
6. Combine all categories for each sub dataset into one category combination and assign this to all the data elements in your table (or sub dataset if you like).
7. 7. When you are done with all the tables (sub datasets), create a new dataset and add all the data elements you have identified (in the whole paper form) to that dataset.
8. 8. Your dataset will then consist of a set of data elements that are linked to one or more category combinations.

---

## Additional data dimensions

### About additional data dimensions

DHIS2 has the ability to add dimensions to data in addition to what was described in the previous chapter. We will call these dimensions "attribute categories" (ACs). The categories described in the previous chapter we will call "disaggregation categories" (DCs) to differentiate them from ACs.

ACs and DCs are quite similar—they work in much the same way, are accessed through the same part of the maintenance interface, and exist in the same part of the database. The main difference between them is what they are connected to: a DC is attached to a data element. An AC, however, is attached to a data set. This means values for all DC options can be entered on the same data entry screen, whereas you must choose the AC option before you begin to enter data.

In setting up a system, you could just use DCs and ignore ACs altogether. However, ACs are a way to simplify data entry screens or reduce the size of the cross-product of category option combos.

When you're deciding which categories should be DCs and which should be ACs, here's a good rubric:

- Use DCs when you want to use different combinations of categories on different data elements within a data set
- Use DCs when you want to enter all the category option combinations on one data entry screen
- Use ACs when you want to use the same combination of categories for all the data in a data set
- Use ACs when you want to enter only one category option combination on one data entry screen

While we referred to DCs as part of the *what* dimension for simplicity in the former chapter, it's actually more complex. Either DCs or ACs can answer any question about a data element, including *what* (of course), *who*, *why*, *how*, or even a *where* or a *when* beyond the organisation unit and period dimensions.

### Create or edit an attribute category and its options

For the process of creating an attribute category as well as options and combinations, see the section of this manual named Manage categories.

## Relationship model

A relationship represents a link between two entities in the Tracker-model. A relationship is considered data in DHIS2 and is based on a Relationship Type, similar to how a Tracked Entity Instance is based on a Tracked Entity Type.

Relationships always include two entities, and these entities can include Tracked Entity Instances, Enrollments and Events, and any combination of these. Note that not all of these combinations are available in the current apps.

In addition, relationships can be defined as unidirectional or bidirectional. The only functional difference is currently that these requires different levels of access to create. Unidirectional relationships requires the user to have data write access to the "from" entity and data read access for the "to" entity, while bidirectional relationships require data write access for both sides.

## Relationship Type

A Relationship Type is the definition of the properties a relationship have. Relationships always consists of two sides, referred to as "from" and "to", and what entities can be contained for each side is determined by the Relationship Type. The properties that determine what each can contain are called constraints, fromConstraint and toConstraint respectively. These constraints are significant when working with the data later, to understand what a relationship can and cannot contain.

Each of the constraints defined in the Relationship Type consists of several properties. The primary property is the relationship entity, which decides what kind of entities the relationship can contain. The entities can be one of the following for each constraint:

- Tracked Entity Instance
- Enrollment
- Event

Depending on the kind of relationship entity you select, you can choose additional limitations for each constraint. The following table explains the different combinations you can configure:

|                     | Tracked Entity Instance | Enrollment | Event    |
|---------------------|-------------------------|------------|----------|
| Tracked Entity Type | Required                | Optional   | -        |
| Program             | -                       | Required   | -        |
| Program Stage       | -                       | Required   | Optional |

These additional limitations, will require the entity to match the limitation set before it can be created. For example, if your relationship is between a mother and a child, both constraints would have their required Tracked Entity Type set to Person and could optionally set the Enrollment to Maternal Health Program and Child Program respectively. This way, only Tracked Entity Instances who are of type Person and who is enrolled in the required program is allowed to be included in these relationships.

In addition to the constrains a Relationship Type can have, each relationship can be set to bidirectional, true or false. If the property is set to false, the relationships are treated as unidirectional. As previously mentioned, the only functional difference between these relationships are how strict the access is when creating or updating them - bidirectional being the strictest. Relationships are also presented differently in the UI based on whether or not the relationship is bidirectional or unidirectional.

---

One important thing to note about bidirectional relationships, are that the "from" and "to" sides are still significant in the database, meaning each entity must match the constraint for that side. However, from a user perspective, which side each entity is stored as is insignificant.

## DHIS2 Glossary

### A

**Aggregation** : In the context of DHIS2, aggregation refers to how data elements are combined within a particular hierarchical relationship. As an example, all the health facilities in a particular district would contribute to the total value for the particular district in question. Different aggregation operators are supported within DHIS2, such as SUM, AVERAGE, and COUNT.

**Analytics** : Analytics refers to the process which processes and prepares data which has been entered into DHIS2 into a format which is more suitable for retrieving indicators and aggregated data. When data is entered into DHIS2, it is stored in a format which is optimized for writing the data. However, when data needs to be processed into indicators or aggregated (e.g from months to quarters), it is more efficient to transform and store this data in a different format which is optimized for read-only operations. The analytics system of DHIS2 is used extensively by the analytics apps (GIS, Pivot Table, Event reports, etc.).

It is important to keep in mind that because the data which has been entered into DHIS2 must be processed into the analytics format, the data which appears in the analytics apps only represents the data which was present in the system the last time analytics was run. If data has been entered after that, analytics will need to be run again for this data to appear in the analytics apps.

**Aggregate data** : In the context of DHIS2, aggregate data refers to either data elements or indicators that have been derived from other hierarchical data sources. For instance, aggregate facility data would result from the aggregate totals of all patients that have attended that facility for a particular service. Aggregate district data would result from the aggregate totals of all facilities contained within a particular district.

**Application programming interface** : An application programming interface is a specification of how different software components should interact with each other. The DHIS2 API (or WebAPI) can be used to interface DHIS2 with other software, to build reports or custom data entry forms.

**Approvals** : Approvals can be used to control the visibility and editability of data. When data is submitted from the lowest reporting level, it can be approved by the next higher level. This approval has two effects:

1. Data is no longer able to be edited in the data entry screens at the lower level.
2. Depending on the system settings which have been enabled, the data will become visible at the approval level.

As an example, data is entered at the facility level, and the submitted for approval. Once the data has been approved at the district level, the data will become locked in the data entry screens for the facility level. It will also become visible in the analytics apps to district users.

### B

**Bi-monthly** : Refers to a two-month period, such as January 1<sup>st</sup> to February 28<sup>th</sup>.



---

**C**

**Category :** Categories are groups of category options. They are used in combinations to disaggregate data elements. Categories are typically a single type of concept, such as "Age" or "Gender".

**Category combinations :** Category combinations are used to disaggregate data elements. As an example, the data element "Number of confirmed cases of malaria" could be disaggregated subdivided into categories: "Age" and "Gender". In turn each of these categories, would consist of several category options, such as "Male" and "Female" for the gender category. Category combinations may consist of one or several categories.

**Category combination options :** Category combination options are dynamically composed of all of the different combinations of category options which compose a category combination. As an example, two categories "Gender" and "Age", might have options such as "Male" or "Female" and "<5 years" or ">5 years". The category combination options would then consist of:

- Male <5 years
- Male >5 years
- Female <5 years
- Female >5 years

**Category option :** Category options are atomic elements that are grouped into categories.

**Comma separated values :** Comma separated values are series of tabular data stored in a plain-text format. They are commonly used with DHIS2 to export and import data values.

**D**

**Data dictionary :** A collection of data elements and indicators, which can be exchanged with other DHIS2 systems. Typically used to define a set of data elements and indicators when setting up the DHIS2 system.

**Data exchange format :** In the context of DHIS2, the "data exchange format" refers to a XML schema that enables the transportation of data and meta-data between disconnected DHIS2 instances, as well as between different applications that support the DXF schema.

**Datamart :** A set of database tables in DHIS2 that contains processed data elements and indicator values that is generated based on aggregation rules and calculated data element and indicator formulae. Datamart tables are used for analysis and report production. Typically, users should not work directly with unaggregated data values, but rather with values that have resulted from a datamart export for analysis.

**Data element :** A data element is the fundamental building block of DHIS2. It is an atomic unit of data with well-defined meaning. Essentially it is a data value that has been actually observed or recorded which is further characterized by a number of dimensions. As an example the data element "Number of fully immunized children" would refer to the number of children that received this particular service. Data elements are always linked to a period as well as an organizational unit. They optionally may be linked to other dimensions.

**Data element group :** Data element groups are used to categorize multiple data elements according to a common theme, such as "Immunization" or "ART". Typically, they are used during reporting and analysis to allow related data elements to be analysed together.

**Data element group sets :** Data element groups are used to categorize multiple data element groups into a common theme.

**Dimension** : A dimension is used to categorize data elements during analysis. Dimensions provide a mechanism to group and filter data based on common characteristics. Typically, related data elements may be aggregated or filtered during analysis with the use of dimensions. Dimensions may be a member of a hierarchy. For instance the "Period" dimension may be broken down into "Day->Month->Quarter->Year".

DXF

## H

**Health management information system** : Typically, an electronic database system that is used to record aggregated data on service delivery, disease incidence, human resource data and other information used to evaluate the performance of delivery of health services. Typically, an HMIS does not contain the highly detailed data of electronic medical record systems or individual patient data.

## I

**Indicator** : The divisor of an indicator. Can be composed of multiple data elements with the use of an indicator formula.

```
\[
Indicator = {\frac{Numerator}{Denominator}}
\]
```

This is obviously a very generalized example. The numerator and indicator themselves can be composed of various data elements, factors, and the four basic operands (addition, multiplication, division and subtraction).

## N

**Numerator** : The dividend of a indicator. Can be composed of multiple data elements and factors with the use of indicator formulas.

## O

**Organisational unit** : An organisational unit is usually a geographical unit, which exists within a hierarchy. As an example, in the United States, "Georgia" would be considered an organisational unit with in the orgunit level of "State". Organizational units can also be used to specify an administrative unit, such as a ward within a hospital. The organisational unit dimension specifies essentially *where* a particular data value occurs.

**Organisational unit level** : Refers to a level within an organizational hierarchy. Typically, countries are administered at different levels, such as 1) Country 2) States 3) Counties 4) Health facilities. In the context of DHIS2, health facilities typically are the lowest orgunit level. Data is aggregated upwards from the lowest orgunit level to the highest.

## P

**Period** : A period is a specific time interval which consists of a start date and end date. For instance "January 2011" would refer to the time interval of January 1<sup>st</sup> 2011-January 31<sup>st</sup> 2011.

## U

**Unique identifier** : A unique identifier (UID) is a semi-random series of letters and numbers used by DHIS2 to identify specific resources. UIDs begin with a letter, and are followed by exactly 10 letters or digits.

## About demo server, live package and database design

### Using the DHIS2 demo server

The DHIS2 team maintains a demonstration server at <https://play.dhis2.org/demo>. This is by far the easiest way to try out DHIS2. Simply open the link in your web browser and login with username = admin and password = district.

#### Note

All changes on this server are deleted each night, so do not save any important work on this server. It is strictly for demonstration purposes only!

### Using the DHIS2 live package

#### Starting the DHIS2 Live package

The DHIS2 Live package is the easiest way to get started with DHIS2 on your local computer. DHIS2 Live is appropriate for a stand-alone installation and demos. Simply download the application from [here](#). Once the file is downloaded, you can simply double-click the downloaded file, and get started using DHIS2.

#### Prerequisites for DHIS2 Live

You must be sure that you have a current version of the Java Runtime installed on your machine. Depending on your operating system, there are different ways of installing Java. The reader is referred to this [website](#) for detailed information on getting Java installed.

#### Starting up with a blank database

The live package comes with a demo database just like what you see on the [online demo](#) (which is based on the national Sierra Leone HMIS), and if you want to start with a blank system/database and build up your own system then you need to do the following:

- 1) Stop DHIS2 live if it is already running. Right click on the tray icon and select Exit. The tray icon is the green symbol on the bottom right of your screen (on Windows) which should say 'DHIS2 Server running' when you hover your mouse pointer over the icon.
- 2) Open the folder where the DHIS2 live package is installed and locate the folder called "conf".
- 3) In conf/ open the file called 'hibernate.properties' in a text editor (notepad or similar) and do the following modification: locate the string 'jdbc:h2:./database/dhis2' and replace the 'dhis2' part with any name that you want to give to your database (e.g. dhis2\_test).
- 4) Save and close the hibernate.properties file.
- 5) Start DHIS2 Live by double-clicking on the file dhis2-live.exe in the DHIS2 Live installation folder or by using a desktop shortcut or menu link that you might have set up.
- 6) Wait for the browser window to open and the login screen to show, and then log in with username: admin and password: district
- 7) Now you will see a completely empty DHIS2 system and you should start by adding your users, organisational hierarchy, data elements, and datasets etc. Please refer to the other sections of the user manual for instructions on how to do this.

## Downloading and installing the server version


The latest stable server version can be downloaded from this [website](#). For detailed information on how to install it please refer to the installation chapter in the implementation manual.

## Logging on to DHIS2

Regardless of whether you have installed the server version or the desktop Live version, you will use a web-browser to log on to the application. DHIS2 should be compatible with most modern web-browsers, although you will need to ensure that Java Script is enabled.

To log on to the application just enter <http://localhost:8080/dhis> if you are using the DHIS2 live package, or replace localhost with the name or IP address of the server where the server version is installed.

Once you have started DHIS2, either on-line or off-line, the displayed screen will prompt you to enter your registered user-name and password. After entering the required information click on log-in button to log into the application. The default user name and password are 'admin' and 'district'. They should be changed immediately upon logging on the first time.

 **DHIS 2 Demo - Sierra Leone** [Create an account](#)

Welcome to the DHIS 2 demo application

# dhis2

Sign in

[Forgot password?](#)  
[Create an account](#)

Log in with admin / district and feel free to do any changes - system is reset every night.

Powered by DHIS 2 [Learn more at dhis2.org](#) [ Change language ] ▼

---

You can select the language which you wish to display DHIS2 in from the "Change language" dialog box at the bottom of the screen. Not all languages may be available.

Should you have forgotten your password, you can click on the "Forgot password?" link. You must have informed DHIS2 of your email address and the server must be properly configured to send emails.

If you want to create your own account (and the server administrator allows this), simply click "Create an account" and follow the directions provided.

Once you have logged into DHIS2, refer to the specific sections in this manual for the different functionality which is available.

## **Logging out of DHIS2**

Just click on the Profile and then click "Log out" in the top-right corner of the DHIS2 menu.

## **Quick intro to designing a DHIS2 database**

DHIS2 provides a powerful set of tools for data collection, validation, reporting and analysis, but the contents of the database, e.g. what to collect, who should collect it and on what format will depend on the context of use. However, in order to do anything with DHIS2, you must first create meta-data. Meta-data, or data about the data, describes what should be collected (data elements and categories), where it should be collected (organisation units) and how frequently it should be collected (periods). This meta-data needs to be created in the DHIS2 database before it can be used. This can be done through the user interface and requires no programming or in-depth technical skills of the software, but does require a good understanding of the processes which you are trying to collect data from.

This section will provide a very quick and brief introduction to DHIS2 database design and mainly explain the various steps needed to prepare a new DHIS2 system for use. How to do each step is explained in other chapters, and best practices on design choices will be explained in the implementers manual. Here are the steps to follow:

1. Set up an organisational hierarchy
2. Define data elements
3. Define data sets and data entry forms
4. Define validation rules
5. Define indicators
6. Define report tables and design reports
7. Set up the GIS module
8. Design charts and customise the dashboard

### **The organisational hierarchy**

The organisational hierarchy defines the organisation using the DHIS2, the health facilities, administrative areas and other geographical areas used in data collection and data analysis. This dimension to the data is defined as a hierarchy with one root unit (e.g. Ministry of Health) and any number of levels and nodes below. Each node in this hierarchy is called an organisational unit in DHIS2.

The design of this hierarchy will determine the geographical units of analysis available to the users as data is collected and aggregated in this structure. There can only be one organisational

---

---

hierarchy at the same time so its structure needs careful consideration. Additional hierarchies (e.g. parallel administrative groupings such as "Facility ownership") can be modelled using organisational groups and group sets, however the organisational hierarchy is the main vehicle for data aggregation on the geographical dimension. Typically national organisational hierarchies in public health have 4-6 levels, but any number of levels is supported. The hierarchy is built up of parent-child relations, e.g. a Country or MoH unit (the root) might have e.g. 8 parent units (provinces), and each province again (at level 2) might have 10-15 districts as their children. Normally the health facilities will be located at the lowest level, but they can also be located at higher levels, e.g. national or provincial hospitals, so skewed organisational trees are supported (e.g. a leaf node can be positioned at level 2 while most other leaf nodes are at level 5).

Typically there is a geographical hierarchy defined by the health system. e.g. where the administrative offices are located (e.g. MoH, province, district), but often there are other administrative boundaries in the country that might or might not be added, depending on how its boundaries will improve data analysis. When designing the hierarchy the number of children for any organisational unit may indicate the usefulness of the structure, e.g. having one or more 1-1 relationships between two levels is not very useful as the values will be the same for the child and the parent level. On the other extreme a very high number of children in the middle of the hierarchy (e.g. 50 districts in a province) might call for an extra level to be added in between to increase the usefulness of data analysis. The lowest level, the health facilities will often have a large number of children (10-60), but for other levels higher up in the hierarchy approx. 5-20 children is recommended. Too few or too many children might indicate that a level should be removed or added.

Note that it is quite easy to make changes to the upper levels of the hierarchy at a later stage, the only problem is changing organisational units that collect data (the leaf nodes), e.g. splitting or merging health facilities. Aggregation up the hierarchy is done based on the current hierarchy at any time and will always reflect the most recent changes to the organisational structure. Refer to the chapter on Organisation Units to learn how to create organisational units and to build up the hierarchy.

### **Data Elements**

The Data Element is perhaps the most important building block of a DHIS2 database. It represents the "WHAT" dimension, it explains what is being collected or analysed. In some contexts this is referred to an indicator, but in DHIS2 we call this unit of collection and analysis a *data element*. The data element often represents a count of something, and its name describes what is being counted, e.g. "BCG doses given" or "Malaria cases". When data is collected, validated, analysed, reported or presented it is the data elements or expressions built upon data elements that describes the WHAT of the data. As such the data elements become important for all aspects of the system and they decide not only how data is collected, but more importantly how the data values are represented in the database, which again decides how data can be analysed and presented.

It is possible to add more details to this "WHAT" dimension through the disaggregation dimension called data element categories. Some common categories are Age and Gender, but any category can be added by the user and linked to specific data elements. The combination of a data element's name and its assigned category defines the smallest unit of collection and analysis available in the system, and hence describes the raw data in the database. Aggregations can be done when zooming out of this dimension, but no further drill-down is possible, so designing data elements and categories define the detail of the analysis available to the system (on the WHAT dimension). Changes to data elements and categories at a later stage in the process might be complicated as these will change the meaning of the data values already captured in the database (if any). So this step is one of the more decisive and careful steps in the database design process.

One best practice when designing data elements is to think of data elements as a unit of data analysis and not just as a field in the data collection form. Each data element lives on its own in the database, completely detached from the collection form, and reports and other outputs are based on data elements and expressions/formulas composed of data elements and not the data collection forms. So the data analysis needs should drive the process, and not the look and feel of the data collection forms. A simple rule of thumb is that the name of the data element must be able to stand on its own and describe the data value also outside the context of its collection form. E.g. a data element name like "Total referrals" makes sense when looking at it in either the "RCH" form or the "OPD" form, but on its own it does not uniquely describe the phenomena (who are being referred?), and should instead be called "Total referrals from Maternity" or "Total referrals from OPD". Two different data elements with different meanings, although the field on the paper form might only say "Total referrals" since the user of the form will always know where these referrals come from. In a database or a repository of data elements this context is no longer valid and therefore the names of the data elements become so important in describing the data.

Common properties of data elements can be modelled through what is called data element groups. The groups are completely flexible in the sense that they are defined by the user, both their names and their memberships. Groups are useful both for browsing and presenting related data, but can also be used to aggregate data elements together. Groups are loosely coupled to data elements and not tied directly to the data values which means they can be modified and added at any point in time without interfering with the raw data.

### **Datasets and data entry forms**

All data entry in DHIS2 is organised through the use of Datasets. A Dataset is a collection of data elements grouped together for data collection, and in the case of distributed installs they also define chunks of data for export and import between instances of DHIS2 (e.g. from a district office local installation to a national server). Datasets are not linked directly to the data values, only through their data elements and frequencies, and as such a dataset can be modified, deleted or added at any point in time without affecting the raw data already captured in the system, but such changes will of course affect how new data will be collected.

A dataset has a period type which controls the data collection frequency, which can be daily, weekly, monthly, quarterly, six-monthly, or yearly. Both which data elements to include in the dataset and the period type is defined by the user, together with a name, short name, and code.

In order to use a dataset to collect data for a specific orgunit you must assign the orgunit to the dataset, and this mechanism controls which orgunits that can use which datasets, and at the same time defines the target values for data completeness (e.g. how many health facilities in a district expected to submit RCH data every month).

A data element can belong to multiple datasets, but this requires careful thinking as it may lead to overlapping and inconstant data being collected if e.g. the datasets are given different frequencies and are used by the same orgunits.

### **Data entry forms**

Once you have assigned a dataset to an orgunit that dataset will be made available in Data Entry (under Services) for the orgunits you have assigned it to and for the valid periods according to the dataset's period type. A default data entry form will then be shown, which is simply a list of the data elements belonging to the dataset together with a column for inputting the values. If your dataset contains data elements with categories such as age groups or gender, then additional columns will be automatically generated in the default form based on the categories. In addition to the default list-based data entry form there are two more alternatives, the section-based form and the custom form.

---

## Section forms

Section forms allow for a bit more flexibility when it comes to using tabular forms and are quick and simple to design. Often your data entry form will need multiple tables with subheadings, and sometimes you need to disable (grey out) a few fields in the table (e.g. some categories do not apply to all data elements), both of these functions are supported in section forms. After defining a dataset you can define its sections with subsets of data elements, a heading and possible grey fields in the section's table. The order of sections in a dataset can also be defined. In Data Entry you can now start using the Section form (should appear automatically when sections are available for the selected dataset). You can switch between default and section forms in the top right corner of the data entry screen. Most tabular data entry forms should be possible to do with sections forms, and the more you can utilise the section forms (or default forms) the easier it is for you. If these two types of forms are not meeting your requirements then the third option is the completely flexible, although more time-consuming, custom data entry forms.

## Custom Forms

When the form you want to design is too complicated for the default or section forms then your last option is to use a custom form. This takes more time, but gives you full flexibility in terms of the design. In DHIS2 there is a built-in HTML editor (FCK Editor) for the form designer and you can either design the form in the UI or paste in your HTML directly using the Source window in the editor. In the custom form you can insert static text or data fields (linked to data elements + category) in any position on the form and you have complete freedom to design the layout of the form. Once a custom form has been added to a dataset it will be available in data entry and used automatically. You can switch back to default and section (if exists) forms in the top right corner of the data entry screen.

## Validation rules

Once you have set up the data entry part of the system and started to collect data then there is time to define data quality checks that help to improve the quality of the data being collected. You can add as many validation rules as you like and these are composed of left and right side expressions that again are composed of data elements, with an operator between the two sides. Typical rules are comparing subtotals to totals of something. E.g. if you have two data elements "HIV tests taken" and "HIV test result positive" then you know that in the same form (for the same period and organisational unit) the total number of tests must always be equal or higher than the number of positive tests. These rules should be absolute rules meaning that they are mathematically correct and not just assumptions or "most of the time correct". The rules can be run in data entry, after filling each form, or as a more batch-like process on multiple forms at the same time, e.g. for all facilities for the previous reporting month. The results of the tests will list all violations and the detailed values for each side of the expression where the violation occurred to make it easy to go back to data entry and correct the values.

## Indicators

Indicators represent perhaps the most powerful data analysis feature of the DHIS2. While data elements represent the raw data (counts) being collected the indicators represent formulas providing coverage rates, incidence rates, ratios and other formula-based units of analysis. An indicator is made up of a factor (e.g. 1, 100, 100, 100 000), a numerator and a denominator, the two latter are both expressions based on one or more data elements. E.g. the indicator "BCG coverage <1 year" is defined a formula with a factor 100, a numerator ("BCG doses given to children under 1 year") and a denominator ("Target population under 1 year"). The indicator "DPT1 to DPT3 drop out rate" is a formula of  $100 \% \times (\text{"DPT1 doses given"} - \text{"DPT3 doses given"}) / (\text{"DPT1 doses given"})$ .



Most report modules in DHIS2 support both data elements and indicators and you can also combine these in custom reports, but the important difference and strength of indicators versus raw data (data element's data values) is the ability to compare data across different geographical areas (e.g. highly populated vs rural areas) as the target population can be used in the denominator.

Indicators can be added, modified and deleted at any point in time without interfering with the data values in the database.

### **Report tables and reports**

Standard reports in DHIS2 are a very flexible way of presenting the data that has been collected. Data can be aggregated by any organisational unit or orgunit level, by data element, by indicators, as well as over time (e.g. monthly, quarterly, yearly). The report tables are custom data sources for the standard reports and can be flexibly defined in the user interface and later accessed in external report designers such as iReport or through custom HTML reports. These report designs can then be set up as easily accessible one-click reports with parameters so that the users can run the same reports e.g. every month when new data is entered, and also be relevant to users at all levels as the organisational unit can be selected at the time of running the report.

### **GIS**

In the integrated GIS module you can easily display your data on maps, both on polygons (areas) and as points (health facilities), and either as data elements or indicators. By providing the coordinates of your organisational units to the system you can quickly get up to speed with this module. See the GIS section for details on how to get started.

### **Charts and dashboard**

One of the easiest ways to display your indicator data is through charts. An easy to use chart dialogue will guide you through the creation of various types of charts with data on indicators, organisational units and periods of your choice. These charts can easily be added to one of the four chart sections on your dashboard and there be made easily available right after log in. Make sure to set the dashboard module as the start module in user settings.

## DHIS2 Tutorials

### Create Scorecards using the Pivot Table app

**\*Scorecards definition:** In public health settings such as Ministries of Health, scorecards offer a useful and standardized method for combining related indicators into one table. A scorecard gives an overall view of the performance of a health program such as a vaccination program, highlighting successes, weaknesses, and areas for improvement Here's what a typical scorecard looks like:\*

| ANC 1 Coverage  |                 | ANC 2 Coverage  |                 | ANC 3 Coverage  |                 | ANC => 4 Coverage |                 | ANC IPT 1 Coverage |                 | ANC IPT 2 Coverage |                 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|--------------------|-----------------|--------------------|-----------------|
| Oct to Dec 2016 | Jul to Sep 2016 | Oct to Dec 2016 | Jul to Sep 2016 | Oct to Dec 2016 | Jul to Sep 2016 | Oct to Dec 2016   | Jul to Sep 2016 | Oct to Dec 2016    | Jul to Sep 2016 | Oct to Dec 2016    | Jul to Sep 2016 |
| 136.6           | 165.2           | 119.1           | 155             | 120.3           | 94.8            | 63.2              | 51.9            | 127.1              | 91.5            | 111.5              | 70.8            |
| 54.5            | 88.8            | 51.3            | 75.2            | 36.3            | 59              | 17.6              | 30.2            | 98.7               | 72.7            | 74.9               | 60.2            |
| 35.8            | 118             | 35.4            | 117.6           | 30.1            | 84.3            | 22.1              | 55.4            | 125.5              | 107.6           | 73.2               | 83.2            |
| 77.4            | 84.7            | 83.3            | 84.1            | 72.2            | 71.7            | 45.8              | 49.1            | 130.1              | 83              | 104.2              | 78.3            |
| 109.4           | 97.7            | 95.3            | 94.8            | 65.6            | 65.8            | 33.9              | 29.1            | 120.7              | 79.7            | 118.7              | 57.8            |
| 93.5            | 90              | 117             | 106.3           | 86.7            | 87.7            | 57.5              | 56              | 94.3               | 93.1            | 54.7               | 65.4            |
| 37.7            | 84.4            | 28.9            | 70              | 20.5            | 51.7            | 16.1              | 38.4            | 112.5              | 114.3           | 103.7              | 107.4           |
| 26.6            | 57.4            | 25.2            | 55.3            | 15.9            | 43.9            | 5.8               | 29.1            | 85                 | 95.7            | 45.8               | 61.8            |
| 108             | 123.1           | 97.9            | 111.6           | 83.9            | 96.1            | 76.7              | 82              | 104.4              | 108             | 96.2               | 97.2            |
| 64.2            | 112.1           | 57.7            | 95.5            | 36.6            | 57.1            | 20.3              | 31.6            | 168.3              | 162.2           | 128                | 138.1           |
| 0.71            | 113.1           | 1.1             | 106.6           | 0.74            | 82              | 0.13              | 48.3            | 223.8              | 143.6           | 118.2              | 116.6           |
| 139.6           | 135             | 114.4           | 104.2           | 67.6            | 60.4            | 28.2              | 25              | 127.8              | 96.8            | 96.7               | 90              |
| 122.2           | 123.7           | 111.8           | 112.9           | 72.3            | 83.8            | 66.2              | 63.3            | 119.6              | 155.6           | 115.2              | 128.9           |

This tutorial explains how to create a scorecard in the DHIS2 Pivot Table app. There are several advantages to using the Pivot Table to create a scorecard, such as:

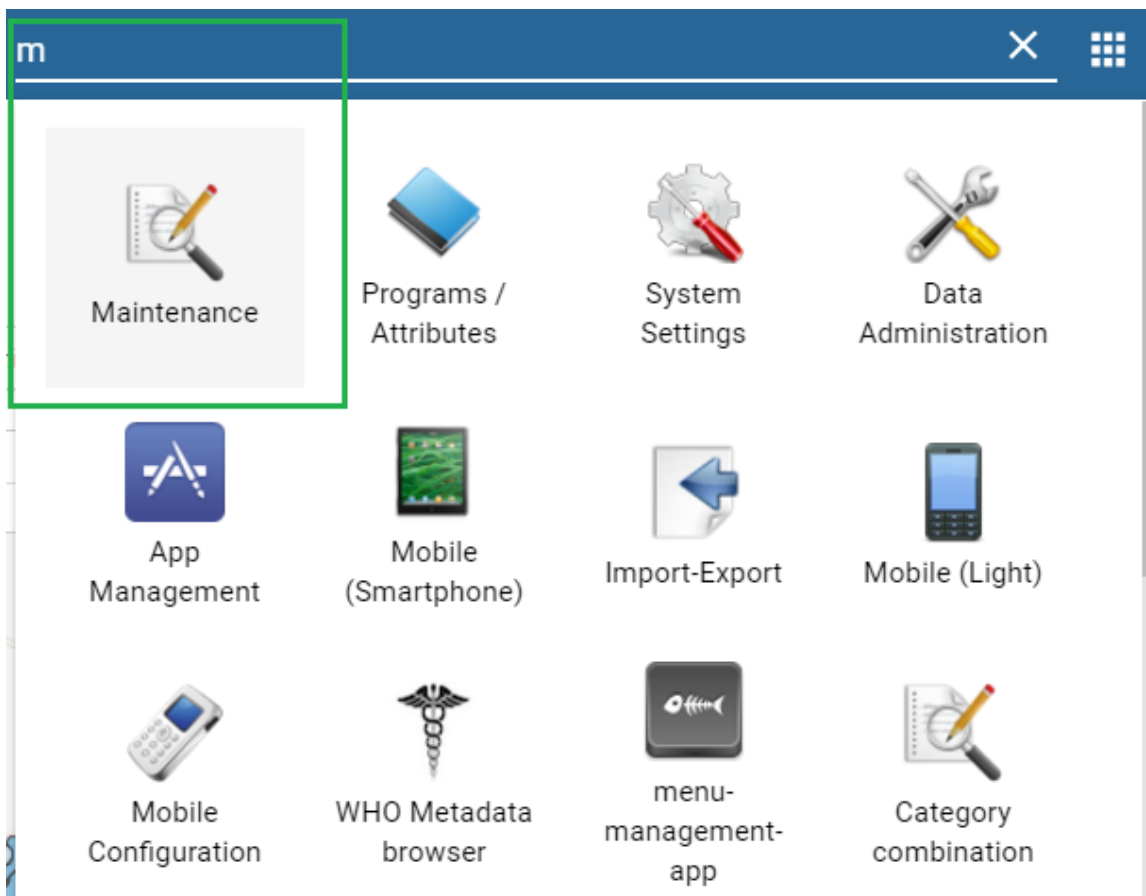
- You can save the scorecard on the dashboard and use it offline.
- You can share the scorecard with other DHIS2 users.

Let's get started!

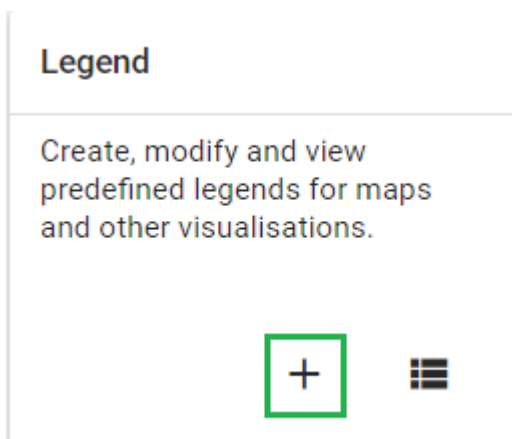
#### Create a legend for your scorecard

First, we'll create a 3-color "traffic light" legend for the scorecard. With three basic colors, the scorecard is easy to scan and easy to understand.

1. Open the **Maintenance** app. Click the menu in the top right corner and select Maintenance from the list of apps. You can also type the first letters of the word maintenance in the search field to find the app.



2. In the Maintenance app, scroll to the bottom of the page right down to the **Other** section.
3. Go to **Legend** and click the +.



4. In the **Legend Management** page, scroll to the bottom of the page and create a new legend by clicking the blue + button.



5. Enter a name for the legend such as “Traffic light”, a start value and an end value in the fields. The values you enter here depend on the performance ratings you wish to set for the scorecard.
6. Change **Number of legend items** to 3 to display three colors in the scorecard. To change the legend item colors, click the blue + button and then edit the colors.

### Edit legend item

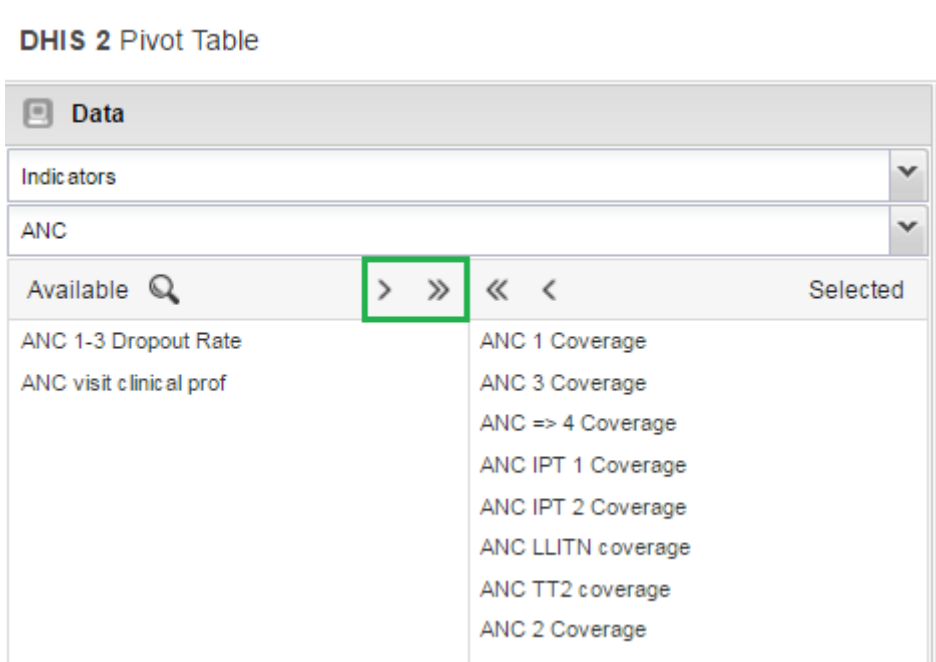
|             |                |
|-------------|----------------|
| Name        | Red            |
| Start value | 0              |
| End value   | 33             |
|             | <b>#EF1216</b> |

#EF1216  
HEX

**CANCEL** **OK!**

### Create a scorecard in the Pivot Table app

1. Open the **Pivot Table** app from the top right menu of the dashboard. You can also enter the first letters of Pivot Table in the search field.
2. Go to **Data** in the pane on the left side and select **Indicators** in the list.
3. Select an **Indicator group** such as “ANC” in the second list.
4. Using the arrows, select the type of indicators you want to see in your scorecard.



5. Click **Update**. This button is in the menu at the top of the workspace
6. Go to **Periods** and select a period for which you want to display data. In this “traffic light” example, we’ll use the relative period section. In **Quarters**, select **This quarter\*\*and \*\*Last quarter**. Clear any other checkboxes and click **Update**.

## DHIS 2 Pivot Table

**Data**

**Periods**

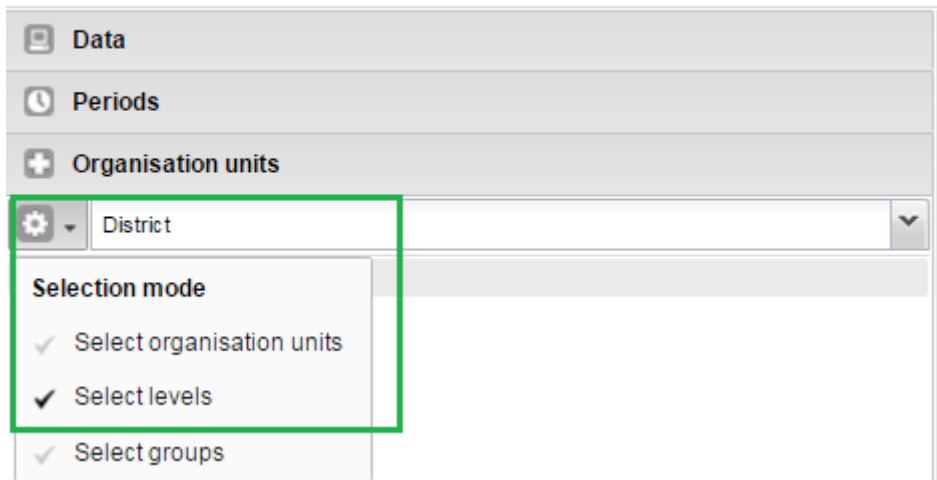
Select period type ▼ Prev year Next year

Available > >> << < Selected

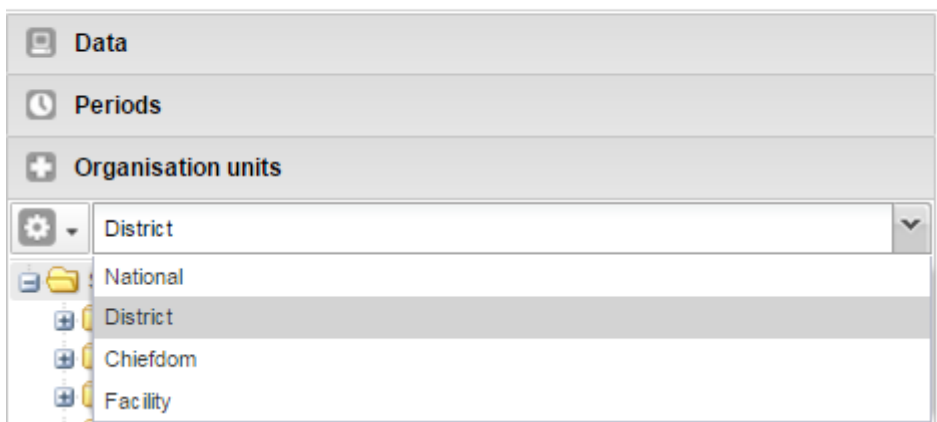
|  |   |  |
|--|---|--|
| <b>Weeks</b> <ul style="list-style-type: none"><li><input type="checkbox"/> This week</li><li><input type="checkbox"/> Last week</li><li><input type="checkbox"/> Last 4 weeks</li><li><input type="checkbox"/> Last 12 weeks</li><li><input type="checkbox"/> Last 52 weeks</li></ul> | <b>Months</b> <ul style="list-style-type: none"><li><input type="checkbox"/> This month</li><li><input type="checkbox"/> Last month</li><li><input type="checkbox"/> Last 3 months</li><li><input type="checkbox"/> Last 6 months</li><li><input type="checkbox"/> Last 12 months</li></ul> | <b>Bi-months</b> <ul style="list-style-type: none"><li><input type="checkbox"/> This bi-month</li><li><input type="checkbox"/> Last bi-month</li><li><input type="checkbox"/> Last 6 bi-months</li></ul>                         |
| <b>Quarters</b> <ul style="list-style-type: none"><li><input checked="" type="checkbox"/> This quarter</li><li><input checked="" type="checkbox"/> Last quarter</li><li><input type="checkbox"/> Last 4 quarters</li></ul>   | <b>Six-months</b> <ul style="list-style-type: none"><li><input type="checkbox"/> This six-month</li><li><input type="checkbox"/> Last six-month</li><li><input type="checkbox"/> Last 2 six-months</li></ul>  | <b>Financial years</b> <ul style="list-style-type: none"><li><input type="checkbox"/> This financial year</li><li><input type="checkbox"/> Last financial year</li><li><input type="checkbox"/> Last 5 financial years</li></ul> |
| <b>Years</b> <ul style="list-style-type: none"><li><input type="checkbox"/> This year</li><li><input type="checkbox"/> Last year</li><li><input type="checkbox"/> Last 5 years</li></ul>   |   |  |

7. Go to **Organisation Units** in the same left side pane, and click the arrow next to the gear button.

8. Select **Select levels**.

**DHIS 2 Pivot Table**

9. Select **District** from the list (next to the gear button). Click **Update**.

**DHIS 2 Pivot Table**

As you can see, the scorecard is starting to take shape in the workspace. Now it's time to fine-tune the look and feel.

**Organise the layout and display of your scorecard**

1. In the workspace, click **Layout**.

The screenshot shows the 'TABLE LAYOUT' configuration window. The window has a title bar with 'TABLE LAYOUT' and a close button. Below the title bar are four menu items: 'Layout', 'Options', 'Download', and 'Embed'. The main area is divided into three columns: 'Excluded dimensions' (with 'Assigned categories' below it), 'Report filter', and 'Column dimensions' (with 'Data' and 'Periods' below it). Below the 'Report filter' column is a 'Row dimensions' section with 'Organisation units' below it. At the bottom right, there are 'Hide' and 'Update' buttons.

2. In **Table layout**, drag **Organisation units** down to the **Row dimensions** section.
3. Drag **Data** to the **Column dimensions** section.
4. In the **Column dimensions** pane, drag **Periods** below **Data**, and click **Update**.
5. In the workspace, click **Options**.



Options ▾ Download ▾ Embed ▾

**TABLE OPTIONS** [X]

**Data**

- Show column totals
- Show row totals
- Show column sub-totals
- Show row sub-totals
- Show dimension labels
- Hide empty rows
- Skip rounding

Aggregation type: By data element ▾

**Organisation units**

- Show hierarchy

**Events**

- Include only completed events

**Style**

Display density: Normal ▾

Font size: Normal ▾

Digit group separator: Space ▾

Legend set: Traffic Light ▾

Legend display style: Background color ▾

**General**

Table title:

**Parameters** (for standard reports only)

6. Go to **Data** and clear all the checkboxes.
7. Go to **Style > Legend set** and from the list, select the legend you created in the Maintenance app. In this example, we called it Traffic light.
8. Go to **Style > Legend display style** and select **Background color**.
9. Click **Update**.

The Scorecard is ready!

| ANC 1 Coverage  |                 | ANC 2 Coverage  |                 | ANC 3 Coverage  |                 | ANC => 4 Coverage |                 | ANC IPT 1 Coverage |                 | ANC IPT 2 Coverage |                 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|--------------------|-----------------|--------------------|-----------------|
| Oct to Dec 2016 | Jul to Sep 2016 | Oct to Dec 2016 | Jul to Sep 2016 | Oct to Dec 2016 | Jul to Sep 2016 | Oct to Dec 2016   | Jul to Sep 2016 | Oct to Dec 2016    | Jul to Sep 2016 | Oct to Dec 2016    | Jul to Sep 2016 |
| 136.6           | 165.2           | 119.1           | 155             | 120.3           | 94.8            | 63.2              | 51.9            | 127.1              | 91.5            | 111.5              | 70.8            |
| 54.5            | 88.8            | 51.3            | 75.2            | 36.3            | 59              | 17.6              | 30.2            | 98.7               | 72.7            | 74.9               | 60.2            |
| 35.8            | 118             | 35.4            | 117.6           | 30.1            | 84.3            | 22.1              | 55.4            | 125.5              | 107.6           | 73.2               | 83.2            |
| 77.4            | 84.7            | 83.3            | 84.1            | 72.2            | 71.7            | 45.8              | 49.1            | 130.1              | 83              | 104.2              | 78.3            |
| 109.4           | 97.7            | 95.3            | 94.8            | 65.6            | 65.8            | 33.9              | 29.1            | 120.7              | 78.7            | 118.7              | 57.8            |
| 93.5            | 90              | 117             | 106.3           | 86.7            | 87.7            | 57.5              | 56              | 94.3               | 93.1            | 54.7               | 65.4            |
| 37.7            | 84.4            | 28.9            | 70              | 20.5            | 51.7            | 16.1              | 38.4            | 112.5              | 114.3           | 103.7              | 107.4           |
| 26.6            | 57.4            | 25.2            | 55.3            | 15.9            | 43.9            | 5.8               | 29.1            | 85                 | 95.7            | 45.8               | 61.8            |
| 108             | 123.1           | 97.9            | 111.6           | 83.9            | 96.1            | 76.7              | 82              | 104.4              | 108             | 96.2               | 97.2            |
| 64.2            | 112.1           | 57.7            | 95.5            | 36.6            | 57.1            | 20.3              | 31.6            | 168.3              | 162.2           | 128                | 138.1           |
| 0.71            | 113.1           | 1.1             | 106.6           | 0.74            | 82              | 0.13              | 48.3            | 223.8              | 143.6           | 118.2              | 116.6           |
| 139.6           | 135             | 114.4           | 104.2           | 67.6            | 60.4            | 28.2              | 25              | 127.8              | 96.8            | 96.7               | 90              |
| 122.2           | 123.7           | 111.8           | 112.9           | 72.3            | 83.8            | 66.2              | 63.3            | 119.6              | 155.6           | 115.2              | 128.9           |

### Save and share your scorecard

1. In the workspace, go to the **Favorites** menu.
2. Click **Save as**. Enter a name for your Scorecard.
3. To share your Scorecard, select **Favorites**.
4. Enter the name of a user group name, and click **Save**. Your scorecard can be viewed by people that you share a dashboard with.

### Working with TextPattern

TextPattern was introduced in DHIS2 version 2.29, as a way of defining a pattern that includes variables, generated values and raw text, which then could be generated into a text value. The current use-case for TextPattern is automatically generated attributes for tracked entities, where you want to generate for example unique ids based on a specific pattern.

This guide will cover both basic and advanced topics for working with TextPattern, but is mainly focused on how you can define TextPatterns and which limitations and caveats exists.

#### TextPattern syntax

A TextPattern is a sequence of *segments*, joined together by the "+" character. A segment has a specific notation and in most cases a parameter *format*, which allows for further manipulation of the value.

#### TextPattern segments

| Segment notation      | Description   | Parameter (format) | Example (segment → input value → result)  |
|-----------------------|---|--------------------|---|
| "Plain text"          | <p>The plain text segment will remain unchanged in all generated values. This special segment is defined by wrapping text between two double quotes. If your pattern should include separation symbols like a dash, you should use this "-".</p> <p>The plain text segment also allows for placeholder text. That means you can specify that parts of the plain text segment should be any of a set of characters. Currently there are 4 supported special characters you can use:</p> <ul style="list-style-type: none"> <li>• <code>\d</code> (0-9)</li> <li>• <code>\x</code> (a-z)</li> <li>• <code>\X</code> (A-Z)</li> <li>• <code>\w</code> (a-zA-Z0-9)</li> </ul> | None               | <p>"Hello world" → None → Hello world</p> <p>"Hello \x\x\x" → "Hello you" → Hello you</p> <p>"\d\d\d" → "123" → 123</p> |
| CURRENT_DATE(format)  | Current date segment will be generated by the server at the time of generation. This is useful if you want your patterns to have a time-constraint that is disconnected from the context. You should not use this if you need to control which date is injected into the pattern.   | Date format        | CURRENT_DATE(yyyy) → 01-01-2018 → 2018  |
| ORG_UNIT_CODE(format) | This segment represents the organisation unit code associated with the generation.  | Text format        | ORG_UNIT_CODE(...) → OSLO → OSL   |
| RANDOM(format)        | Random segments will be replaced by a value randomly generated by the server based on the format. Generated segments, like Random, bases its uniqueness on the rest of the pattern. That means a random value can appear twice, as long as the rest of the pattern is different, which means the generated text as a whole will be unique.  | Generation format  | RANDOM(X#####) → None → A1234   |

| Segment notation   | Description   | Parameter (format) | Example (segment → input value → result)  |
|--------------------|---|--------------------|---|
| SEQUENTIAL(format) | <p>Sequential segments will be replaced by a number, based on a counting value on the server.</p> <p>Sequential segments will start at the value 1, and for each generated value count up until no more values are available, based on the format.</p> <p>Like Random segments, uniqueness is based on the rest of the pattern, so each possible version of the pattern will have its own sequential counter starting from 1.</p> | Generation format  | <p>"A"+SEQUENTIAL(###) → None → A001</p> <p>"A"-SEQUENTIAL(###) → None → A002</p> <p>"B"-SEQUENTIAL(###) → None → B001</p> <p>"B"-SEQUENTIAL(###) → None → B002</p> |

Most segments has a parameter *format*, except for the plain text segment. The following table lists the available formats, how they are used and example notations using them.

#### Parameter formats

| Format            | Description   | Example   |
|-------------------|---|---|
| Date format       | This format is based directly on the java SimpleDateFormat, which means any pattern valid for SimpleDateFormat, will be valid as a date format in TextPattern   | <p>CURRENT_DATE(dd-MM-yyyy) → 31-12-2018</p> <p>CURRENT_DATE(MM-yyyy) → 12-2018</p>   |
| Text format       | The text format allows for some basic text manipulation. Leaving the format empty will return the value unmodified, but using "^", "." and "\$", you can modify the value before it is returned. Each "." represents a character, while "^" represents the start of the text and "\$" represents the end. When using formats, the input value must be at least the same length as the format.   | <p>ORG_UNIT_CODE(...) → OSLO</p> <p>ORG_UNIT_CODE(.) → OS</p> <p>ORG_UNIT_CODE(.\$) → LO</p> <p>ORG_UNIT_CODE(^...\$) → OSLO</p> <p>^...\$ will require the input value to be exactly 4 characters.</p> |
| Generation format | The generation format accepts a combination of one or more of the following characters: "#", "X", "x" and "*". They respectively represent a number(0-9), an uppercase letter (A-Z), a lowercase letter(a-z) or any of the above(0-9,a-z,A-Z). The SEQUENTIAL segment only accepts "#", since it will only generate numbers. The number of characters in the format decides the size of the value generated. Using just one "#" will in other words only allow for 10 values (0-9), while "####" will allow for 1000 values (000-999). SEQUENTIAL generated values have leading zeroes, so the length of the generated value will always match the format length. | <p>RANDOM(X####) → A123</p> <p>RANDOM(****) → 1AbC</p> <p>SEQUENTIAL(###) → 001</p> <p>SEQUENTIAL(#####) → 000001</p>   |

---

A few important things to note regarding the formats:

- Date format is very versatile, but be aware of which date or time components you are using. Using components smaller than a day (For example hours or seconds) is not recommended, even though available.
- Text format allows for marking both the start and end of the input value, but "^..." and "... " will in reality give exactly the same results. The only time you would want to use "^" is when you want to enforce the length of the input value. For example, "^....\$" will accept OSLO, since its 4 characters between the start and end, but PARIS will be rejected, since it has 5 characters.
- When text format is used for unique values, like organisation unit code, make sure that the format does not break the uniqueness. (Example: ORG\_UNIT\_CODE(.) for "PARIS" and "PANAMA CITY" would both return PA, which means these two organisation units would in reality share generated values)
- Generation format is the primary way to understanding the capacity of your pattern. Make sure the format is long enough to cover more values than you need.

To finish off the syntax section of the tutorial, here is a couple of example TextPattern:

```
ORG_UNIT_CODE(...) + "-" + CURRENT_DATE(yyyyww) + "-" + SEQUENTIAL(#####)
```

This pattern will have 99999 possible values (based on SEQUENTIAL. 00000 is never used since we start at 1). In addition, the remaining pattern will change for each different organisation unit generating values (ORG\_UNIT\_CODE) and for each week (CURRENT\_DATE(yyyyww) represents year and week). That effectively means every new week, each organisation unit will have 99999 new values they can use.

```
"ABC_" + RANDOM(****)
```

The plain text segment of this pattern, will make no difference in the total capacity of the pattern, however the generated segment (RANDOM) will allow for 14776336 possible values. The reason for this is that \* can be any one character of the 62 characters available (0-9, a-z, A-Z). You can read more about understanding pattern capacity further down in the tutorial.

### Designing TextPattern for generating ids

One use-case for TextPattern is to generate unique ids. In this section we will present guidelines and common issues related to designing TextPatterns used for ids.

An id should never contain sensitive information, or information that in combination can identify an individual. TextPattern does not currently support segments that uses these kind of values, but might do so in the future.

The following list highlights some of the TextPattern specific restrictions you need to consider when designing a TextPattern for ids:

- Make sure the capacity (number of possible values) of the TextPattern covers your use-case. It's better to have more values than needed than less. Tracked entity attributes using TextPattern will require that a single generated segment is present in the TextPattern.
- A TextPattern is unique in the entire system, but only for the object using it. In other words, if you have a single tracked entity attribute with TextPattern, used by multiple Tracked

---

entities (Not to be mistaken for tracked entity instances), all values generated will be shared between all traced entities using the attribute. This also means that if you have two tracked entity attributes with the same TextPattern syntax, each attribute will be able to generate the same value as the other, since uniqueness is based on the attribute.

- SEQUENTIAL segments are in the implementation numbers starting from 1, increasing by 1 for each value, sequentially until no more values are available. However, in reality you will most likely end up with gaps when users generate and reserve values that is never used, or if a user sends in a value where the SEQUENTIAL segment has a higher value than recorded on the server.
- The current implementation relies on the user-client to send in the values contained in the TextPattern when storing a new value. That means generating a correct id is depending on the user, and user-client, to provide the correct data.

### Understanding TextPattern capacity

The most important thing to keep in mind when designing a TextPattern, is the capacity - that means the total number of potential values a TextPattern can yield.

With the current implementation of TextPattern, there are three main factors that decides the capacity:

1. Capacity of the generated segment in the TextPattern
2. The presence of a CURRENT\_DATE segment
3. The presence of a ORG\_UNIT\_CODE segment

The presence of a date segment (like CURRENT\_DATE) will effectively reset the capacity each time the segment changes. Depending on the date format, it can change anywhere to yearly to daily. **Important: If your date format don't contain a year, the pattern will resolve to the same value every year.** That means values will already be used. For example, if your TextPattern looks like this:

```
CURRENT_DATE(ww) + "-" + RANDOM(#)
```

This pattern will give you up to 10 unique values for each week, but after 1 year, CURRENT\_DATE(ww) will be the same as last year, and you will have no new values available. If you use "yyyy-ww" instead, it will be unique for every year, every week.

Organisation unit codes will make your values unique for each different organisation unit, which means if you have a text pattern like this:

```
ORG_UNIT_CODE() + "-" + RANDOM(#)
```

This pattern will give you 10 unique values for each different organisation unit.

### Calculating capacity for generated segments

Understanding how to calculate the capacity of a TextPattern is critical when designing TextPatterns. The generated segments will be the main component of any TextPattern in terms of capacity, then increased based on the presence of ORG\_UNIT\_CODE or CURRENT\_DATE.

Let's start with SEQUENTIAL segments. Each "#" in the format represents a number between 0 and 9. To calculate the total capacity, you multiply the number of possible values for each "#". Since it's always 10 (0-9) the maths is quite straight forward:

```
SEQUENTIAL(#) = 10 = 10
SEQUENTIAL(###) = 10 * 10 * 10 = 1000
SEQUENTIAL(#####) = 10 * 10 * 10 * 10 * 10 = 100000
```

Since SEQUENTIAL counters on the server start at 1 and not 0, the actual capacity is 999, but that's insignificant in most cases.

As soon as we involve RANDOM, the calculation becomes a bit more complicated. Similar to SEQUENTIAL, a "#" has 10 possible values, in addition we have "X" and "x" with 26 possible values each, as well as "\*" which can be any of the previous, which means 62 (10+26+26) possible values.

To calculate the capacity, you need to take each character in your format and replace with the number of possible values, then multiply them all together like we did for SEQUENTIAL:

```
RANDOM(#) = 10 = 10
RANDOM(X) = 26 = 26
RANDOM(*) = 62 = 62

RANDOM(X##) = 26 * 10 * 10 = 2600
RANDOM(XXxx) = 26 * 26 * 26 * 26 = 456976

RANDOM(***) = 62 * 62 * 62 = 238328
```

As you can see, the maths gets a bit more complicated when, but by following this recipe you can see the number of potential values.

### Random segments and why you should avoid it

There is a hidden cost of using the random segment in TextPattern in the long run, but that does not mean you should never use it. This section will highlight the problems of using the random segment and suggest when it might be more appropriate to use it.

This section is motivated by an issue with the previous generation strategy, where you only had random generation. After while, instances using this feature would actually be unable to generate and reserve new values, since it was taking too long to find available values. This section looks at some of the problems with random generation that created this situation.

#### Generating random values

Before using the RANDOM segment in your TextPattern, you should consider the following problems connected to the use of RANDOM:

- Generating values from a TextPattern with a RANDOM segment will be more complex than other TextPatterns

#### Data entry for TextPattern based metadata

As previously mentioned, the only metadata currently supporting TextPattern is the tracked entity attributes. In this section, we will describe the different ways data entry for TextPattern works, especially for tracked entity attributes.

### Validation of values using TextPattern

By default, all values sent to the server for metadata using TextPattern, will be validated. Validation can be skipped if needed, but you should always validate input under normal circumstances. The validation will be based on the TextPattern you have defined and will be as strict as possible:

- Date segments must match the same format as specified in the segment parameter
- Plain text segments must match exactly
- Text segments values must be at least as long as the format string. If both "^" and "\$" is present, the value must match the exact length.
- Generated segment values must match the format exactly, character by character.

When using the server to first generate and reserve values, the server will modify the values used in the TextPattern before injecting them, meaning you will always get a valid value when generating it on the server.

A final exception to TextPattern validation is made for a special case: If you change a TextPattern after reserving values for the original pattern, values sent to the server that are invalid according to the new TextPattern, will still be accepted if it was already reserved.

### Different data entry flows for TextPattern

There is currently 2 ways a client can store values for TextPattern metadata:

1. Generating and reserving values (Apps should do this for you)
2. Storing a custom value

The preferred way, is to generate and reserve the needed values (The number of values generated and reserved is handled by the app). That means each time you are seeing and storing a value, it has been generated and reserved by the server, and will be valid.

The other way might be useful in specific cases. The user will supply the value themselves and as long as the value supplied is valid for the TextPattern, they can put anything they want. The caveat of doing it this way, is that you might use values that was reserved by someone else and if you have a SEQUENTIAL segment, the counter will not be updated.



## DHIS2 Frequently Asked Questions

**Q:** I have entered data into a data entry form, but I cannot see the data in any reports (pivot tables, charts, maps). Why does data which is entered not show up immediately in my graphs in DHIS2?

**A:** Data which is entered into DHIS2 must first be processed with the "analytics". This means that data is not immediately available in the analytics resources (such as reports, pivot tables, data visualizer, GIS, etc.) after it has been entered. If scheduling is active, the analytics process will run automatically at midnight each day. After that, new data which was entered since the last time the analytics process ran, will become visible.

You can trigger the analytics process manually by selecting Reports->Analytics from the main menu and pressing the "Start export" button. Note, the process may take a significant amount of time depending on the amount of data in your database.

Other factors which can affect the visibility of data are:

- Data approval: If data has not been approved to a level which corresponds to your users level, the data may not be visible to you.
- Sharing of meta-data objects: If certain meta-data objects have not been shared with a user group which you are a member of, the data may not be visible to you.
- Caching of analytics: In many cases, server administrators cache analytical objects (such as pivot tables, maps, graphs) on the server. If you have entered data, re-run analytics, and you are still not seeing any (updated) data, be sure that your data is not being cached by the server.

**Q:** I have downloaded DHIS2 from <https://www.dhis2.org/downloads> but when i try to enter the system it needs a username and password. Which should I use?

**A:** By default, the username will be "admin" and the password "district". Usernames and passwords are case sensitive.

## Release and upgrade notes

For up-to-date information about the latest DHIS 2 releases, please refer to the [DHIS 2 downloads](#) page on our website.