

The United Republic of Tanzania
Ministry of Health, Community Development,
Gender, Elderly and Children

DHIS 2 Functions and **Data Use** for Health Information System Strengthening

Training Manual
Participants' Guide

September 2017



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Acknowledgements

The *DHIS 2 Functions and Data Use for Health Information System Strengthening Training Manual* has been developed to augment the capacity and skills of Council Health Management Teams (CHMTs) and Regional Health Management Teams (RHMTs) to use the advanced functions and features of DHIS 2. The training manual addresses competencies that will enable CHMTs and RHMTs to improve the quality, analysis, and use of routinely collected health management information system data for effective health program monitoring, planning, and decision making. We thank the United States Agency for International Development (USAID) and the United States President's Emergency Plan for AIDS Relief (PEPFAR) for their support of this project.

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Abbreviations

ANC	antenatal care
BEmONC	basic emergency obstetric and newborn care
CBIS	community-based information system(s)
CEmONC	comprehensive emergency obstetric and newborn care
CHAI	Clinton Health Access Initiative
CHMT	council health management team
CTC	care and treatment clinic
DACC	district AIDS control coordinator
DDU	data demand and use
DHS	Demographic and Health Survey(s)
DHIS	district health information system
DMFP	district malaria focal person
DMO	district medical officer
DOCSE	Department of Computer Science and Engineering (at UDSM)
DPP	director of policy and planning
DRCH Co	district reproductive and child health coordinator
DTC	Diarrhoea Treatment Corner
EGPAF	Elizabeth Glaser Pediatric AIDS Foundation
eIDSR	electronic integrated disease surveillance and response
eLMIS	electronic logistic management information system
EMR	electronic medical record
FBO	faith-based organisation
FMIS	financial management information system(s)
GBD	global burden of disease
GIS	geographic information system(s)
HIS	health information system(s)
HMIS	health management information system(s)
HRH	human resources for health
HRHIS	Human Resource for Health Information System
HRIS	human resource information system(s)
IDSR	integrated disease surveillance and response
IHI	Ifakara Health Institute
IPD	inpatient department
IPTp	intermittent preventive therapy for malaria during pregnancy

IVD	immunisation and vaccination development
JICA	Japan International Cooperation Agency
KCMC	Kilimanjaro Christian Medical Centre
L&D	labour and delivery
LLIN	long-lasting insecticide-treated net
LMIS	logistic management information system
M&E	monitoring and evaluation
MESI	Monitoring and Evaluation Strengthening Initiative
MFL	master facility list
MIS	management information system(s)
MNH	Muhimbili National Hospital
MOH	Ministry of Health
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MTUHA	<i>Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya</i> (Kiswahili for “health management information system”)
MVC	most vulnerable children
NACP	National AIDS Control Program
NBS	National Bureau of Statistics
NHA	National Health Accounts
NMCP	National Malaria Control Programme
NTLP	National Tuberculosis and Leprosy Programme
OCGS	Office of the Chief Government Statistician
OPD	outpatient department
ORCI	Ocean Road Cancer Institute
PMTCT	prevention of maternal-to-child transmission of HIV
PNC	postnatal care
PRISM	Performance of Routine Information System Management
RACC	regional AIDS control coordinator
RCH	reproductive and child health
RCHS	reproductive and child health section
RHMT	regional health management team
RHS	regional health secretary
RITA	Registration Insolvency and Trusteeship Agency
RMFP	regional malaria focal person
RMO	regional medical officer
R&R	report and requisition

RRCH Co	regional reproductive and child health coordinator
SDG	Sustainable Development Goal
STI	sexually transmitted infection
TACAIDS	Tanzania Commission for AIDS
TB	tuberculosis
TDHS	Tanzania Demographic and Health Survey(s)
TFNC	Tanzania Food and Nutrition Centre
TFR	total fertility rate
THMIS	Tanzania HIV and Malaria Indicator Survey(s)
TSPA	Tanzania Service Provision Assessment
UDSM	University of Dar es Salaam
UNAIDS	Joint United Nations Programme on HIV/AIDS
USAID	U.S. Agency for International Development



MODULE 1: OVERVIEW OF HEALTH SECTOR DATA SOURCES IN TANZANIA

Module Introduction

Healthcare delivery occurs in a complex environment that is influenced by factors both within the healthcare system (e.g., health facilities and healthcare providers, management, and resources) and outside of it (social, political, cultural, and geographic factors). To make informed healthcare decisions, therefore, managers need a wide range of information related to the following topics:

- Health service accessibility by the community
- Quality of the provided service
- Health outcomes in the community—for example, a decrease in morbidity and mortality
- Human resources for health management
- Logistics and drugs supplies

To meet these vast information requirements, a variety of data sources are needed for healthcare and health system management. A number of methods are employed to extract such data for use in management decision making in Tanzania.

This module introduces the health information system (HIS), discusses different HIS data sources (both routine and nonroutine), the HIS subsystems that are used to collect and manage those data, and how the data can be used to set benchmarks for health service performance.

Module Objectives

At the end of this module, participants will:

- 1. Be able to identify the basic health information system data sources used to track the status and progress of health in the country**
- 2. Be able to explain the interdependence of health sector data sources**
- 3. Be able to distinguish routine and nonroutine health sector data sources**
- 4. Understand and be able to describe essential data elements of common health surveys conducted in Tanzania**

Session 1: Health Information System Data Sources

1.1.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Be able to distinguish different HIS data sources and understand how they are classified
- Be able to distinguish routine and nonroutine data sources
- Understand the interdependence of different HIS data sources

1.1.1 INTRODUCTION

Healthcare delivery occurs in a complex environment that is influenced by factors both within the healthcare system (e.g., health facilities and healthcare providers, management, and resources) and outside of it (social, political, cultural, and geographic factors). The healthcare services offered must meet the following performance dimensions:

- **Coverage:** Are services reaching those in need?
- **Quality:** Are clients satisfied with services? Are healthcare providers satisfied with the environment for health service delivery? Which factors affect client satisfaction with healthcare services?
- **Patient-level outcomes:** Do the patients achieve improved health or well-being from the services provided?
- **Population-level outcomes:** Are the health services provided having an impact at the community level and at the population-level?

To answer these questions, a comprehensive HIS facilitates the collection, analysis, and use of data from a variety of sources. With this information, different levels of the health system can perform their functions, ultimately addressing the major health challenges that Tanzania faces.

This module introduces the HIS and discusses both routine and nonroutine HIS data sources, the HIS subsystems that collect and manage those data, and how the data can be used to set benchmarks for health service performance.

The contents of this module should help improve understanding of data sources for tracking health service indicators (Modules 2 and 3), the quality issues with some data sources (Module 4), and how different types of data can be used to assess improvements in health outcomes and health sector performance (Module 5).

1.1.2 HEALTH DATA SOURCES

Data that are needed by various levels of the health system for healthcare management and health system management are diverse—for example, patient-level data, service statistics, administrative data, and survey data—and come from multiple sources.

Generally, health data sources are categorized in two ways:

- Population-based vs. institution-based data
- Routine vs. nonroutine data

Population-based sources generate data on all individuals within a defined population and can include total population counts (for example, census and civil registration) and data on representative populations or subpopulations (household and other population-based surveys). Institution-based sources generate data as a result of programmatic, operational, and administrative activities. These include service statistics; information on the availability and quality of services; case reporting; and human resources, financial, and logistics information.

Routine data sources are those in which data are collected on an ongoing or continuous basis as part of health service delivery or health service management. Nonroutine data are collected periodically depending on need, availability of resources, and other factors specific to the environment.

Having multiple sources of data can be useful. Nonroutine sources can be used in conjunction with routine data: for example, survey data can provide denominators for many health management information system (HMIS) indicators, which generate information that is much more powerful than the service statistics count alone. Multiple health data sources are also useful for triangulation of data. Triangulation is a term that refers to a data analysis approach that validates data from one source by comparing them with data from other sources.

1.1.3 ROUTINE DATA SOURCES

Currently, a great percentage of routine data are collected by the Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) through the HMIS Unit. The primary sources of routine health data are **service records**, **administrative records**, and **civil registration and vital statistics**.

Service and Disease Records

Service records are those related to the provision of health services in the country. The services can be provided by a facility or through community-based programs; examples are antenatal services, delivery services, postnatal services, and immunization services. The data from facility-based services are part of the HMIS and are managed using DHIS 2, a web-based software package developed by the Health Information Systems Programme (a global partnership) for the collection, validation, analysis, and presentation of aggregate statistical data. Currently, data from most vulnerable children (MVC) and other community-based programs are collected separately, but plans are underway to integrate these data in the country's district health information system (DHIS). Health and disease surveillance records are another important source of data, giving information about morbidity in a particular population. Different health facility points generate different disease records. The outpatient department (OPD) and the inpatient department (IPD) are the major sources of data for disease records. Another section generating data on diseases is the reproductive and child health (RCH) section. It generates information about malaria in pregnancy, anaemia, blood pressure, cervical cancer, breast cancer, and other illnesses.

Service and disease systems in Tanzania are:

- HMIS, managed using DHIS 2
- Community-based information systems (CBIS), such as the MVC database
- Integrated disease surveillance and response (IDSR) systems

ADMINISTRATIVE RECORDS

These are records related to the management of the health sector, such as human resource records and reports on drugs and medical supplies.

Human Resource Records Management

- The records for Human Resource for Health in Tanzania are managed by the Human Resource for Health Information System (HRHIS).
- HRHIS keeps records on individual staff members, such as names, check numbers, salary scales, amounts, designations, and departments.
- The HRHIS is able to communicate with DHIS 2, the software used to manage the HMIS data.
- DHIS 2 takes in aggregated data, not individual-level data, on such things as the number of medical doctors and the number of nurses.

Drugs and Medical Supplies

- Drugs and medical supplies are managed through the HMIS, using the tracer medicine data collection form. The system started with only 10 tracer medicines, but it is now collecting data on 30.
- Data collection involves identifying the availability of these drugs; if a drug is unavailable, the health worker states “for how long” the drug has been unavailable. All health facilities are charged with collecting data related to tracer medicines.

Figure 1. Screenshot of the Tracer Medicine Reporting Tool

Tracer Medicine Reporting Tool

Line No	Description	Je Kituo kinatoa huduma hii?	Hali ya kiashiria/dawa ipo?	Kama haipo		
				A: < 1 Week	B: 1-4 Weeks	C: > 4 Weeks
1	DPT + HepB/ HiB vaccine for immunization	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>
2	Vidonge vya ALU vya kumeza	<input type="text" value="Yes"/>	<input type="text" value="No"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>
3	Amoxicillin/ Cotrimoxazole ya maji	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>
4	Amoxicillin/ Cotrimoxazole ya vidonge	<input type="text" value="Yes"/>	<input type="text" value="Yes"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>	<input type="text" value="No value"/>

Here are some examples of administrative record systems:

- Human resource information systems (HRIS), such as HRHIS
- Logistics management information systems (LMIS), such as the digital eLMIS
- Financial management information systems (FMIS), such as National Health Accounts (NHA)

CIVIL REGISTRATION AND VITAL STATISTICS

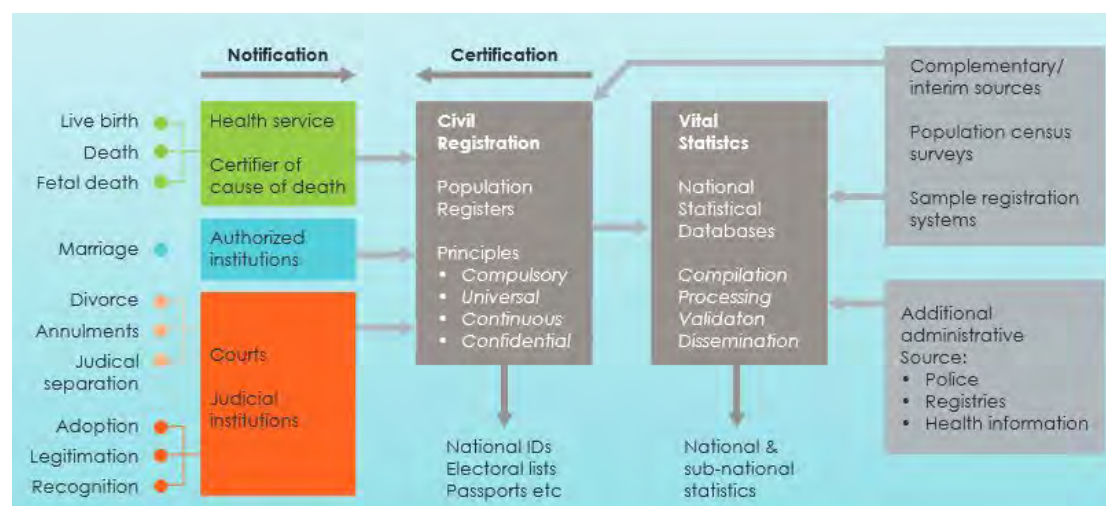
Figure 2: Mass Vital Registration Campaign



Source: Registration Insolvency and Trusteeship Agency website, <http://www.rita.go.tz/> (26 August 2015)

Civil registration is a critical source of data, particularly the continuous recording of births, deaths, and causes of death. It relies increasingly on information systems in health facilities and the community. Sample vital registration can be used as an intermediate measure, but there is now growing momentum to register all births and provide an identity for everyone.

Figure 3: Civil Registration and Vital Statistics Systems



Source: Adapted from *The Roadmap for Health Measurement and Accountability: MA4Health, a Common Agenda for the Post-2015 Era*, June 2015, p. 4. Retrieved from <http://ma4health.hsaccess.org/roadmap>.

A civil registration system is an administrative system that systematically records changes in the population's civil status. Important items recorded are births, deaths, and marriages.

Modern civil registration systems record nine types of events, as shown in Figure 4.

Figure 4: Common Data Elements in Civil Registration

• Birth	• Death	• Marriage
• Divorce	• Annulment	• Separation
• Adoption	• Legitimation	• Recognition

CIVIL REGISTRATION IN TANZANIA

Civil registration in Tanzania is managed by the Registration Insolvency and Trusteeship Agency (RITA).

RITA is a government agency that deals with vital registration using the different national laws set for its constituent functionalities. Such laws include the Births and Deaths Registration Act and the Law of Marriage Act. Currently, the agency is concentrating more on birth registration than the other civil registration elements. Awareness of and infrastructure for civil registration exists from the village to the national level, as well as in hospitals where babies are born.

1.1.4 NONROUTINE DATA SOURCES

This section briefly talks about some common nonroutine data sources—specifically the census and surveys.

1.1.4.0 CENSUS

A census is a systematic procedure for gathering and recording data about the members of a given population. It is a very important source of data in the health sector, because most indicators use census data as their denominators.

Commonly referred to as the “Population and Housing Census,” this is the primary source of information about the size of a population, its geographical distribution, and the social, demographic, and economic characteristics of its members.

In Tanzania, the National Bureau of Statistics is in charge of all census activities: planning the census, managing the data collection, monitoring progress, and disseminating the results.

Census Progress

The first census in Tanzania after independence was done in 1967. Many others followed, with differing characteristics.

- As of 2015, Tanzania had conducted five Population and Housing Censuses.
- Although the “population count” element was the same in each one, other data elements collected were different. These elements were dependent on the environment and requirements at the time each census was conducted.
- The following are the populations recorded for each of the five censuses conducted:

Year	1967	1978	1988	2002	2012
Population	12,313,469	17,512,610	23,095,878	34,569,232	44,928,923

Characteristics of Tanzania’s Census

- The Population and Housing Census is usually held on a decennial basis (that is, every 10 years).
- The Population and Housing Census provides population distribution by age, sex, and other disaggregations.
- The Population and Housing Census also collects other data, such as economic characteristics.

The following figure shows the data elements collected in the 2012 census.

Figure 5: Items Collected in Tanzania’s 2012 Census

Items Collected in the 2012 Census, Tanzania	
• Population size	• Growth and distribution
• Household composition	• Marital status
• Citizenship	• Birth registration
• Survival of parents	• Education and literacy
• Housing conditions	• Household assets and amenities
• Fertility and mortality	• Age and sex profile
• Economic activity	• Marital status
• Disability	• Agriculture and livestock

1.1.4.1 SURVEYS

Surveys are another important source of data in the health sector. Surveys are designed to address specific questions.

Surveys use a sample of a population to make a statistical inference about the population being studied. The sample is usually carefully calculated in order to have statistical validity, so that inferences about the entire population can be made with confidence.

Surveys can be either cross-sectional or longitudinal. Cross-sectional surveys consist of a single questionnaire or interview administered at a single point in time to each sample member, while longitudinal surveys repeatedly collect information from the same people over time.

Session 2 of this document is entirely dedicated to surveys, particularly health surveys.

Exercise 1.1.1 Information Needs at Different Levels of the Health System

Divide into groups

- Discuss the information needs of different levels of the health system. Relate the information needs to the functions of the health system levels.

Exercise 1.1.2 Data and Data Sources

Divide into groups of no more than five. Each group:

- Identify data that can be obtained only through a single source. Identify the source.
- Identify data that can be obtained through multiple sources.

Session 2: Major Health Surveys in Tanzania


1.2.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Be familiar with the health surveys that are conducted in Tanzania and the type of data they collect
- Understand how data from health surveys can inform health programs
- Understand how data from health surveys can be used with HMIS data

1.2.1 INTRODUCTION

In simple terms, a survey is a method of collecting data from the population. Surveys use interviews and/or questionnaires to collect data from a certain sample of the population. This sample is normally statistically and rigorously obtained, so that it is representative of the entire population being studied. This rigour is emphasised so that the data collected, thereafter, are statistically valid and can be used to make inferences about the relevant population.



Most health surveys are cross-sectional in design and meant to offer a better understanding of a particular health-related issue at a certain moment in time. Cross-sectional surveys involve administration of a questionnaire or interview to each sampled member of the population at a given point in time. When a cross-sectional survey is repeated later using the same sampling procedures and tools with the same population, it can facilitate the assessment of changes in factors of interest (e.g., HIV risk behaviour) between the two (or multiple) survey time points. These are called repeated cross-sectional surveys.

In contrast, longitudinal surveys involve collecting data on the same factors from the same sampled individuals at multiple points in time. The most common type of longitudinal health survey is the Demographic and Health Survey (DHS). DHS involves the selection and long-term monitoring of a defined population, typically residing in a specific geographic region. Central to the DHS is continuous demographic surveillance, consisting of an initial census and repeat censuses of the chosen population, registering each individual resident and recording their associated information, such as socioeconomic and behavioural data. Health outcomes and vital events in the area are then linked to individual demographic records for precise, rather than estimated, data on fertility, morbidity, mortality, and migration. Because DHS study sites are typically chosen for their high rates of infectious disease or their fertility patterns, the findings and subsequent interventions that are associated with the DHS have direct impact on the health and well-being of the populations under study. The DHS provides useful information, even though it may be for a limited geographic scope, in places where effective vital registration is weak.

In this session, we will focus mainly on cross-sectional health surveys.

1.2.2 HEALTH SURVEYS

A number of health surveys are conducted in Tanzania by different institutions with different purposes and different areas of investigation. Two examples are the Tanzania HIV and Malaria Indicator Survey(s) (THMIS) and the Tanzania Demographic and Health Survey(s) (TDHS). The following section briefly describes the most common health surveys conducted in Tanzania, beginning with these two.

1.2.3 TANZANIA HIV AND MALARIA INDICATOR SURVEYS

THMIS collects and communicates data related to HIV and malaria. The main objectives of THMIS are:

- To collect data on knowledge and behaviour regarding HIV and AIDS and malaria
- To measure HIV prevalence among women and men ages 15–49
- To measure the presence of malaria parasites and anaemia among children ages 6–59 months

The THMIS surveys are conducted by the National Bureau of Statistics, with support from the Office of the Prime Minister, the MOHCDGEC, the National AIDS Control Programme, and other institutions.

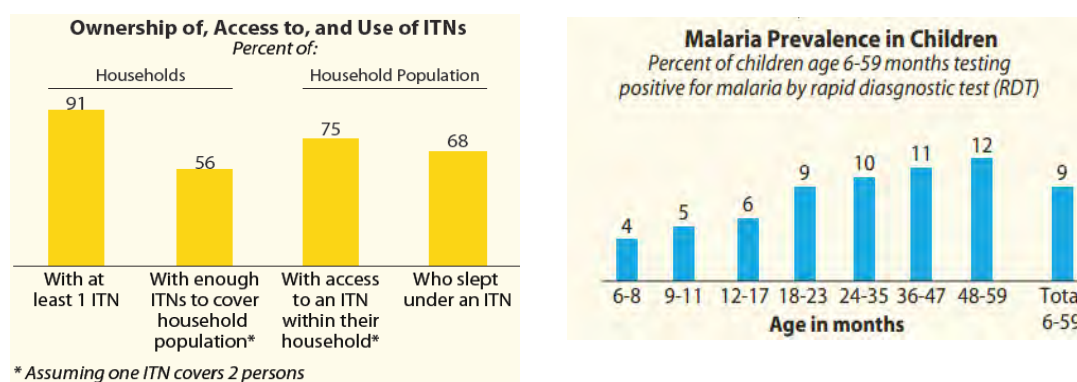
The last THMIS was completed in 2012 (the third in the series). The survey covered both the Tanzania Mainland and Zanzibar. The previous ones were the Tanzania HIV/AIDS Indicator Survey 2003–2004 and the Tanzania HIV/AIDS and Malaria Indicator Survey 2007–2008.

Figure 6: Selected Characteristics and Results of the 2012 THMIS

Methods
<ul style="list-style-type: none"> A total of 20,811 were involved—men and women. Age range was 15–49 years. Of the respondents, 90% of women and 79% of men provided specimens for HIV testing.
Findings
<ul style="list-style-type: none"> 5.1% of Tanzanians ages 15–49 are HIV-positive. HIV prevalence among women is 6.2%. HIV prevalence among men is 3.8%. HIV prevalence is higher in urban areas. Compared to the previous survey, HIV prevalence has declined slightly, from 5.7% to 5.1%.

Eligibility criteria: All women and men ages 15–49 who either are permanent residents of the selected households or visitors who stayed in the sampled households the night before the survey are eligible to be interviewed. In the process, children ages 6–59 months are also tested for anaemia and malaria in each household.

Figure 7: Examples of Findings from the 2012 THMIS



1.2.4 TANZANIA DEMOGRAPHIC AND HEALTH SURVEY (TDHS)

This is the most famous of the health surveys in Tanzania, because of its frequency, the methods used, and the extent of inquiry. At the time of this writing, the most recent TDHS was in 2010 (the fifth in the series). The TDHS is conducted every five years as part of the worldwide DHS program funded by the U.S. Agency for International Development (USAID), which helps countries collect data to monitor and evaluate population, health, and nutrition programs.

The 2010 TDHS had 475 sample points throughout Tanzania and involved a total sample of 10,300 households.

The TDHS is conducted by the National Bureau of Statistics, in collaboration with the Tanzania Commission for AIDS (TACAIDS), the Tanzania Food and Nutrition Centre (TFNC), and other partners.

TDHS collects data on the following indicators:

- Household characteristics
- Fertility levels and preferences
- Awareness and use of family planning methods
- Childhood and adult mortality
- Maternal and child health
- Breastfeeding practices
- Antenatal care (ANC)
- Childhood immunisation and diseases
- Nutritional status of young children and women
- Malaria prevention and treatment
- Women's status
- Female circumcision
- Sexual activity
- Knowledge and behaviour regarding HIV and AIDS
- Prevalence of domestic violence

Table 1 highlights some of the findings from the last TDHS survey.

Table 1: Sample Findings from the 2010 Tanzania Demographic and Health Survey

Fertility
<ul style="list-style-type: none">• Total fertility rate (TFR) in Mainland: 5.4• TFR in Zanzibar: 5.1• TFR range: 3.9 in the Eastern zone to 7.1 in the Western zone• 3.0 children per woman with education• 7.0 children per woman without education
Initiation of Childbearing
<ul style="list-style-type: none">• 23% of women ages 15–19 have begun childbearing• 17% of women ages 15–19 already have at least one child• 6% of women ages 15–19 are pregnant with their first child
Mortality
<ul style="list-style-type: none">• Infant mortality rate: 51 deaths per 1,000 live births• Overall under-5 mortality rate: 81 per 1,000

1.2.5 TANZANIA SERVICE PROVISION ASSESSMENT

The Tanzania Service Provision Assessment (TSPA) survey is a health facility assessment that provides a comprehensive overview of the availability and delivery of health services in the country. TSPA surveys fill an urgent need for monitoring health system strengthening in developing countries. They collect information on the overall availability of different facility-based health services provided in a country and the readiness of facilities to provide these services. Two rounds of TSPA have been conducted in Tanzania to date, the first in 2006 and the second in 2014–2015.

The 2014–2015 TSPA was implemented by the National Bureau of Statistics (NBS) in collaboration with the MOHCDGEC; the Office of the Chief Government Statistician (OCGS), Zanzibar; and Ministry of Health (MOH), Zanzibar. The survey sample comprised 1,200 health facilities out of 7,102 formal-sector health facilities in Tanzania. The sample distribution by type of facility was as follows: hospitals (21.5%); health centres (31.9%); dispensaries (41.5%); and clinics (5.1%).

The general objectives of the 2014–2015 TSPA were to collect information on the delivery of healthcare services and examine the readiness of facilities to provide high-quality health services. The specific objectives were the following:

- Assess the preparedness of health facilities in Tanzania to provide high-quality child and maternal health and family planning services.
- Provide a comprehensive body of information on the performance of different types of facilities that provide essential healthcare services.
- Identify gaps in the infrastructure, resources, and processes that are used to provide health services and that may negatively affect the ability of facilities to provide high-quality services.
- Describe the processes used to provide essential healthcare services and the extent of adherence to accepted standards for high-quality service provision.
- Compare the findings by facility type, management authority, and region.
- Describe the extent to which clients understand how to follow up on the service received so that the best health outcome is achieved.

The key services and topics assessed in a TSPA survey are listed here:

- Infrastructure, resources, and systems: water; electricity; latrines; and infection control; management systems; storage and stock monitoring for vaccines, contraceptives, and medicines; and infection control
- Child health: availability of vaccines, medicines, and vitamin A; availability of curative care services; availability of equipment and supplies for outpatient care; and adherence to guidelines for sick child care
- Maternal and newborn health: availability and appropriate assessment of clients for antenatal care, delivery services, newborn care, and emergency obstetric care

- Family planning: availability of contraceptives and supplies, user fees, counselling and client assessment, and provision of sexually transmitted infection (STI) treatment for family planning clients
- HIV and AIDS: availability of HIV testing services, HIV and AIDS care and support services, antiretroviral treatment, prevention of mother-to-child-transmission services, and post-exposure prophylaxis
- STIs
- Malaria: availability of malaria diagnostic and treatment services, guidelines, and antimalarial drugs and laboratory diagnostic capacity
- TB: availability of TB diagnostic services and first-line medicines for treating TB
- Basic surgery
- Noncommunicable diseases: diabetes, cardiovascular diseases, and chronic respiratory diseases

TSPA 2014–2015 DATA COLLECTION METHODS

Facility Inventory Questionnaire: The questionnaire collects information on the availability of specific items (including their location and functional status), components of support systems (e.g., logistics, maintenance, and management), and facility infrastructure (including the service delivery environment).

The inventory questionnaire consists of three modules:

1. Module 1 collects information on service availability.
2. Module 2 collects information on general facility readiness. Seven sections cover topics such as facility infrastructure (sources of water, electricity, etc.), staffing, health management information systems, health statistics, processing of instruments for re-use, healthcare waste management, availability of basic supplies and equipment, laboratory diagnostic capacity, and medicines and commodities.
3. Module 3 collects information on service-specific readiness. Sections cover child health (child vaccination, growth monitoring, and curative care); family planning; antenatal care; prevention of mother-to-child transmission of HIV (PMTCT); delivery and newborn care; infectious diseases such as tuberculosis, malaria, HIV and AIDS; and noncommunicable diseases, including diabetes, chronic respiratory diseases, and cardiovascular diseases.

Health Provider Questionnaire: The questionnaire was used to collect information from a sample of health service providers on their qualifications (training, experience, and continuing education), supervision they had received, and their perceptions of the service delivery environment.

Observation Protocols: These capture key components of consultations and examinations for care of sick children, ANC, and family planning.

Client Exit Interview Questionnaire: This is used with clients whose consultations have been observed. It was designed to assess each client's understanding of the consultation, examination, or both as part of the visit to the facility.

The tables below highlight some of the findings from the assessment.

Table 2: Service Availability by Type of Facility, TSPA 2014–2015

Type of Service	Hospital (%)	Health Centre (%)	Dispensary (%)	Clinic (%)
ANC	91	91	81	33
STI	98	100	98	65
All basic client services	69	79	75	13

Table 3: Service Availability by Type of Managing Authority, TSPA 2014–2015

Type of Service	Government (%)	Private (%)	Faith-Based Organisation (%)	Other (%)
ANC	97	36	81	29
STI	98	95	97	92
All basic client services	92	24	36	29

Exercise 1.2.1 Surveys

Discuss as a group and identify the types of surveys that respond to the following aspects of healthcare delivery

- Healthcare coverage (e.g., are services reaching those in need?)
- Healthcare quality (e.g., are clients satisfied with services? Are healthcare providers satisfied with the environment for health service delivery? Which factors affect client satisfaction with healthcare services?)
- Patient-level outcomes (e.g., do the patients achieve improved health through the services provided?)
- Population-level outcomes (e.g., are the health services provided having an impact on a community or population?)

MODULE 2

OVERVIEW OF TANZANIA'S HEALTH MANAGEMENT INFORMATION SYSTEM

Module Introduction

This module provides an overview of Tanzania's HMIS including data flow, data management processes, and staff roles and responsibilities at each level of the HMIS. It also provides an introduction to the data collected by the HMIS, the data collection and reporting tools that are used to capture and report these data, and the national core indicators that are constructed using these data. Finally, the module offers two conceptual frameworks to help define HMIS performance and highlight the different factors that influence HMIS performance.

Module Objectives

At the end of this module, participants will:

- **Be able to describe the structure and functions of Tanzania's HMIS**
- **Understand HMIS roles and responsibilities at different health management levels in Tanzania**
- **Be able to identify sources of HMIS data**
- **Be familiar with the different registers and tools used in the collection of HMIS data**
- **Be able to differentiate types of indicators**
- **Be familiar with the core HMIS indicators and know their definitions**
- **Be able to define HMIS performance and understand the role of a well-functioning HMIS in the production and use of high-quality data**
- **Understand the differences among the technical, organizational, and behavioural factors influencing HMIS performance**

Session 1: HMIS Structure, Data Flow, and Staff Roles and Responsibilities

2.1.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Be able to describe the flow of HMIS data across levels of health management in Tanzania
- Understand HMIS roles and responsibilities at different health management levels in Tanzania

2.1.1 INTRODUCTION

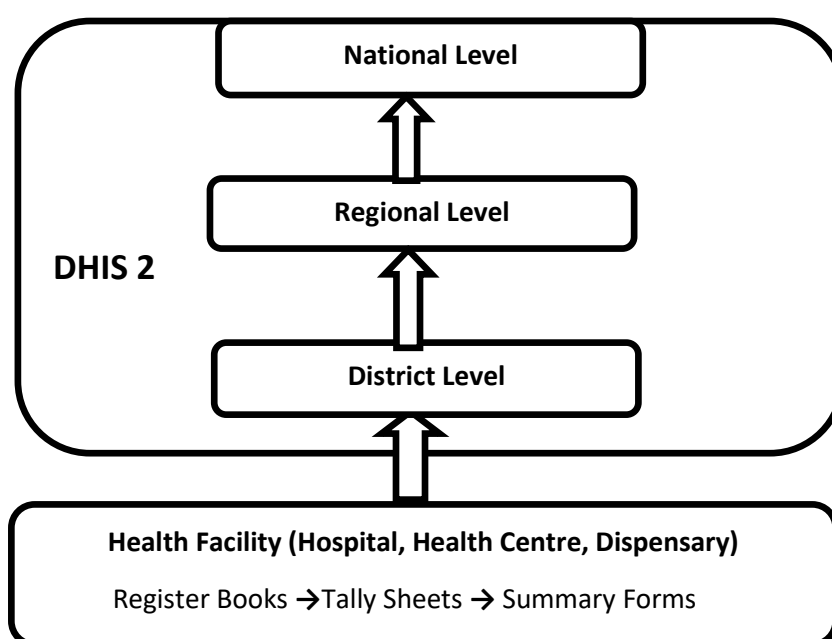
Generating and using data are important functions of the health sector, facilitating evidence-informed decision making by staff at all levels—from providers of services at health facilities to those responsible for running health programs at the health ministry and at partner organizations. The HIS has to be responsive to the data needs of health staff and managers; otherwise, the delivery of health services by the health system will be compromised, because major decisions will be based on assumptions, not on data.

In the case of the HMIS in Tanzania, the primary sources of data are the health facilities where clients receive healthcare services. The health facilities are responsible for capturing and reporting data on the services provided to clients and clients' health and disease status. These data are recorded in various registers and most are retained by the facility, for facility-level patient management and use. A subset of the data is reported on monthly HMIS reporting forms and will flow up the system to the upper levels of health administration, eventually ending up at the national level (i.e., the MOHCDGEC). This session describes the HMIS data flow mechanisms and staff responsibilities at each level.

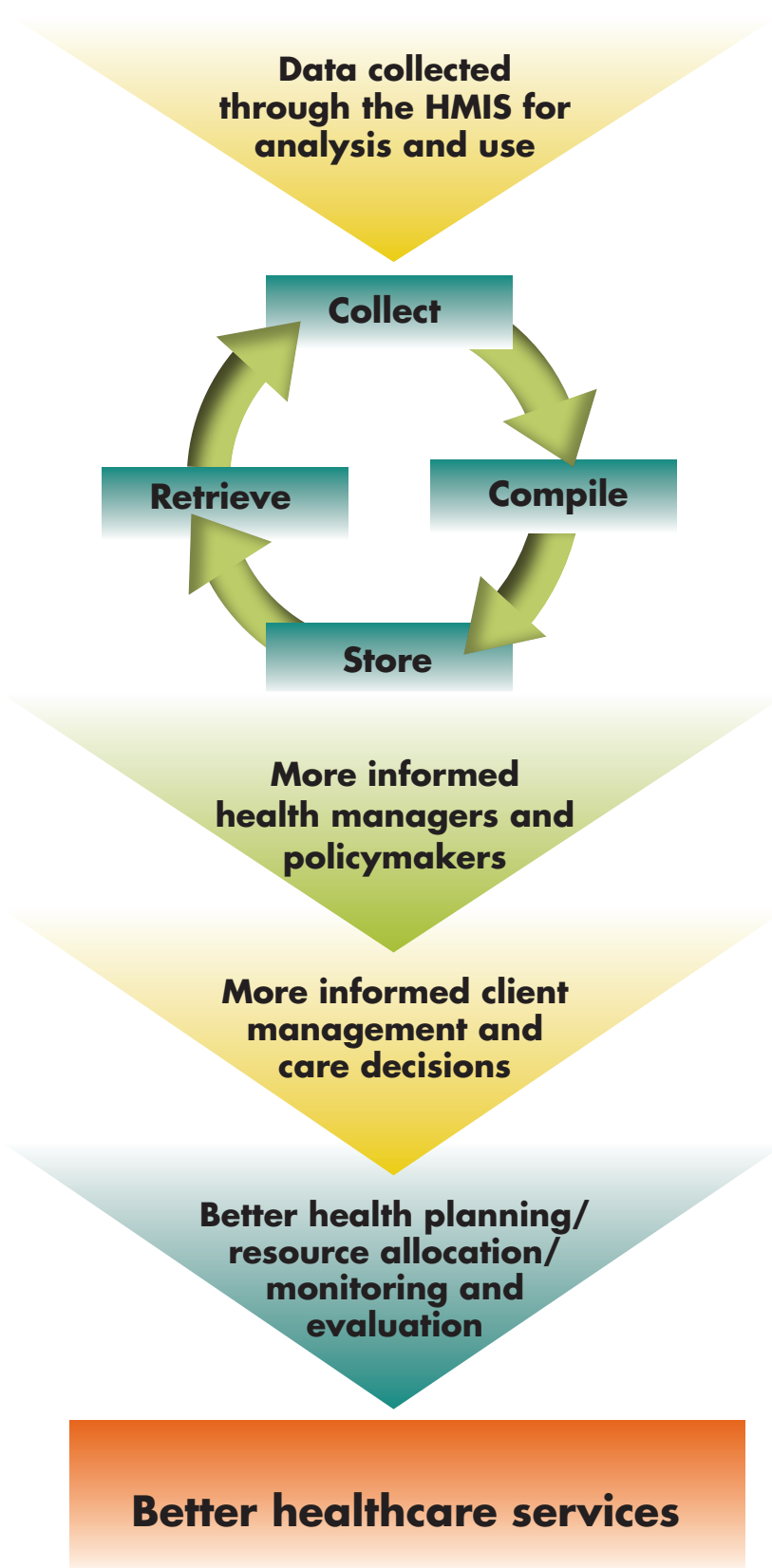
2.1.2 HMIS DATA FLOW OVERVIEW

Health service delivery data are primarily generated by health facilities where services such as ANC, labour and delivery (L&D), and OPD and IPD care are provided to clients. When clients are seen by service providers, they are registered in the appropriate HMIS register book (discussed in more detail in Session 2). At the end of each day, the information in the registers is summarized on tally sheets, which are used at the end of each month to compile monthly summary forms; these are submitted to the district level. At the district level, data from the monthly summary forms are entered in DHIS 2 (the web-based software, explained in Module 1, on which Tanzania's HMIS runs). Entered data are then accessed by users from the regional and national levels for analysis, use, and other activities.

Figure 8: Data Flow Levels



Purposes of Tanzania's Health Management Information System



2.1.3 HEALTH FACILITY

Service providers at health facilities are responsible for providing healthcare services to clients and recording the details of every such encounter, including the services provided, in the appropriate HMIS register books. At this level, the recording system is paper-based; clients' details are recorded in books provided by the national HMIS unit. Responsibilities at the facility level are:

- Providing healthcare services (such as ANC, L&D, postnatal care [PNC], immunisation and child health, and OPD and IPD care) and recording in the appropriate registers the details of patient demographics (such as age and sex) for each service provided
- Summarizing details of the day's services on service tally sheets before the facility closes each day
- Compiling monthly summary reports and filling in respective service monthly summary forms
- Review and sign-off by the health facility in-charge of that facility's monthly summary form
- Submission of all monthly summary forms to the district level—specifically to the office of the district medical officer

2.1.4 DISTRICT COUNCIL LEVEL

The district council, through the office of the district medical officer (DMO), is responsible for coordinating all health sector activities in a given district. This includes health services delivery, campaigns, and other related activities. All HMIS monthly summary forms from the health facility level are submitted to the DMO's office, where they are entered in DHIS 2 for compilation, aggregation, analysis, and use by the district level as well as the other levels of the health system.

This is also the level where the council health management team (CHMT) is situated. The CHMT is supervised by the DMO and consists of the vertical program coordinators, including the district RCH coordinator (the DRCH Co), the district AIDS control coordinator (DACC), district malaria focal person (DMFP), the district TB and leprosy coordinator, the district health secretary, and the district HMIS focal person. Working as a team and using HMIS information to coordinate their activities, the CHMT is responsible for:

- Receiving data from all health facilities in the district and entering data into DHIS 2
- Following up with health facilities that are not reporting data
- Checking the quality of data submitted by health facilities, identifying all quality queries/issues, and resolving them by following up with the respective health facility (or facilities)
- Conducting data-related supervisory visits to health facilities
- Conducting data quality analysis and verification, to verify reported data against data at the health-facility level

- Conducting district-level data analysis using DHIS 2
- Providing feedback to district stakeholders on the district's health status, as well as following up on any district-level actions required

2.1.5 REGIONAL LEVEL

The regional level, through the office of the regional medical officer (RMO), is responsible for coordination of all health sector activities in a particular region. This is the level where the regional health management team (RHMT) is situated. The RHMT is chaired by the RMO and consists of the regional HMIS focal person, the regional RCH coordinator (RRCH Co), the regional AIDS control coordinator (RACC), regional malaria focal person (RMFP), the regional TB and leprosy coordinator, and the regional health secretary (RHS). Working as a team and using HMIS information to coordinate their activities, the RHMT is responsible for:

- Supervising and following up HMIS data entry issues at the district level
- Making sure each district in a region is entering data in DHIS 2 in a timely manner
- Running data quality checks, identifying all quality issues, and resolving them, by following up with the respective districts
- Conducting data-related supervisory visits to the district and health facility levels, if necessary
- Conducting data quality analysis and verification to verify reported data against data at the health facility level
- Conducting regional data analysis using DHIS 2 and providing feedback to regional stakeholders on a region's health status as well as following up on any regional action required

2.1.6 NATIONAL LEVEL

At the national level, the MOHCDGEC is responsible for ensuring the availability of high-quality health services, by developing policies, standards, and guidelines on health service delivery and ensuring that these are operationalized and followed. The HMIS at this level is under the Director of Policy and Planning (DPP), in collaboration with vertical programs such as the Reproductive and Child Health Section (RCHS), the National AIDS Control Program (NACP), the National Malaria Control Program (NMCP), the National TB and Leprosy Programme (NTLP), and other sections and departments in the MOHCDGEC. The national level uses HMIS information to monitor and evaluate its programs. It is responsible for:

- Running data quality assessments, identifying all quality issues (including the collection and reporting of age- and sex-disaggregated data where required), and resolving them by following up with the appropriate regions and districts
- Conducting data-related supervisory visits to regional, district, and health facility levels if necessary
- Conducting data quality analysis and verification to check reported data against data at the health facility level

- Conducting national-level data analysis using DHIS 2 and providing feedback to national stakeholders on the country's health status, as well as following up on any actions required at the national level

Session 2: Overview of HMIS Data Collection and Reporting Tools

2.2.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand the purpose of the HMIS in Tanzania
- Be able to identify sources of HMIS data
- Be familiar with the different registers and tools used to collect HMIS data
- Understand the importance of the registers in ensuring that high-quality HMIS data are collected

2.2.1 INTRODUCTION

What Is an HMIS?

The Kiswahili term for the HMIS is MTUHA (*Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya*), and in Tanzania the HMIS is often referred to this way. The books that health facilities use to record client details (see Session 2.1.3) are known as MTUHA books.

The HMIS is designed to collect, compile, store, and retrieve facility-based health data for analysis and use by stakeholders at all levels of the health system. Data collected through the HMIS allow service providers to make more informed client management and care decisions. These data also allow health managers and policymakers at the subnational and national levels to set more informed policies and make sound decisions related to health planning, resource allocation, monitoring and evaluation, and the provision of services at all levels of healthcare delivery.

The HMIS conforms to the generic definition of a **system**: a set of interacting or interdependent component parts forming a complex, intricate whole. The HMIS consists of the data elements and indicators being collected; the tools and processes that are used for collecting, reporting, and managing these data (for example, paper-based registers, report forms, tally sheets, and DHIS 2); and the system users (that is, the staff who use the HMIS at all levels of the health system) who contribute to the collection and use of these data.

The purpose of the HMIS is to routinely generate high-quality health information and use that information for management decisions to improve the health sector's performance. Hence, the HMIS is more than a system for collecting and generating data, because it also encompasses the continued use by decision makers of the information generated.

2.2.2 WHERE ARE HMIS DATA GENERATED?

Generally, HMIS data are facility-based health data that different departments and clinics within facilities generate. In Tanzania, the main sources of HMIS data are:

- Outpatient department (including dental and eye clinics)
- Inpatient department (IPD)
- Diagnostics services (laboratory and radiology)
- RCH services
- Pharmacy
- Pathology department
- Medical records department
- Administration
- Accounts
- Information from the community (see Book 3 in Session 2.2.4)

2.2.3 HMIS REPORTING TOOLS

As mentioned earlier, the tools used to collect, analyse, store, manage, and report data are part of the HMIS. These tools are:

- Individual patient/client paper records and electronic medical records (EMRs)
- Books/registers
- Tally sheet forms
- Monthly report forms
- DHIS 2

In this section we will talk about the first four paper-based tools, which are used primarily at the health facility level. In Module 3, we will discuss DHIS 2, the web-based HMIS platform that is used primarily at the district level and above.

2.2.4 HMIS DATA COLLECTION BOOKS

HMIS data collection books/registers are instruments used to collect health-related data for future analysis and decision making in health. Currently, 18 books/registers are used in the Tanzania HMIS. These are:

- Book 1: HMIS guidelines
- Book 2: Facility and hospital summary
- Book 3: Community data
- Book 4: Ledger
- Book 5: OPD register

- Book 6: ANC register
- Book 7: Child register
- Book 8: Family planning register
- Book 9: Diarrhoea treatment corner (DTC) register
- Book 10: Annual facility report
- Book 11: Dental register
- Book 12: L&D
- Book 13: Postnatal register
- Book 14: IPD register
- Book 15: Human resource register
- Book 16: Eye care register
- Tracer medicine forms
- Laboratory register
- GBV forms

In addition, more data are collected at the hospital level in the following departmental registers:

- Diagnostic/laboratory
- Physiotherapy
- Mortuary
- Pathology
- HIV and AIDS
- TB and leprosy
- Safe-blood services

The HMIS data collection books are classified in five main groups:

1. HMIS Guidelines

The HMIS guidelines in Book 1 serve as an instruction manual and reference tool for using Books 2 through 15. Each facility should have at least one copy of Book 1.

2. Data Collection Books

Books 3 through 15 are the registers and other types of data collection tools used to collect data on different aspects of health service delivery. Among these, the newer data collection books/registers are the postnatal register, the IPD register, and the human resource register.

3. Tally Sheet Forms

These forms are used to summarize data recorded in the data collection books/registers. Each HMIS book/register should have a corresponding tally sheet. The tally sheets are used at the end of the month to prepare the monthly report forms.

4. Monthly Report Forms

The HMIS uses these forms to collect and report data at the end of each month. They are in duplicate: one copy is sent to the district and the other is kept at the health facility.

5. Facility and Hospital Summary Book

Book 2 is used to document important records of the facility or hospital. It has charts and tables with information about the facility such as staff absences, procurement of buildings and transport facilities, renovations, vehicle maintenance, and blood bank supplies. It is kept by the facility-in-charge along with the monthly report book and is used for reference as needed.

2.2.5 DESCRIPTION OF HMIS BOOKS

Table 4. Description of HMIS Books

Book	Description
Book 1: HMIS Guidelines	An instruction manual and reference tool for using Books 2 through 15. Each facility should have at least one copy of Book 1.
Book 2: Facility and Hospital Summary Book	This book is used to document important records of the facility or hospital. It has charts and tables with information about the facility, such as staff absences, procurement of buildings and vehicles, renovations, vehicle maintenance, and blood bank supplies.
Book 3: Community data	This book is used by the facility to collect data about the community or communities in the catchment area. The projections data used are provided by the National Bureau of Statistics (NBS). Service delivery points that do not offer relevant services will not use this book.
Book 4: Ledger	The ledger is used to record the daily use of medicine and medical supplies by the facility. These records are used for the requisition of future supplies.
Book 5: Register for outpatients (OPD register)	The OPD register is used to record information on the patients attended in the OPD.
Book 6: ANC register	The ANC register is used to record information on pregnant women from their first to their last visit for ANC services.

Book 7: Child register	The child register is used to record information on children under 5 years of age who visit the health facility/child clinic for health services.
Book 8: Family planning (FP) register	The FP register is used to record information on new and repeat clients who visit the health facility for FP services.
Book 9: Diarrhoea treatment corner (DTC) register	The DTC register is used to record information on infants referred to the DTC unit.
Book 11: Dental register	The dental register is used to record information on clients who visit the dental clinics.
Book 12: L&D register	The L&D register is used to record information on women admitted to the labour and delivery ward.
Book 13: PNC register	The PNC register is used to record information on the postnatal visits of new mothers and their infants during the first 42 days after delivery.
Book 14: IPD register	The inpatient register is used to record information on patients who have been admitted to the health facility.
Book 15: Human resource register	The human resource register is used by the human resource unit to record information on all cadres of personnel employed by the health sector.
Book 16: Eye care register	The eye care register is used to collect information on clients provided with eye care services.
Tracer medicine forms	The tracer medicine forms are used to collect information on tracer commodities.
Laboratory register	The laboratory register is used to collect information from the laboratory unit.

2.2.6 IMPORTANCE OF THE HMIS DATA COLLECTION BOOKS

The HMIS books are used to collect essential data that different levels of the health system use for the following purposes:

- Monitor patients and illnesses, including infectious diseases
- Generate indicators for reports to the higher health system levels
- Help with planning, management, and decision making related to health services
- Provide evidence of disease trends over time (e.g., prevalence and incidence)
- Identify programs or services that require additional resources or effort
- Present a lot of data that can be used for research purposes

Data must be disaggregated by sex in order to see if differences in health indicators between male and female patients exist. Therefore, data collection forms and summary tools must have a space (e.g., a field, checkbox, row, or column) for the sex of the patient. This disaggregation must be carried through summary tools into national databases whenever possible.

Exercise 2.2.1 Sharing Experiences on Data Collection

Divide into groups. Discuss the following

- Which types of data collection tools are used in facilities for collecting routine data?
- What is your individual role in data collection?
 - How does your performance affect how data is collected and used?
- What best practices/recommendations can you share in terms of data collection tools?
- Each group will have 5 minutes for feedback.

Session 3: Overview of Indicators

2.3.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand what indicators are and why they are important
- Know how the types of indicators differ
- Be familiar with core indicators and know their definitions

2.3.1 INTRODUCTION

Goal

A goal is a statement of a desired outcome that a person, institution, or a system envisions, plans, and commits to achieve. The statement may express an intention to rectify a situation or promote a certain status.

Example: Goal 3 of the Sustainable Development Goals (SDGs): Ensure healthy lives and promote well-being for all at all ages.

Target

A target is associated with a goal and goes one step further, to state “how much” and “by when” a goal is desired. Targets should be feasible and achievable and therefore should be set taking into account the resources that are available. Generally, any goal should have targets.

Example: For SDG 3 to ensure healthy lives and promote well-being for all at all ages, nine targets have been set. One of them is: By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.

Indicator

An indicator is a quantitative or qualitative variable (something that changes) that provides a simple and reliable measurement of one aspect of performance, achievement, or change in a program or project.

An indicator is associated with a target and is meant to measure progress toward achieving the target and performance over time. Indicators are useful, because they can detect inconsistencies and differences. If performance is not going in the direction of the intended target, corrective action will be needed.

Indicators are **tools** that help to:

- Reduce a large amount of data down to their simplest form
- Monitor progress towards achieving goals and targets
- Measure change over time
- Establish trends over time
- Measure trends among subpopulations (e.g., women, men, sex workers, vulnerable children)
- Provide evidence of achievement (or lack of achievement) of results and activities
- Provide a yardstick whereby institutions or teams can compare themselves to others doing similar work
- Direct resources to areas where the needs are greatest


2.3.2 INDICATOR STRUCTURE

Generally, indicators are made up of a **numerator** (top figure) that is divided by a **denominator** (bottom figure). The **numerator** is the thing we are counting (usually a data element). The **denominator** is the group against which the thing we are counting is compared (comparison population).

An indicator is computed as follows:

$$\text{Indicator Name} = \frac{\text{Numerator Value}}{\text{Denominator Value}} \times \text{X Factor}$$

Depending on the indicator, the factor can be one of the following:

- 100 for percentage indicators
 - 1,000 for child mortality, among other measures
 - 100,000 for maternal mortality, among other measures
 - 1 for ratios
- 

Examples

Indicator	Structure Description
Rate of ANC visits before 12 weeks : 150 numerator 300 denominator = 50% (the rate)	Numerator: Pregnant women on 1st ANC visit (150) Denominator: Estimated number of pregnancies (300)
PNC coverage within 7 days of delivery 20 numerator 25 denominator = 80% (the rate)	Numerator: PNC attendance within 7 days of delivery (20 women went for a postnatal check) Denominator: Estimated number of all live births (25 babies were born)

Disaggregating an indicator means to separate—or stratify—it by one or more categories. Indicators can be disaggregated by many characteristics, such as patients' sex and age, and location and type of facility. For example, HIV prevalence and vaccination rates can and should be disaggregated by sex and age.

2.3.3 TYPES OF INDICATORS

1. Count Indicator

Counts the number of events that occurred. There is no denominator so no calculation is required.

Example: The number of voluntary medical male circumcisions performed

2. Ratio Indicator

Compares two different groups (for example, mothers and babies). The numerator is not included in the denominator.

Example: The maternal mortality ratio is the number of maternal deaths expressed per 100,000 live births in a specific period.

Example: In region X, there are 1,697 nursing officers and 650 health facilities. The ratio of nursing officers to health facilities is:

$$\frac{1,697}{650} = 2.6 \text{ nursing officers per health facility}$$

3. Proportion Indicator

Compares two different values in the same group. The numerator (the thing we count) is divided by the denominator (things with which we compare the numerator) and is expressed as a percentage. The numerator is contained in the

denominator. This indicator is used to compare parts of the whole, such as the proportion of all ANC first visitors who are younger than 20.

Example: If 6,040 of 38,190 ANC first-visit clients are under 20 years of age, what is the proportion of ANC first-visit clients under 20 years of age in the region?

$$= 6,040/38,190 \sim 1/6 \text{ ANC first-visit clients are under 20 years of age}$$

4. Percentage Indicator

A way to express a proportion (that is, proportion multiplied by 100). This indicator expresses a number in relation to the whole.

Example: If 6,040 of 38,190 ANC first-visit clients are under 20 years of age, what is the percentage of ANC first-visit clients under 20 years of age in the region?

$$\frac{6,040}{38,190} \times 100 = 15.81\% \text{ of ANC first-visit clients are under 20 years}$$

5. Rate Indicator

Measures the frequency of an event during a specific period in a specific population. The numerator is contained in the denominator and is usually expressed per 100, per 1,000, per 10,000, or per 100,000 of the population (for example, fertility rate, mortality rate, and maternal mortality rate).

Example: 75 infants (younger than one year of age) died, out of 4,000 infants born that year.

$$75/4,000 = .0187 \times 1,000 = 18.7 \sim 19 \text{ infants died per 1,000 live births}$$

2.3.4 NATIONAL PRIORITY INDICATORS (HSSP IV)

The indicators in the HSSP IV are the national priority indicators used to monitor health and social welfare performance in Tanzania. The indicators are detailed in the appendix. The 64 indicators include 43 input, output, and outcome indicators that are collected and reported quarterly or monthly. These performance indicators are monitored annually, through a report prepared by the MOHCDGEC and reviewed by stakeholders. Ten of these indicators can also be measured by surveys, which provide a population-based calibration of facility-based indicators. Population-based health status, fertility, and mortality rates are measured by 21 survey or census indicators that reflect impact and policy goals.

The indicators are classified in five categories:

1. Health status
2. Service delivery
3. Social welfare
4. Health systems
5. Facilities

1. Health Status

Mortality Indicators

- Neonatal mortality rate
- Infant mortality rate
- Under-five mortality rate
- Maternal mortality ratio
- Life expectancy at birth

Fertility Indicators

- Total fertility rate (TFR)

2. Service Delivery

Reproductive Health Indicators

- Contraceptive prevalence rate (modern methods)
- Adolescent fertility (pregnant before age 20)
- ANC coverage: first visit before 12 weeks gestational age
- ANC coverage: four visits
- Institutional delivery coverage
- Percentage of deliveries assisted by skilled health attendants
- PNC: within seven days after delivery
- Basic emergency obstetric and newborn care (BEmONC) at dispensaries and health centres
- Comprehensive emergency obstetric and newborn care (CEmONC) at health centres and hospitals

Vaccination Indicators

- Vaccination rate: measles among children under one year of age
- Vaccination rate: Penta3 among children under one year of age
- Vitamin A supplementation coverage
- Children under five who are underweight
- Children under five who are stunted
- Incidence of low birthweight among newborns
- Percentage of pregnant women with anaemia

Nutrition Indicators

- Children under five who are underweight
- Children under five who are stunted

- Incidence of low birthweight among newborns
- Percentage of pregnant women with anaemia

HIV/AIDS Indicators

- HIV prevalence in the 15- to 24-year-olds age group
- Antiretroviral (ARV) coverage
- PMTCT

Malaria Indicators

- Intermittent preventive therapy for malaria during pregnancy (IPTp)
- Use of long-lasting insecticide-treated nets (LLIN)
- Children with blood test in febrile illness
- Confirmed malaria cases
- Malaria parasite prevalence among children ages 6–59 months

TB and Leprosy Indicators

- Case detection rate for all forms of tuberculosis
- Treatment success rate for all forms of tuberculosis
- Disability grade at leprosy diagnosis
- Children among newly detected cases

Infectious and Noncommunicable Diseases

- Obesity and overweight among adults
- Raised blood pressure among adults
- Raised glucose/diabetes among adults
- Cervical cancer screening

Exercise 2.3.1 Understanding Indicators

Divide into groups for discussion. Select two indicators from the following indicators list.

- Confirmed malaria cases
- ANC coverage: before 12 weeks gestational age
- Antenatal care coverage: 4 visits
- ARV Coverage
- Cervical cancer screening
- Outpatient attendance
- Completeness—expected reports submitted in a given period



For the selected indicators:

- What is the type of indicator?
- What are the numerator and denominator?
- From where can we get the data for the numerator and denominator of these indicators?
- Each group will have 5 minutes for feedback

Exercise 2.3.2 National Priority Indicators

Divide into groups for discussion.

- Choose two indicators from the reference sheet provided.
- Discuss what each indicator means and how it can help to measure the performance of a health service or program

Session 4: Frameworks for Understanding a Well-Functioning HMIS

2.4.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Be able to define HMIS performance
- Understand the role of a well-functioning HMIS in the production and use of high-quality data
- Understand the differences among the technical, organizational, and behavioural factors influencing HMIS performance

2.4.1 WHAT IS THE PURPOSE OF A WELL-FUNCTIONING HMIS?

The purpose of an HMIS is to routinely generate high-quality health information that provides specific information support for decision making to monitor and improve performance of the health sector.

A well-functioning HMIS is necessary for the collection, aggregation, analysis, and use of health data.

The performance of an HMIS is defined **both** in terms of the ability of the system to produce **high-quality** information as well as the **use** of information for decision making.

2.4.2 WHAT IS A CONCEPTUAL FRAMEWORK?

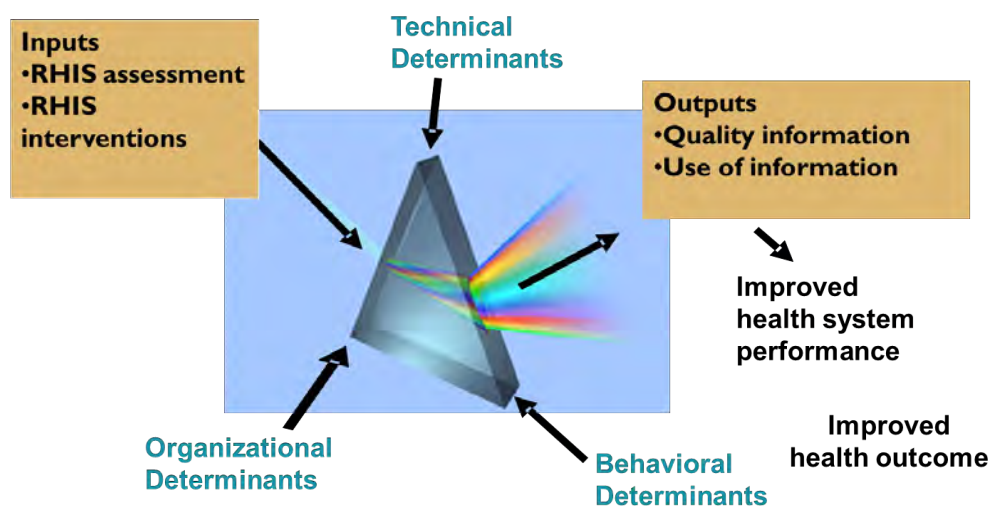
Conceptual frameworks are best understood as useful tools for understanding and analysing a concept, a problem or even a program. They are used to make conceptual distinctions and organize ideas. Strong conceptual frameworks capture something real and do this in a way that is easy to remember and apply.

2.4.2.0 THE PRISM FRAMEWORK

The PRISM framework is an example of a conceptual framework. PRISM stands for Performance of Routine Information System Management. The PRISM framework argues that optimal performance of the HMIS— data collection, reporting, decision making, and sharing of information—depends on improvements and successes in three interrelated areas:

- Technical determinants¹
- Organizational/environmental determinants
- Behavioural determinants

Figure 9. The PRISM Framework



Technical determinants: the tools and functional aspects associated with data processing and management. They might include:

- Data collection processes in place
- Well-designed data collection forms that streamline the amount of data collected
- A standard set of clearly defined indicators
- Having enough staff who can complete data collection and reporting forms
- Appropriate technology for data analysis, transfer, and presentation
- Processes in place for using the data

Organizational determinants: the system or organizational context that supports data collection, availability, and use, including:

- Organizational structure
- Functions
- Management

¹ Adapted from the Performance of Routine Information System Management (PRISM) analytical framework (Aqil, Lippeveld, & Hozumi, 2009; LaFond, Fields, et al., 2005).

- Roles and responsibilities
- Information culture

Behavioural determinants: the behaviour of individuals who produce and use data and other information, including:

- Knowledge
- Skills
- Competence
- Attitude
- Motivation

Each of the determinants and their components need to be in place and functioning for HMIS performance to improve.

Strengthening of the HMIS can contribute greatly to improved service delivery, including improvements in quality, effectiveness, and efficiency. This leads to improved health system performance, and ultimately to improved health outcomes.

An organization's failure to align information and information systems with their strategies and objectives can result in wasted resources and poor performance.

2.4.2.1 THE 12 COMPONENTS FRAMEWORK

The 12 Components Framework, designed by the Joint United Nations Programme on HIV/AIDS (UNAIDS) is an organizing framework for a functioning HIV monitoring and evaluation (M&E) system. The framework helps explain how we think about an M&E system, from its individual components to the enabling environment that is needed for success. The 12 components are organized in three rings, as Figure 10 shows.

Figure 10. The 12 Components Framework



Outer ring—partnerships, people, and planning: The outer ring represents the human resources, partnerships, and planning required to support data collection and data use. It includes individuals, organisations, functions/actions, and the organisational culture that are fundamental to improving and sustaining M&E system performance.

These are:

- Organisational structures
- Human capacity
- Partnerships to plan, coordinate, and manage the M&E system
- National, multisectoral M&E plan
- Annual, costed national M&E workplan
- Communication, advocacy, and culture for M&E

Middle ring—collect, capture, and verify: The middle ring focuses on the mechanisms through which data are collected, verified, and analysed. These are:

- Routine programme monitoring
- Surveys and surveillance
- National and subnational databases
- Supportive supervision and data auditing
- Evaluation and research agenda

Inner ring—data for decisions: The centre of the diagram represents the primary purpose of the M&E system: using data for decision making. Activities here are:

- Data analysis
- Data interpretation
- Data use
- Data communication
- Data dissemination

Exercise 2.4.1 Defining a Functional HMIS

Divide into small groups and answer the following question.

- What is the purpose of a well-functioning HMIS?
 - List five things you need in order to have a well-functioning HMIS.

Exercise 2.4.2 Factor Analysis

Divide into small groups. Choose three bottlenecks that you are currently facing with the HMIS. For each problem, list the factors contributing to the problem. Be as specific as possible when listing the causes. For example:

- **Problem:** Data are not being transmitted on schedule
- **Factors:** Lack of materials/forms; staff not trained to fill out the forms; no incentive to submit on time

Exercise 2.4.3 Describe the Status of the HMIS Using the PRISM Framework

Using the PRISM framework, discuss the current status of the HMIS in your district. How well is your district handling:

- Technical determinants
- Organizational determinants
- Behavioral determinants

MODULE 3: INTRODUCTION TO HIS DATA MANAGEMENT SYSTEMS

Module Introduction

This module introduces the major HIS data management systems used by the MOHCDGEC to manage the types of data that Tanzania's health sector generates. It discusses the types of data the systems contain and how these systems relate to one another for interoperability and information sharing. The module describes in detail DHIS 2, the main data warehouse in Tanzania and the system that is used to manage HMIS data. The module presents the main concepts and terminologies used by DHIS 2 and the system's major functional areas, including how data entry and validation are done. Other functional areas of DHIS 2 will be covered in detail in subsequent modules: data quality (Module 4) and data analysis (Module 5).

Module Objectives

At the end of this module, participants will:

- **Know the main HIS data management systems that MOHCDGEC uses and the types of data they contain**
- **Understand and be able to use the basic data capture and data management functionalities of DHIS 2**

Session 1: Major HIS Data Management Systems in Tanzania

3.1.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Be able to describe the main HIS data management systems that Tanzania's health sector uses
- Be familiar with the data sets managed by these systems
- Understand how these systems are useful to CHMTs and RHMTs

3.1.1 INTRODUCTION

To easily capture, analyse, and use data required for routine health program management, the MOHCDGEC, in collaboration with partners, has developed and deployed a number of information system software programs. These systems help stakeholders at various levels convert data into information, by generating the reports they need

for planning, accountability, and decision making. This session discusses six major information system softwares that the MOHCDGEC uses. They are:

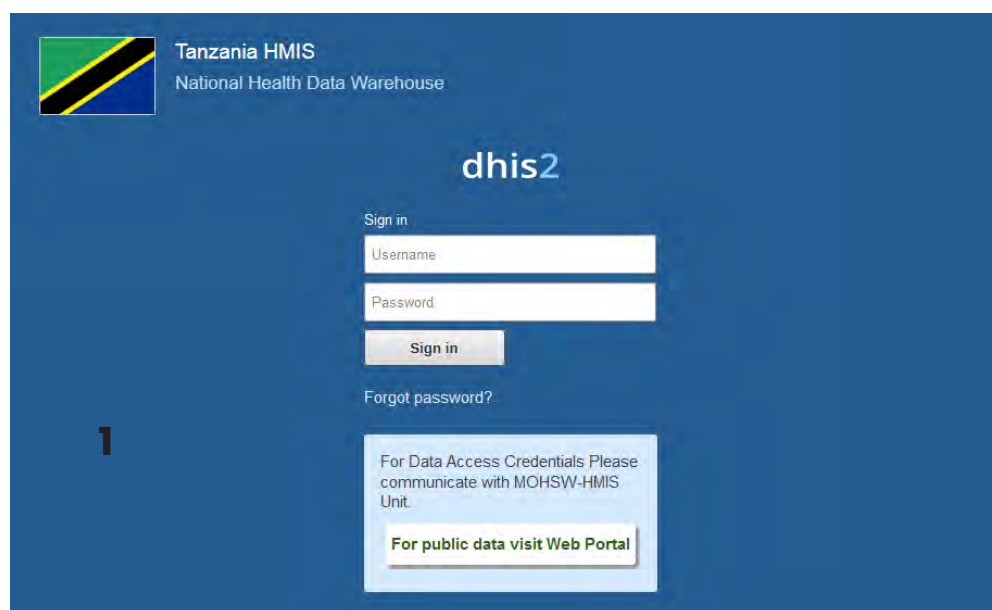
- DHIS 2
- HRHIS
- eIDSRS
- eLIMS
- Master facility list (MFL)
- PlanRep

3.1.2 MAJOR HIS DATA MANAGEMENT SYSTEMS

1. DHIS 2

This web-based system for the management of routinely collected health data is the main health data management software program in the country. All other systems should complement DHIS 2 and be compatible with it.

Figure 11: DHIS 2 Login Page



Why Was DHIS 2 Adopted?

1. DHIS 2 replaced the older proprietary health management information system software called MTUHA, for “Mfumo wa Taarifa za Uendeshaji wa Huduma za Afya” (Kiswahili for “health management information system”).

DHIS 2 is a web-based system. It was adopted to capitalize on advances in web technology in the country. In recent years, Internet access has greatly improved, with even remote districts able to connect, at least through modems.

2. DHIS 2 was adopted to improve data quality, including completeness and timeliness of reporting. Data are entered directly into the web-based platform, and everyone with access privileges will be able to access data instantly.
3. DHIS 2 was adopted because it is more flexible than the old MTUHA system. With the ever-changing requirements for health sector data, an agile system that can adapt to growing and changing data needs is essential.
4. DHIS 2 was adopted to promote the use of one integrated system for reporting routinely collected health data. The proliferation of programmes and donor-funded initiatives in the health sector mandated the construction of one data management system that could accommodate multiple types of data needs, to discourage the development of multiple vertical, siloed systems.

DHIS 2 Design

DHIS 2 was developed based on data warehousing principles and a modular structure that allows users to exploit only the functionalities they need (and leave the rest). DHIS 2 is platform-independent: that is, it can run on any operating system and supports both online (with the Internet) and offline (without the Internet) modes. The data entry module can be operated without Internet connectivity. DHIS 2 has built-in functionality for geographic information system(s) (GIS), basic and advanced data visualization, and dashboards, and it can be adapted to multiple languages.

DHIS 2 in Tanzania

In 2010, as laid out in the Monitoring and Evaluation Strengthening Initiative (MESI) strategic plan, the MOHCDGEC and other stakeholders collaborated to develop a new paper-based HMIS. At the same time, they adapted, updated, and customized DHIS 2 to be compatible with the revised paper-based HMIS tools and to support the ministry's data needs. In July 2011, the MOHCDGEC started deploying the new version of DHIS 2 and started training users at different health management levels to use the system. By the end of December 2013, DHIS 2 had been rolled out in all regions and associated districts in Mainland Tanzania. In addition to the HMIS module, other program-specific modules such as malaria, RCHS, immunisation and vaccine development (IVD), HIV, and PMTCT have also been developed. They are used by these health programs and by such implementing partners as Ifakara Health Institute (IHI), Doctors with Africa CUAMM, Elizabeth Glaser Pediatric AIDS Foundation (EGPAF), JHPIEGO, Engender Health, and Clinton Health Access Initiative (CHAI) in various districts in Tanzania.

To access DHIS 2, please go to: <https://dhis.moh.go.tz>.

2. Human Resource for Health Information System

As in many sub-Saharan African countries, Tanzania is facing a serious shortage in human resources for health (HRH), which hinders these resources' appropriate distribution throughout the country. The shortage in health staff impacts the ability of the health system to deliver needed healthcare services effectively. The global burden of diseases

(GBD) is a major challenge for the health systems of developing countries, where average life expectancy remains below 51 years of age. Furthermore, the overall prevalence of major diseases such as HIV and AIDS, malaria, and tuberculosis (TB) remains high, and interventions such as PMTCT, care and treatment clinics (CTC), and LLINs have significantly increased the workload of existing health staff, making it increasingly necessary to expand the health workforce or risk the quality of services.

In the meantime, an information gap on HRH makes addressing these challenges difficult. This information gap has the following causes:

- Lack of timely data collection and reporting from the health facility level to the national level
- Poor quality of HRH staffing information and lack of standards on necessary cross-cutting staff information needed for HRH planning, management, and decision making
- Fragmentation of HRH information across multiple data sources, coupled with inadequate coordination and sharing of information among systems, making data captured by these systems unreliable
- Lack of readily available information on staff in-service trainings and employment history

To address challenges associated with the lack of availability of HRH information, the MOHCDGEC revised its HRH Strategic Plan in 2008. Thereafter, with the technical support of experts from the Department of Computer Science and Engineering (DOCSE) of the University of Dar es Salaam (UDSM), as well as financial support from Japan International Cooperation Agency (JICA), MOHCDGEC designed, developed, and implemented the web-based HRHIS, aiming to address the challenges observed by working within the existing information systems.

The HRHIS facilitates the following:

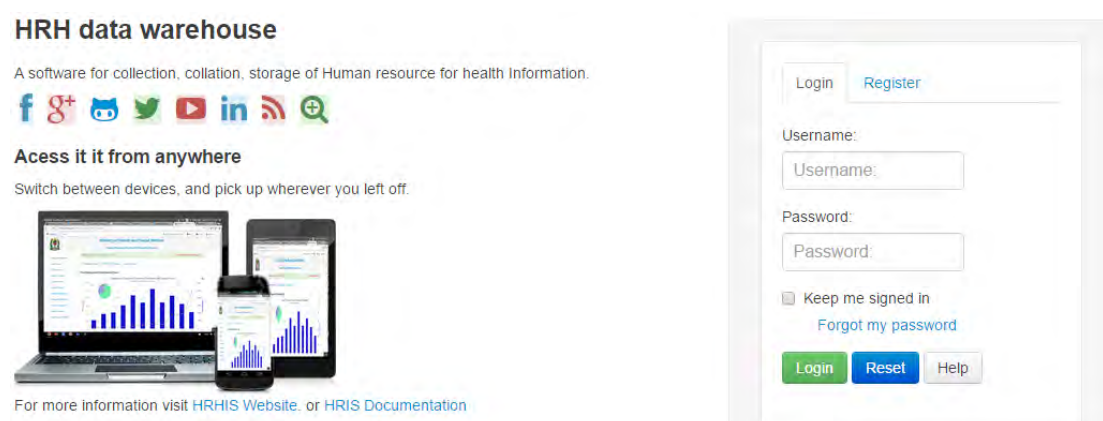
- A picture of the actual HRH situation in Tanzania at any given time
- Forecast of trends in aspects of HRH, such as attrition, migration, retention, absorption, and production
- Information to support HRH planning, projection, capacity building, and management at all levels

Development of the HRHIS started in July 2009 and the first version was piloted in Pwani and Dar es Salaam regions from November 2009 to March 2010. Based on the feedback gathered from the pilot regions, the system was improved and deployed in phases to all regions of Tanzania Mainland.

To date, HRHIS has been rolled out successfully and is in use throughout the country by all MOHCDGEC departments and agencies (25 regions, 163 councils, and 19 regional referral hospitals) together with eight other referral hospitals: *Muhimbili National Hospital* (MNH), MOI, Ocean Road Cancer Institute (ORCI), Bugando Medical

Centre, Kilimanjaro Christian Medical Centre (KCMC), Mbeya Zonal Referral Hospital, Kibong'oto Hospital, and Mirembe Hospital). HRH data collected from public, private, and faith-based organisations (FBOs) are sent to the district/council level and entered in the HRHIS for analysis and reporting to higher levels.

Figure 12: HRHIS Login Screen



HRHIS is a flexible, web-based open source system with capacity to support the whole HRH reporting structure, from data collection and validation at the facility level to analysis, reporting, and dissemination at all reporting levels in the national reporting hierarchy. This includes tabular and graphic analysis, such as column charts, bar charts, and line and pie chart analysis of data.

Addressing the lack of information on staff in-service training and the need to improve the management of staff capacity building in general, HRHIS can capture in-service trainings attended by staff as well as employment history. This gives managers at council, regional, and national levels the information they require in order to plan skills building in specific cadres, improve staff retention, and reduce staff attrition due to transfer, failure to report, resignation, and retirement.

To access HRHIS, please go to: <http://hrhis.moh.go.tz>.

3. Electronic Integrated Disease Surveillance and Response

Electronic integrated disease surveillance and response (eIDSR) refers to the use of mobile communications technology, such as mobile phones, to assist in disease surveillance and prevention, and response to disease outbreaks and public health events of international concern. A tool for data reporting and analysis—eIDSR—was developed to strengthen and improve IDSR in Tanzania. Using the eIDSR reporting system, health facilities use mobile phones to report data to DHIS 2, where data processing and analysis are done. Users of eIDSR at the facility level can use their mobile phones to report data without incurring any monetary cost. They can also receive data submission reminders and confirmations. Also, users at other levels (district, regional, and national) can receive notifications of disease outbreaks so they can take action quickly.

Figure 13: eIDSR Mobile Reporting Flow



Using eIDSR, facility-level users can send two types of reports: **immediate reports**, sent following the outbreak of an immediately reportable disease of public health importance, and **weekly reports**, sent for weekly reportable diseases of public health importance. According to the national IDSR guidelines, each facility must send a report for each epidemiological week.

4. Master Facility List

The MFL is a regularly updated data set of information about all health facilities in the country, complete with descriptive information such as location, contact information, and services provided.

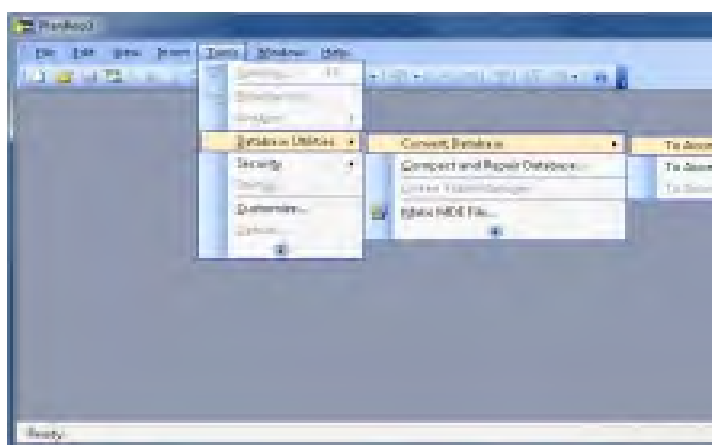
The online Health Facility Registry is a tool for stakeholders and the general public to access MFL data and be able to view, analyse, manage, and curate this information. It enables users to view lists and maps of health facilities in mainland Tanzania; to search, zoom, and filter these lists and maps in various ways; to view core characteristics and attributes of the health facilities; to download lists; and to view the official Registry ID for health facilities. This curation tool facilitates collaboration by the MOHCDGEC, local government authorities, and partners to keep the MFL in the online Health Facility Registry accurate and up to date. If you are an authorised officer of a local government authority or other relevant officer or partner, you may request login access to the curation tool.

To access the Health Facility Registry, please go to: <http://hfrportal.chealth.go.tz>.

5. PlanRep

This is a local government planning and reporting software system that helps local government authorities plan, budget, and project revenues from all sources, and track received funds as well as the physical implementation of planned activities and its associated expenditures. Both councils as well as those using the manual system use PlanRep along with the Epicor accounting system. Using this software, data entered at lower levels can be retrieved by higher levels for compilation and further processing.

Figure 14: PlanRep System




6. Electronic Logistic Management Information System

The eLMIS is a software system for recording and processing logistics (that is, supply chain) data in order to ensure greater commodity security and better health outcomes of people in the country. It has been implemented in all districts in the Tanzania Mainland. This system makes it easy to link health facilities with the central medical store to collect and report logistics data in real time. This is very helpful for reordering supplies for proper supply chain management and continuity of patient care, and for forecasting supplies of the medicines and commodities that are regularly used and need to be in stock.

Key eLMIS features are:

- An integrated data repository where all report and requisition (R&R) data can be entered
- An analytical tool that can process raw data for decision making
- A custom reporting tool for administrators, managers, policy makers, and other decision makers
- Ability to interface and exchange data with other MOHCDGEC-approved management information system (MIS) solutions
- Improved availability of health commodities at service delivery points

Figure 15. eLMIS Login Screen

The image shows the login interface for the Electronic Logistics Management Information Systems (eLMIS). At the top, the title "Electronic Logistics Management Information Systems" is displayed in a grey header bar, with a blue "English" link on the right. Below the header, on the left, is a graphic of a white pill bottle tipped over, with several blue, oval-shaped pills spilling out. To the right of this graphic is the "Sign In" section. It contains two text input fields: "Username" and "Password". Below these fields is a teal "Sign in" button. At the bottom of the sign-in area is a blue link that says "Forgot password?".

To access eLMIS, go to <http://elmis.co.tz>.

Session 2: DHIS 2 Data Capture and Validation

3.2.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand key DHIS 2 terms and concepts
- Be able to demonstrate competence in DHIS 2 data entry and management

3.2.1 INTRODUCTION

This session will focus on the data collection, recording, and compilation functions of DHIS 2.

DHIS 2 is a tool that can be used to manage both numerical and text data. Data entry can be done in lists of data elements or in customized, user-defined forms that are developed to mimic paper-based forms for ease of data entry.

DHIS 2 can also be used to increase or enhance data quality at multiple points in time:

1. At the point of data entry: Checks can be made to make sure data fall within acceptable minimum and maximum values for any given data element. Such checks help identify typing errors at the time of data entry.
2. After data entry: Users can define validation rules, which can be compared against the data that have been entered to identify any validation rule violations. If there are any violations, staff responsible for entering data can determine if any actions need to be taken. These types of checks help to ensure that data entered in the system are of good quality.

Once data have been entered and verified, DHIS 2 can generate both routine (predefined) and analytical reports. Module 5 covers the data analysis and report-generating functions of DHIS 2.

DHIS 2 Terminology

The following terms used in DHIS 2 are important:

- **Data element:** A data element is the fundamental building block of DHIS 2. It is a data value that has actually been observed or recorded, which is further characterized by dimensions such as the number of HIV-positive cases and the number of immunisations.
- **Data set:** This is a collection of data elements organized to facilitate the data collection process.
- **Indicator:** The divisor of an indicator. This can comprise multiple data elements with the use of an indicator formula: (numerator *factor/denominator).
- **Organisation unit:** Represents the geographical context. It may be the health facility or the department or administrative unit responsible for healthcare services. The organisation unit dimension essentially specifies “where” a particular data value occurs.
- **Period:** A period is a specific interval marked by a start date and an end date. To make DHIS 2 data meaningful, they are always linked to a specific period.
- **Aggregate data:** In DHIS 2, this term refers either to data elements or to indicators that have been derived from other hierarchical data sources.

3.2.2 Sources of Data for the DHIS 2 in Tanzania

3.2.2.1 DATA FROM HEALTH FACILITIES

The major data source for DHIS 2 is the routine aggregate data that health facilities collect using HMIS paper-based forms, which are then entered in the system at the district level and used to generate routine reports and indicators at the district level and higher.

Aggregated data are consolidated data relating to multiple patients, and therefore cannot be traced back to a specific patient. They are usually counts, such as the number of cases of malaria, HIV, or other diseases. Aggregated data cannot provide the type of detailed information that patient-level data can, but they are crucial for planning and monitoring the performance of health systems.

3.2.2.2 DATA FROM HRHIS

DHIS 2 automatically imports aggregated data about human resources in the health sector (Book 15—the human resources register) from HRHIS. The imported data for the selected organisation unit and period can also be viewed through the “reports,” “pivot table,” or “data visualizer” modules in DHIS 2.

3.2.2.3 DATA FROM EIDSR

DHIS 2 automatically collects weekly IDSR data reported using eIDSR’s mobile unstructured supplementary service data application. Immediate outbreaks and weekly summary data are directly collected from all public, private, and FBO health facilities within the country. Through this function, DHIS 2 fosters the country’s disease surveillance and response system. The IDSR data for the selected organisation unit and period can be viewed through the “reports,” “pivot table,” or “data visualizer” modules in DHIS 2.

3.2.3 DHIS 2 DATA CAPTURE AND MANAGEMENT

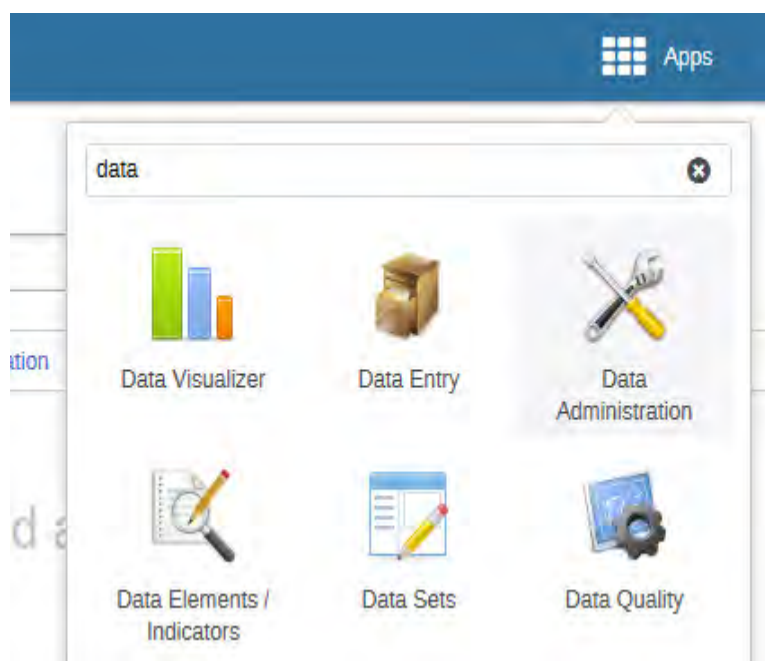
The data entry module is where data are manually registered in the DHIS 2 database. Data are registered for a single organisation unit, period, and set of data elements (data set) at a time. A data set often corresponds to a paper-based HMIS reporting form.

To open the data entry window, follow these simple steps:

1. Click on the Apps menu. A drop-down menu will appear listing the apps in DHIS 2.
2. Look for Data Entry or start typing **Data...** to search for the app. Click on the Data Entry app to open it.



Figure 16: Opening the Data Entry App

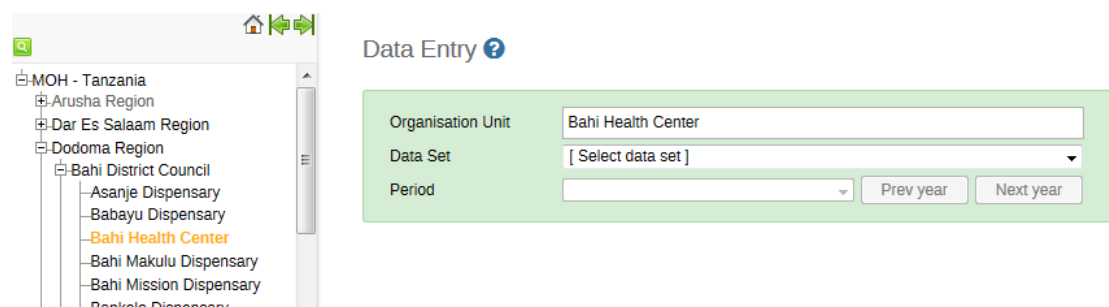


Selecting the Data Entry Form

To open a data entry form, do the following:

1. **Find and select the facility** you are entering data for in the organisational unit hierarchy.

Figure 17: Selecting the Organisation Unit



Click on the “+” symbol to expand the hierarchy in the desired region or district. Click on the facility name to select it. When a facility is selected, the name will change colour to orange.

1. **Select a data set** from the “Data Set” drop-down list. Only data sets assigned to the selected organisation unit will show up on the drop-down list.

Figure 18: Selecting the Data Set

The screenshot shows a form with three fields: 'Organisation Unit' (Bahi Health Center), 'Data Set' (dropdown menu), and 'Period' (dropdown menu). The 'Data Set' dropdown is open, showing a list of options. A red arrow points to the 'Data Set' label. An orange oval highlights the 'HMIS_Kliniki ya Wajawazito (ANC)' option in the list.

Organisation Unit	Data Set	Period
Bahi Health Center	[Select data set]	[Select data set]
	HMIS_Death Registry	
	HMIS_Huduma Baada ya Kujifungua (Postnatal)	
	HMIS_Idadi ya Watu (Population)	
	HMIS_Kliniki ya Wajawazito (ANC)	
	HMIS_Kutoka Wodi ya Wazazi (L&D)	
	HMIS_Magonjwa ya Kuhara (DTC)	
	HMIS_Tracer Medicine	
	HMIS_Ufuatiliaji wa Watoto (Child Health)	
	HMIS_Uzazi wa Mpango (FP)	
	HMIS_Wagonjwa wa Nje (OPD)	
	NACP_HIV Care -ART Reporting Form	
	NACP_HIV Care and Treatment (HCT)	
	NACP_PMTCT MC	
	NACP_PMTCT MC Quaterly	
	NACP_PMTCT PCR	
	NACP_Sexually Transmitted Infections (STI)	
	NMCP_National Malaria Control Programme	

1. **Select a period** for your report. After selecting a data set, a list of available periods will appear in the “Period” drop-down menu. Use “Prev year” and “Next year” buttons to navigate different periods.

Figure 19: Selecting the Period

The screenshot shows the same form as Figure 18, but now the 'Period' dropdown is open, showing a list of months and years. A red arrow points to the 'Period' label. A red bracket highlights the 'Prev year' and 'Next year' buttons.

Organisation Unit	Data Set	Period
Bahi Health Center	HMIS_Ufuatiliaji wa Watoto (Child Health)	[Select period]
		May 2015
		April 2015
		March 2015
		February 2015
		January 2015

Entering Data

Once you have selected an organisation unit, data set, and period, the data entry form will open.

1. Start entering data by clicking inside the first field and typing a value there.
2. Move to the next field using the Tab button. Shift + Tab will take you back one step.

Figure 20: Sample Fields in the DHIS 2 Data Entry Form

	Wanaume	Wanawake	Jumla	Wenye uwezo wa kufanya kazi za kilimo
Idadi ya watu	45	43	88	
	Zinazoongozwa na wanaume	Zinazoongozwa na wanawake	Jumla	Zenye uwezo wa kufanya kazi za kilimo
Idadi ya kaya			0	

	Wanaume	Wanawake	Jumla	Wenye uwezo wa kufanya kazi za kilimo
Idadi ya watu	45	43	0	
	Zinazoongozwa na wanaume	Zinazoongozwa na wanawake	Jumla	Zenye uwezo wa kufanya kazi za kilimo
Idadi ya kaya			0	

- The values are saved immediately and do not require any save/finished button click.
- A green field indicates that the value has been saved in the system (on the server).
- Saving the values might take some time if the Internet connection is slow.

Input Validation

If you type an invalid value—for example, a character in a field that only accepts numeric values—DHIS 2 will prompt you to correct it.

DHIS 2 data entry provides the following input validation when you are entering data:

- You will get a pop-up that explains the problem.
- The field will be coloured yellow (indicating “not saved”) until you have corrected the value.

Figure 21: DHIS 2 Data Correction Prompt

The screenshot shows the DHIS 2 data entry interface. A pop-up message is displayed in the center, stating: "Value must be zero or a positive integer. Waliotibiwa Kona ya Magonjwa ya Kuhara". The message has an "OK" button. The background shows the DHIS 2 interface with a sidebar menu on the left and a data table on the right. The table has columns for "Na.", "Maelezo", and several data entry fields. One field, "Idadi ya wagonjwa waliotibiwaDTC", is highlighted in yellow, indicating it is not saved. The table also shows a summary row with "Jumla Kuu" values.

If you have defined a minimum/maximum range for the field (data element + organisation unit combination) values:

- A pop-up message will notify you when the value is out of range.
- The value will remain unsaved until you have changed the value (or updated the range and then re-entered the value).

Disabled fields: If a field is disabled (grey), the field should not be filled.

- The cursor will automatically jump to the next open field.

Data History and Follow-Up

- Double-clicking any input field in the form will open a “Data element history” window showing the last 12 values registered for that field.
- This window also shows the minimum and maximum range and allows for adjusting the range for the specific organisation unit and data element combination.

Figure 22: Data Element History Window in DHIS 2

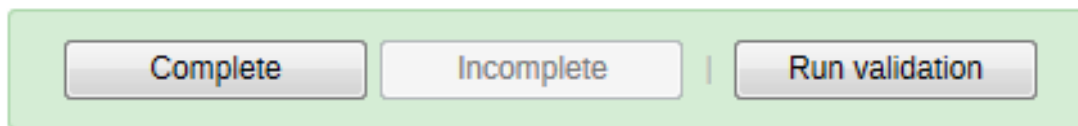


- In the data history window, there is also a feature to tag or star a value. For example, a suspicious value that needs investigation can be kept in the system but marked for follow-up.
- In the data quality module, you can run a follow-up analysis and view all values marked for follow-up, and then later edit the values if they prove to be incorrect.
- This window also provides an “Audit trail,” which shows changes made to values of the selected field, when each change was made, and who made it.

Validating Data and Completing the Form

When all the available values for the form have been entered, you can run a validation check on the data in the form and register the form as complete.

Figure 23. Validation Tabs in DHIS 2

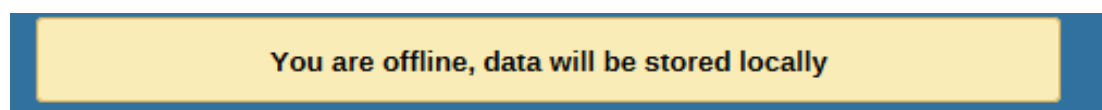


1. Click the “Run validation” button on the top right corner or at the end of the form.
 - All validation rules that involve data elements in the current form (data set) will be run against the data that have been entered.
 - Upon completion, you will be presented with a list of violations or a message that says “The data entry screen successfully passed validation.”
2. Correct any erroneous values and make sure you are done with the form.
 - See Module 4 (on data quality) for information on how to define such validation rules.
 - When you have corrected any erroneous values and are done with the form, click the “Complete” button below the form to register it as complete.
 - This information is used when generating completeness reports for the health facility, district, regional, or national level.

3.3.4.2 OFFLINE DATA ENTRY

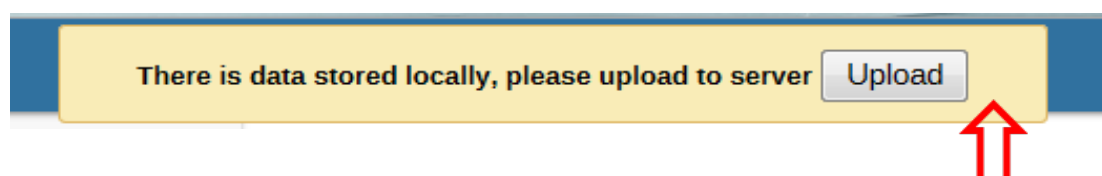
The data entry module will function even if the Internet connection is not stable during data entry. In order to use this function, you must log in to the server while the Internet is active, but if during data entry the Internet link between your computer and the server becomes unstable, data can still be entered in the data entry form, saved to your local computer, and then pushed to the server once the Internet connection has been restored. When you are working offline, DHIS 2 will display the message shown in Figure 24.

Figure 24. DHIS 2 Offline Message



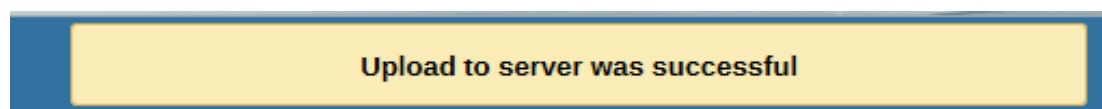
When you connect to the Internet again, you will see the message shown in Figure 25. At that point, you need to click the “Upload” button in order to push data to the central server.

Figure 25. DHIS 2 Upload Prompt



Once the data have been saved successfully in the server, you will receive the message shown in Figure 26.

Figure 26. DHIS 2 Successful Upload Message



3.2.4 USER ACCOUNTS AND PRIVILEGES

- DHIS 2 allows multiple users to access the system simultaneously, each with a defined set of permissions.
- These permissions can be fine-tuned so that only certain users can enter data while others can generate reports.
- Multiple user roles can be created, each with its own set of permissions, and then assigned to users, granting them certain privileges within the system.
- A role in DHIS 2 specifies user access privileges in the system. For instance, a “role” can be created with permission only to access the data entry module. The role can then be assigned to data entry users who are not allowed to do anything in the system other than data entry.

MODULE 4: **MANAGING HEALTH DATA QUALITY ISSUES**

Module **Introduction**

This module defines data quality and explains why data quality assurance for HMIS data is critical for monitoring program performance and improving service delivery. The module describes the main data management functions that are carried out at different levels of the health system and links data management practices and data flow to data quality. It also discusses practices and procedures that should be adopted at each level of the health system to ensure that high-quality data are collected and reported at all levels. Finally, the module describes and demonstrates the types of data quality assurance checks that are programmed into DHIS 2 and that can be run during and after data entry to ensure that high-quality data are entered and stored in the system.

Module **Objectives**

At the end of this module, participants will:

- **Be able to define data quality and understand the importance of data quality in monitoring program performance**
- **Understand the key dimensions of data quality**
- **Understand the factors that affect the quality of data entered in DHIS 2**
- **Know the methods and procedures that can be employed to assess and improve data quality at each level of the health system**
- **Know the data quality checks that are built into DHIS 2 and understand how and when to use them**

Session 1: Introduction to Data Quality

4.1.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand the importance of data quality for HMIS data
- Understand the data quality conceptual framework
- Know the key dimensions of data quality

4.1.1 DATA VERSUS INFORMATION

To understand the concept of “data quality,” one must first understand the distinction between data and information.

Data can be defined as:	Discrete, objective facts about events
Information can be defined as:	Data transformed by the value-adding processes of contextualization, categorization, calculation, and correction

Data come in many forms. Numbers, symbols, words, images, and graphics all are types of data. Once these data are processed or analysed to produce something useful, they become information.

4.1.2 DEFINING DATA QUALITY

Data quality is often defined as “fitness for use.” In other words, data are judged to be of good quality if they have the following characteristics:

- They are regarded as fit for their intended uses in operations, decision making, and planning.
- They reflect real value or true performance.
- They meet reasonable standards when checked against criteria for quality.

4.1.3 IMPORTANCE OF DATA QUALITY

Correct and up-to-date data are critical, not only for the provision of high-quality clinical and social care, but also for research, strategic planning, and management of health and social care services.

Data are evidence and high-quality data are strong evidence that can be trusted to enable providers and managers to optimize healthcare coverage, quality, and, ultimately, health services.

Data quality has serious consequences for the efficiency and effectiveness of health programs. Good-quality data helps to accomplish the following tasks:

- Form an accurate picture of health needs, programs, and services in specific areas.

- Inform appropriate planning and decision making (e.g., staffing requirements, planning, healthcare services, and so forth).
- Allocate and use resources effectively and efficiently.
- Support ongoing monitoring to identify best practices to learn from, and areas where support and corrective measures are needed.

4.1.4 SYMPTOMS OF POOR DATA QUALITY

How can you tell if there are problems with the quality of data? There are some tell-tale signs:

- Different people supply different answers to the same question.
- Data are not collected in a standardized way.
- Data quality is not measured in an objective way.
- The quality of data is unknown.
- Staff suspect that the information is unreliable, but have no way of proving it.
- Parallel data systems exist to collect the same indicator.
- Data management operational processes are not documented.
- Lack of standardization in data collection and reporting tools cause different stakeholders (for example, implementing partners) to have their own formats.
- Too many resources (money, time, and effort) are allocated to investigating and correcting data errors.
- Suspicion of poor quality leads donors and other stakeholders to conduct audits.

4.1.5 DATA QUALITY: AT WHAT PRICE?

There is general agreement that poor data quality negatively affects programs and services and that good data quality is important for programmatic success. However, getting high-quality data is not without cost. So what is the cost of collecting high-quality data and what are we willing to pay?

The Consequences of Data Collection:

Many costs are associated with HMIS data collection:

- There are human resource-related costs. Staff who are responsible for data collection and reporting need to be hired and trained.
- There is the cost of developing and maintaining the system. This includes, for example, developing, printing, and distributing paper-based data collection and reporting tools; the cost of developing, deploying, and maintaining the electronic system (DHIS 2); and the cost of networking and Internet connectivity in order to use the system.

- The time staff spend recording and reporting data is also a cost, because staff could be using this time to do something else. For example, at the facility level, service providers often have to complete registers and compile monthly reports at the cost of seeing patients.

The Cost of Collecting Poor Quality Data

The Government of Tanzania is already making investments to collect HMIS data, but if these data are not of good quality, they will not be useful for decision making, which is the ultimate purpose of collecting data at all. Collecting poor-quality data that are not fit for use in decision making is a grave waste of resources.

If data are not of good quality, then:

- Data will not be **relevant**. Data will have no added value to help monitor programs. They will just be an undue burden on data collectors.
- Data will not be **timely**. Decisions cannot be made in a timely way to fix problems when they occur.
- Data will not be **accurate**. Data will give a distorted picture of program performance, which may be misleading.
- Data will not be **complete**. Data will give only an incomplete picture of what is happening, which may be misleading.
- Data will not be **precise**. Data will not be detailed enough to support certain types of programmatic decisions and evidence-informed decision making.
- Data will not be **reliable**. Confidence in the data will be low.

Decisions based on poor-quality data may be erroneous and result in ineffective planning, inefficient resource utilization, low stakeholder confidence, and, ultimately, higher morbidity and mortality.

“The Perfect is the Enemy of the Good”:

“Perfect” data are unattainable, because the costs are too high. Perfect data are rarely even necessary.

Aim for data of a level of quality that is “good enough” for the intended purpose. This means that the data can lie within an acceptable margin of error. They are not perfect, so they are also not prohibitively expensive to collect.

This can be done by investing additional resources, on top of the cost of collecting data, in data quality assurance mechanisms, such as training, supervision, and data quality assessments.



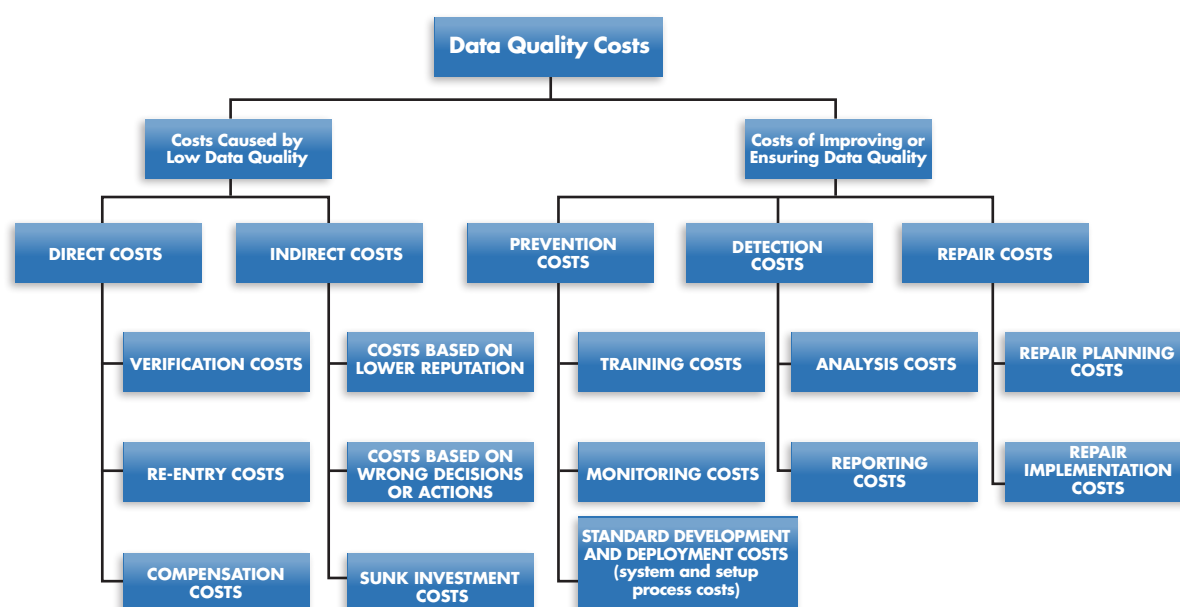
The Cost of Data Quality Improvements:

The cost of collecting good-quality data can be defined along three simple lines:

People	Personnel investments required to implement and maintain data-quality improvements. This includes the human capital investment necessary to change or introduce processes and technology to raise the standard of data quality, and the personnel investment required to institute ongoing data governance.
Process	Changes and enhancements to support introduction of data enhancements and any new data-quality technology. This can, and should, include process changes to support ongoing data governance.
Technology	Solutions introduced to automate improvements in data collection, integration, sharing, and application across the national and subnational levels.

Figure 27 depicts the costs associated with data quality. On the left side, the diagram presents the costs associated with low data quality. On the right side, the diagram presents the costs associated with improving data quality.

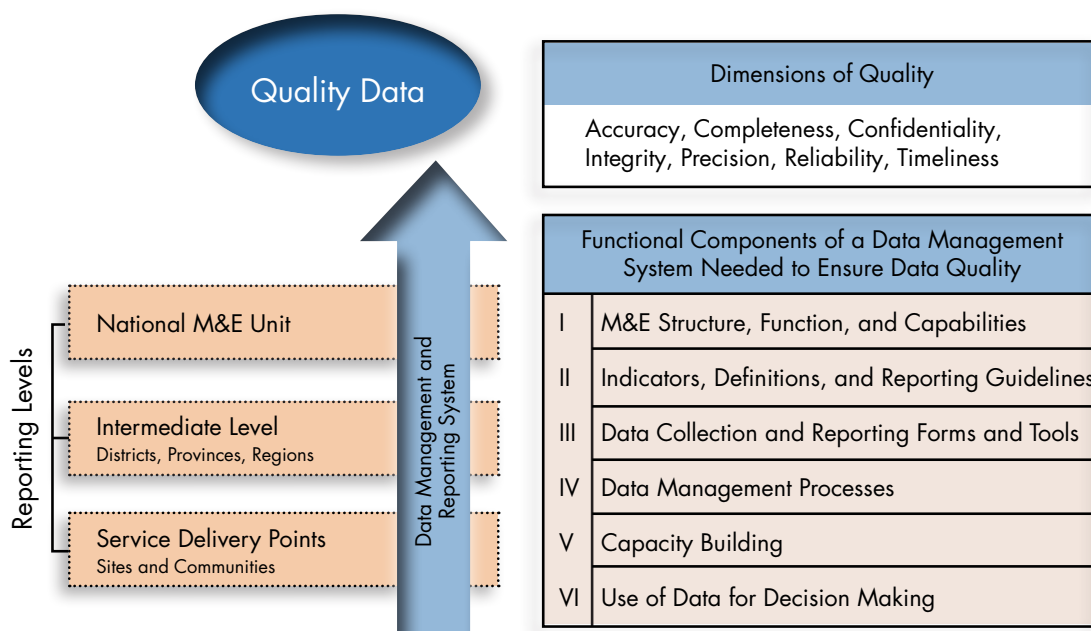
Figure 27: A Data Quality Cost Taxonomy



4.1.6 DATA QUALITY CONCEPTUAL FRAMEWORK

According to the data quality conceptual framework illustrated in Figure 28, the quality of data that an information system generates is intrinsically linked to how well the components of the data management system function.

Figure 28: Conceptual Framework of Data Management and Reporting Systems, Functional Areas, and Data Quality



The three major components of the conceptual framework are:

1. **The reporting levels.** These are the different levels of the information system: the service delivery sites; intermediate aggregation sites, such as the CHMT and RHMT; and the national level. The quality of reported data often depends on the underlying data management and reporting systems at each level of the health system. Strong systems produce good-quality data. Data quality problems can occur at any level of the system, and systematic efforts should be made to ensure high-quality data at all levels.
2. **Functional components** of the data management system. A data management system has six essential components: M&E structures, functions, and capabilities; indicator definitions and reporting guidelines; data collection and reporting forms and tools; data management processes; capacity building; and the use of data for decision making.
3. **The dimensions of data quality.** Data quality is a multidimensional concept. The dimensions highlighted here are accuracy, completeness, confidentiality, integrity, precision, reliability, and timeliness. We can monitor and improve data quality by systematically assessing some of these dimensions.

4.1.7 DIMENSIONS OF DATA QUALITY

As mentioned above, data quality is a multidimensional concept. What dimensions are most commonly used?

Accuracy	Accuracy is also referred to as validity or correctness. Accurate data measure what they are intended to measure. Accurate data minimize error (e.g., recording or interviewer bias, transcription error, and sampling error) to the point of being negligible.
Completeness	Data are complete if they are present and usable (i.e., not missing values). Completeness implies that the information system that generates the data is appropriately inclusive. In other words, it represents the complete list of eligible persons or units and not just a fraction of the list.
Reliability	Reliability is also referred to as consistency. Data are reliable if they are generated by an information system with protocols and procedures that do not change over time or depend on the user. The data are reliable, because they are measured and collected consistently.
Timeliness	Data are timely when they are up-to-date (i.e., current), and promptly available to monitor changes in program activities and inform decisions. Timeliness is affected by: (1) the rate at which a program's information system is updated; (2) the rate of change of actual program activities; and (3) the point in time when the information is actually required for use.
Confidentiality	Data are confidential if they are kept in a secure location and treated with appropriate levels of security (e.g., registers are kept in locked cabinets and electronic data are password-protected), and access permissions are given only to staff of a certain level who sign confidentiality agreements, such that clients are assured that their personal information will not be disclosed inappropriately.
Precision	Data are precise if they are collected with a level of detail that allows for effective monitoring. For example, an indicator requires the number of individuals who received HIV counselling and testing and received their test results, by sex of these individuals. An information system lacks precision if it is not designed to record the sex of the individuals who receive counselling and testing.
Integrity	Data have integrity when the system used to generate them is protected from deliberate bias or manipulation for political or personal reasons.
Relevance	Data are relevant if they are needed for decision making.

Exercise 4.1.1 Group Brainstorm

Divide into small groups and brainstorm on the following questions:

- What costs are associated with collecting the core national indicators in the HMIS?
- What are the consequences of collecting data that are not of good quality?
- What costs are associated with ensuring that the collected data are high-quality?

Exercise 4.2.2 Dimensions of Data Quality

Divide into small groups. Each group will be assigned one/two data quality dimensions:

- Accuracy/validity
- Timeliness
- Completeness
- Reliability
- Confidentiality
- Precision
- Integrity

Read the list of questions provided. Identify the questions that are relevant to your assigned dimension. For each question you pick, explain why the question is relevant to your dimension and how your region/council will address it.

Questions

1. What is the relationship between the activity/programme and what you are measuring?
2. Is the same data collection instrument used from year to year, site to site?
3. What is the data transcription process? Is there potential for error?
4. Are steps being taken to limit transcription error (e.g., double keying of data, built in validation checks, random checks)?
5. If there are data errors, what do you do with that information?
6. Is the appropriate level of detail reported to higher levels?
7. If raw data need to be manipulated, are the correct formulas being applied, and applied consistently (e.g., from site to site, over time)?
8. Is there a written protocol regarding which staff have access to personal data?
9. Do staff sign confidentiality agreements?

10. Clients are assured that their data will be recorded and stored according to national and/or international standards?
11. Are final numbers reported accurately (e.g., does the total add up)?
12. What steps are taken to ensure completeness of data?
13. What systems are in place to maintain data security (e.g., locked cabinets, password-protected databases)?
14. What percent of all fields on data collection form are filled in?
15. Are there procedures in place to ensure that data are free of significant error and that bias is not introduced (e.g., instructions, indicator information sheets, training, etc.)?
16. Is the same data collection process used from year to year, site to site?
17. What percent of all expected reports are actually received?
18. Has there been an independent review of data?
19. Are the data from all sites that are to report included in aggregate data? If not, which sites are missing?
20. Do data collected have sufficient detail (e.g., collected by age, sex)?
21. Are the data reported as soon as possible after collection?
22. Are data available on a frequent enough basis to inform programme management decisions?
23. Are the data from all sites that are to report included in the aggregate data? If not, which sites are missing?
24. Are data collection forms designed to collect exactly what needs to be collected and reported?
25. Is a regularized schedule of data collection in place to meet programme management needs?
26. Do programme staff know and understand the reporting deadline? Is it consistent across all reporting sites?
27. Are the data reported as soon as possible after collection?
28. Are there risks that data are manipulated for personal or political reasons? What systems are in place to minimize such risks?

Session 2: HMIS Data Management and Data Quality

4.2.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand the main data management functions at each level of the HMIS
- Understand how data management and information flow affect data quality
- Understand the main data quality challenges at each level of the HMIS
- Understand what each level of the HMIS can do to improve data quality

4.2.1 HMIS DATA MANAGEMENT

Data management refers to a set of processes that facilitate effective transfer of data from their raw form to a more usable format.

Data management encompasses all of the following processes:

- Data collection
- Data aggregation and reporting
- Data entry
- Data quality assurance
- Data analysis and interpretation
- Data communication and use
- Data storage

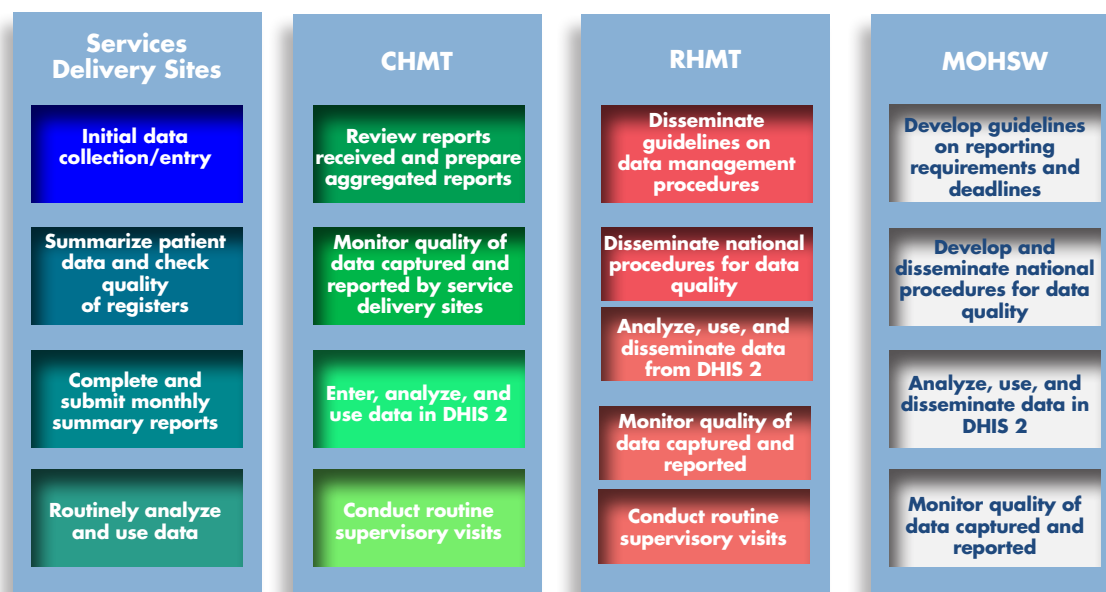
Good data management conforms to the following principles:

- Written, standardized national data management processes and protocols are in place
- Staff are familiar with these processes and are accountable for carrying them out
- Good storage, retrieval, and backup (i.e., for the electronic system) processes are in place

4.2.2 HMIS DATA MANAGEMENT FUNCTIONS BY LEVEL

HMIS data flow through four levels of the health system. These levels are service delivery sites, CHMTs, RHMTs, and the MOHCDGEC. Staff at each level of the HMIS have specific data management roles and responsibilities that they are assigned to carry out. Figure 29 summarizes the data management functions by level.

Figure 29: HMIS Data Management and Functions by Level



Service Delivery Sites

- Conduct initial data collection and entry
- Summarize patient data and compile monthly reports
- Check the quality of data in the registers
- Routinely analyse and use data to improve patient management, quality of care, and facility management

CHMTs

- Review reports submitted by facilities for quality (timeliness, completeness, and accuracy)
- Follow-up with facilities if there are any data quality concerns
- Enter data in DHIS 2
- Analyse data in DHIS 2 and make them available to the CHMTs and facilities
- Conduct regular supervisory visits to the service delivery sites

RHMTs

- Disseminate national guidelines on reporting requirements and deadlines, data management, data quality assurance, and so forth to CHMTs
- Use data in DHIS 2 to monitor the performance of CHMTs
- Review, analyse, and use data in DHIS 2 for regional-level planning and decision making
- Conduct routine supervisory visits to CHMTs to monitor HMIS functionality and training needs

MOHCDGEC

- Develop guidelines on reporting requirements and deadlines, data management, data quality assurance, and so forth.
- Develop data quality standard operating procedures and data quality assessment tools.
- Analyse, use, and disseminate data in DHIS 2.
- Monitor the quality of data captured and reported throughout all levels of the HMIS.
- Perform quality checks on reports, including review and approval of aggregate numbers.
- Conduct routine supervisory visits.

4.2.3 INFORMATION FLOW AND DATA QUALITY

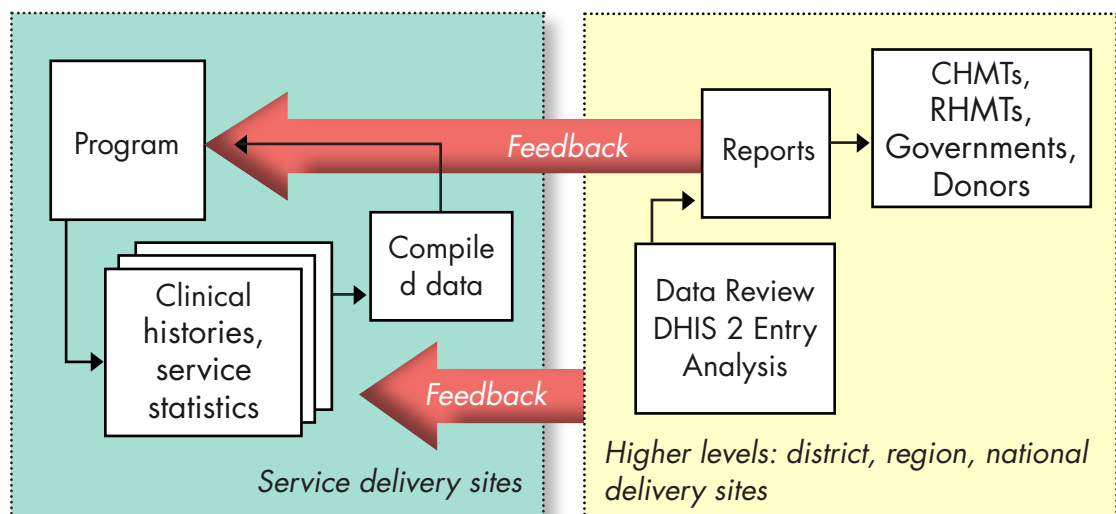
Information flow is the path that data take from their original point of collection to the end users for evidence-informed decision making.

As data are processed, they flow from one tool to another (for example, from a tally sheet to a register), one clinic in the facility to another, one level of the health system to another, and one medium to another (that is, from paper-based tools to an electronic database).

As data flow, many opportunities for data quality problems arise, such as inaccurate or inappropriate data moving from one locus to another.

Understanding the flow of data can reveal opportunities to improve data management steps as well as data quality and data use.

Figure 30: Information Flow



The flowchart in Figure 30 shows how data typically flow from the service delivery level, where they are first collected, to the higher levels, which are responsible for program management and supervision.

Different types of decisions are made at each level of the health system. The right kind of data can help each level make the decisions that are relevant for that level.

Service delivery sites are responsible for collecting primary data on individual clients in clinical charts and patient registers. These client data are compiled and summarised in facility reports. Ideally, the reports should be used by the facility-in-charge, directors, and service providers to help with patient management and programmatic decision making. The facility report is sent, or flows, to the next level: the CHMT.

CHMTs review facility reports, enter these reports in DHIS 2, and analyse and use these data. Once the data have been entered in the system, DHIS 2 can compile and aggregate data from all sites in the catchment area to produce district summary reports. Once entered at the district level, the regions (**RHMTs**) and the national level (**MOHCDEGEC**) also have access to the data and can analyse them to produce regional and national summary reports.

The flow of data should be bidirectional. As data flow upstream to the higher levels, there should be timely **feedback** downstream to the lower levels, including the service delivery sites, to ensure that they receive feedback on the data they submit and can track their performance.

4.2.4 COMMON TYPES OF DATA ERRORS

The quality of HMIS data is undermined by several common types of data errors. These include the following:

- **Missing data:** gaps in completeness
- **Outliers:** values that lie outside the expected range without a plausible explanation
- **Inconsistencies and contradictions** between data elements that are linked and also over time—for example, 100 births in a month when there are only 2,000 women of childbearing age
- **Unlikely values** for a variable: for example, pregnant males
- **Thumb suck:** when data collection tools are not used routinely, staff fill in plausible numbers (often the last digit of these made-up values will be 0 or 5)
- **Duplication:** the same individual or instance is counted more than once—for example, counting a fully immunised child more than once
- **Incorrect capture:** data are recorded in the wrong field
- **Typing errors:** data are entered in the wrong field
- **Mathematical errors:** for example, an arithmetic error in which the age subgroups do not add up to the total number of people
- **Inappropriate use of zero:** for example, when zeros are used inappropriately to denote missing values

4.2.5 POTENTIAL REASONS FOR POOR DATA QUALITY

Many potential reasons for poor quality data exist. The reasons can be categorized as related to the inputs or related to the data management process:

Reasons Related to Inputs

- Lack of routine data management policy and guidelines
- Poorly defined data elements and indicators
- Unstandardized data collection tools
- Limited or lack of resources including staff (number and skills) and equipment

Sources of Weakness in the Data Management Process

- Data collection, collation, and validation
- Capturing
- Processing, including data quality checks and analysis
- Flow and reporting—making data available to and accessible by relevant stakeholders
- Storage

4.2.6 DATA QUALITY ASSURANCE

The goal of data quality assurance is to ensure that data have an acceptable level of quality.

Different indicators or objectives for collecting data may require different levels of quality. For routinely collected HMIS data, quality does not need to be perfect but should fall within a predetermined margin of error.

Since threats exist at all steps of data management and at all levels of the health system, data quality assurance steps need to be built around the entire data management cycle and performed at all levels of the health system.

Service Delivery Sites

- Ensure that source documents such as registers are properly completed.
- Make sure that monthly reports are accurately compiled and review data before they are sent to the next HMIS reporting level.
- Send alerts to higher levels in the system of stockouts of tools and other resources, training needs, and other factors that might compromise data quality.
- Use feedback from higher health system levels to improve practices at the facility.
- Use data for patient management and facility management.

CHMT and RHMT

- Ensure that facilities understand what they are required to report (that is, the data element and indicator definitions).

- Ensure that facilities have an adequate supply of standardized and up-to-date HMIS tools and resources (for example, data collection tools and report forms).
- Discuss data and data quality issues during supervisory and feedback visits.
- Follow up on late, incomplete, inaccurate, and missing reports.
- When data quality issues have been addressed, document the discrepancies and how the discrepancies were resolved.
- Conduct or participate in routine data quality assessments.

MOHCDGEC

- Clearly define, document, and disseminate data element and indicator definitions to ensure confidence that all stakeholders are collecting and reporting the same thing.
- Ensure that all levels of the health system have the resources they need to maintain data quality (for example, staffing, tools, hardware, and software).
- Develop and disseminate standardized data management guidelines and protocols.
- Analyse and use data and provide feedback to other levels of the health system.
- Plan, organize, and conduct data quality assessments or data quality audits and monitor data quality trends across districts and regions and over time.

4.2.7 GENERAL PRINCIPLES FOR IMPROVING DATA QUALITY

Data quality activities should be aligned with the national health policy, strategic plan, and national M&E plan.

- The country's data quality improvement activities should be strategic and guided by, and aligned with, the country's health sector policy framework, strategic plan, and M&E plan, with coordination among stakeholders and donors to avoid overlap and duplication.

Data quality improvement activities should be country-driven and country-owned.

- To ensure that data quality improvement activities are a country priority, activities must be country-driven and the health ministry (or other appropriate leading government agency) must be actively engaged. In addition, data quality improvement activities should be included in the ministry's work plan to ensure funding and implementation.

Data quality should be seen as an integral part of the data life cycle.

- Data quality is fundamental to program success, and consequently it must remain a priority across the full data life cycle. Data quality processes must be defined at the initial stages of program planning, and data quality improvement strategies need to be integrated as part of the larger cycle of implementation. Staff at all levels of the health system play a key role in ensuring that data are of high quality. These staff need to be well-informed and empowered to assure that data quality processes are carried out. These activities should be performed routinely, rather than as one-off activities.

Adequate resources (including human capacity and infrastructure) should be available to ensure high data quality.

- If data quality is a priority, then investments must be made in human resources, capacity, and infrastructure. Staff at all levels of the health system should be present in positions responsible for ensuring proper data management. Staff must have appropriate skills and receive the training and mentoring they need to fulfil their duties. Staff must understand and accept their personal responsibility for monitoring and improving data quality; this can be achieved by formalising this function in their job descriptions. In this way, staff at all levels of the health system hold themselves, and others, accountable for ensuring that high-quality data are collected, reported, and used.

In addition, there may be a need to invest in other resources and infrastructure. This includes ensuring that all components of the data management system, such as the data collection and reporting tools, are distributed to facilities on a regular basis. Electronic systems should have all the necessary hardware and software and be serviced on a regular basis.

There should be a designated local authority or individual or champion for data quality.

- Identification of a local champion for data quality can help strengthen the visibility of data quality improvement activities. Ideally, the champion occupies an influential post within the government and also has technical expertise in data quality.

Data quality should be part of a broader learning agenda.

- Improving data quality is part of a broader learning agenda in which individuals are rewarded for sharing failures and successes; where they learn from experience; and where the ultimate goal is to deliver effective and efficient services.

Exercise 4.2.2 HMIS Data Quality Challenges

Divide into four groups:

- Group 1: Service delivery sites
- Group 2: CHMTs
- Group 3: RHMTs
- Group 4: MOHCDGEC

In your group:

- Describe the main data quality challenges that take place at your level.
- For each challenge, suggest solutions.

Session 3: Data Quality Assurance in DHIS 2

4.3.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand how to use DHIS 2's built-in data quality assurance checks, which can be run during data entry (e.g., data element history and minimum-maximum limits)
- Understand how to use DHIS 2's built-in data quality assurance checks, which can be run after data entry (for example, the reporting rate summary and validation rules)
- Be familiar with other advanced data quality analysis tools in DHIS (for example, standard deviation outlier analysis, follow-up analysis, "min-max" outlier analysis, and gap analysis)

4.3.1 INTRODUCTION

Ensuring data quality is vital for building an effective HMIS that can be relied upon for proper planning, accountability and decision making. The data quality mechanisms within DHIS 2 provide a means of improving the accuracy and reliability of the data in the system. Data quality checks in DHIS 2 can be done through validation rules and statistical checks during various stages of data management.

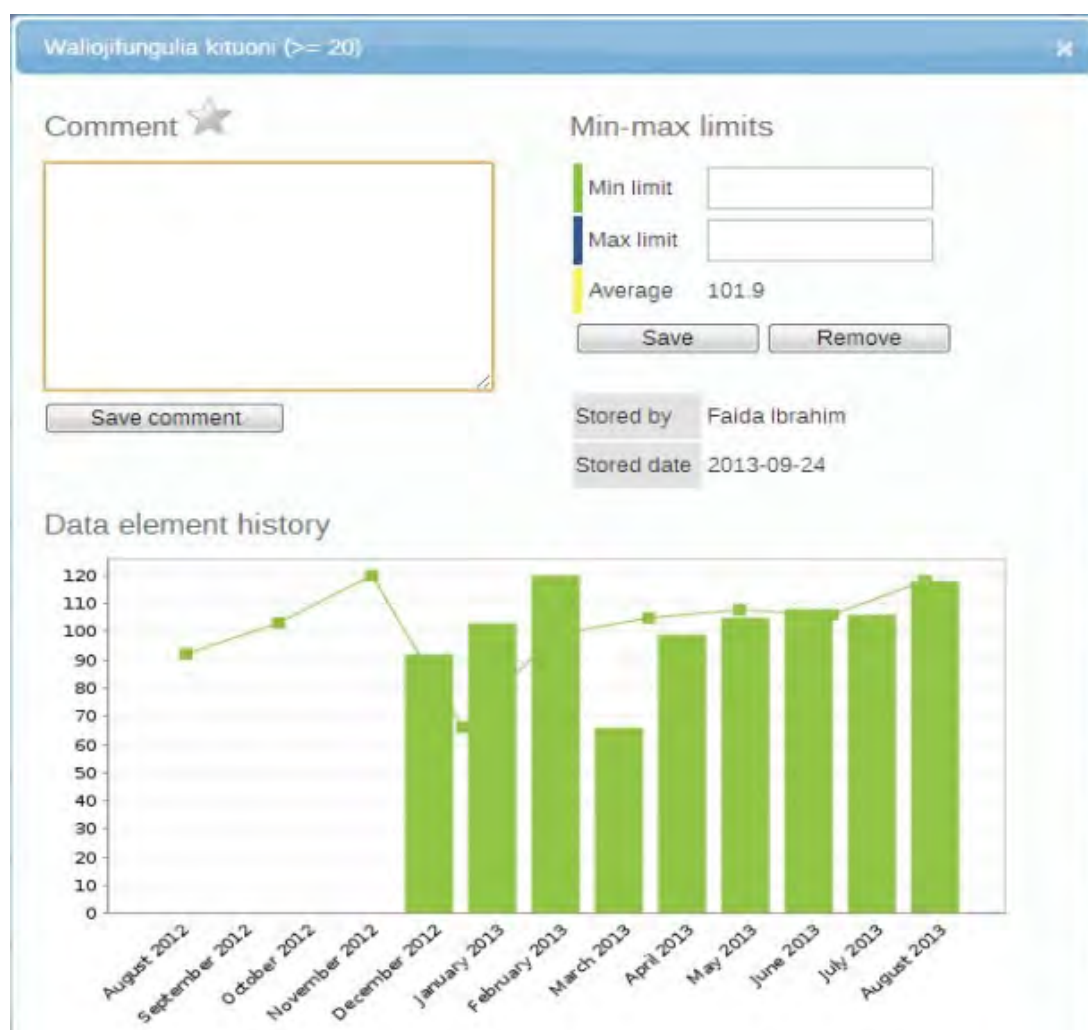
4.3.2 DATA QUALITY ASSURANCE DURING DATA ENTRY

Some data quality checks can be done during data entry. These checks look at the trend of the data and compare the values entered to minimum and maximum values. These checks are particularly useful if the person entering data is sceptical of their accuracy.

To check data as they are entered, in the same data entry screen double-click the data field that you want to check. The resulting screen will resemble the one shown in Figure 31.



Figure 31: Screenshot of Data Element History and Min-Max and Average Values in DHIS 2



This screen will be specific for the data element you have just double-clicked. The name of the data element is shown in the blue title bar. The screen has two parts:

- The lower part shows a graph with the data element history—that is, the values for the data element over the past 12 months. This graph will help you determine if the value that you want to enter is reasonable or not.
- The upper part gives you the average of the already-entered values for the data element. This section also gives you the option to restrict what is entered, by assigning a minimum and maximum value for the data element.

4.3.3 DATA QUALITY ASSURANCE AFTER DATA ENTRY

There are mechanisms for assessing and eventually improving data quality after data have already been entered into DHIS 2. Such mechanisms include the reporting rate summary and validation rule. These mechanisms are highlighted in the sections below.

4.3.3.0 REPORTING RATE SUMMARY

The reporting rate summary is a report that shows which facilities, districts, or regions have reported and which forms they have reported.

Figure 32: Accessing the Reporting Rate Summary



Figure 33 shows how to generate the reporting rate summary.

Figure 33: Generating the Reporting Rate Summary

Organisation unit

- MOH - Tanzania
 - Arusha Region
 - Dar Es Salaam Region
 - Dodoma Region
 - Geita Region
 - Iringa Region
 - Kagera Region
 - Katavi Region
 - Kigoma Region
 - Kilimanjaro Region
 - Lindi Region
 - Manyara Region
 - Mara Region

☒ Based on complete data set registrations
☐ Based on compulsory data elements

[Select data set / View all]

[Select period type] Prev year Next year

Get report Show more options

Download as PDF Download as Excel Download as CSV

After selecting the organisation unit, dataset, and period of interest (see Figure 34), click “Get report.” You will see the reporting rate summary output, as shown in Figure 35.

Figure 34: Selecting Parameters to Generate a Reporting Rate Summary

Organisation unit

- MOH - Tanzania
 - Arusha Region
 - Dar Es Salaam Region
 - Dodoma Region
 - Geita Region
 - Iringa Region
 - Kagera Region
 - Katavi Region
 - Kigoma Region
 - Kilimanjaro Region
 - Lindi Region
 - Manyara Region
 - Mara Region

☒ Based on complete data set registrations
☐ Based on compulsory data elements

HMIS_Kutoka Wodi ya Wazazi (L&D)

Monthly Prev year Next year

June 2015

Get report Show more options

Download as PDF Download as Excel Download as CSV

Figure 35: Reporting Rate Summary Output—A Completeness and Timeliness Report

Dar Es Salaam Region - HMIS_Kutoka Wodi ya Wazazi (L&D) - June 2015

Name	Actual Reports	Expected Reports	Percent	Reports On Time	Percent On Time
Tembeke Municipal Council	30	32	93.8	30	93.8
Itala Municipal Council	38	42	90.5	37	88.1
Kinondoni Municipal Council	53	64	82.8	45	70.3
Dar Es Salaam Region	121	138	87.7	112	81.2

4.3.3.1 VALIDATION RULES

The most common type of data quality checks in DHIS 2 are the “validation rules.” Validation rules are set by the administrators to help system users establish whether the data that have been entered are valid or not. Validation rules are comparison-based validations, in which two or more data elements are compared. They are programmed to alert users to potential problems with data quality.

For example, consider the data elements “ANC Clients Tested for HIV” and “ANC Clients Who Tested HIV-Positive.” For these data elements, the expectation is one of the following two possibilities:

- Many clients were tested and a few clients turned out to be HIV-positive. (OR)
- The number of clients tested was the same as the number who tested positive (if all who were tested turned out to be positive).

In the system, this might be set as a validation rule, as shown in Figure 36.

Figure 36: Sample Validation Rule in DHIS 2

Left Side	Operator	Right Side
ANC Clients Tested for HIV	>=	ANC Clients Tested HIV+.

When you run this validation rule, you are asking the system to identify where this comparison has been violated.

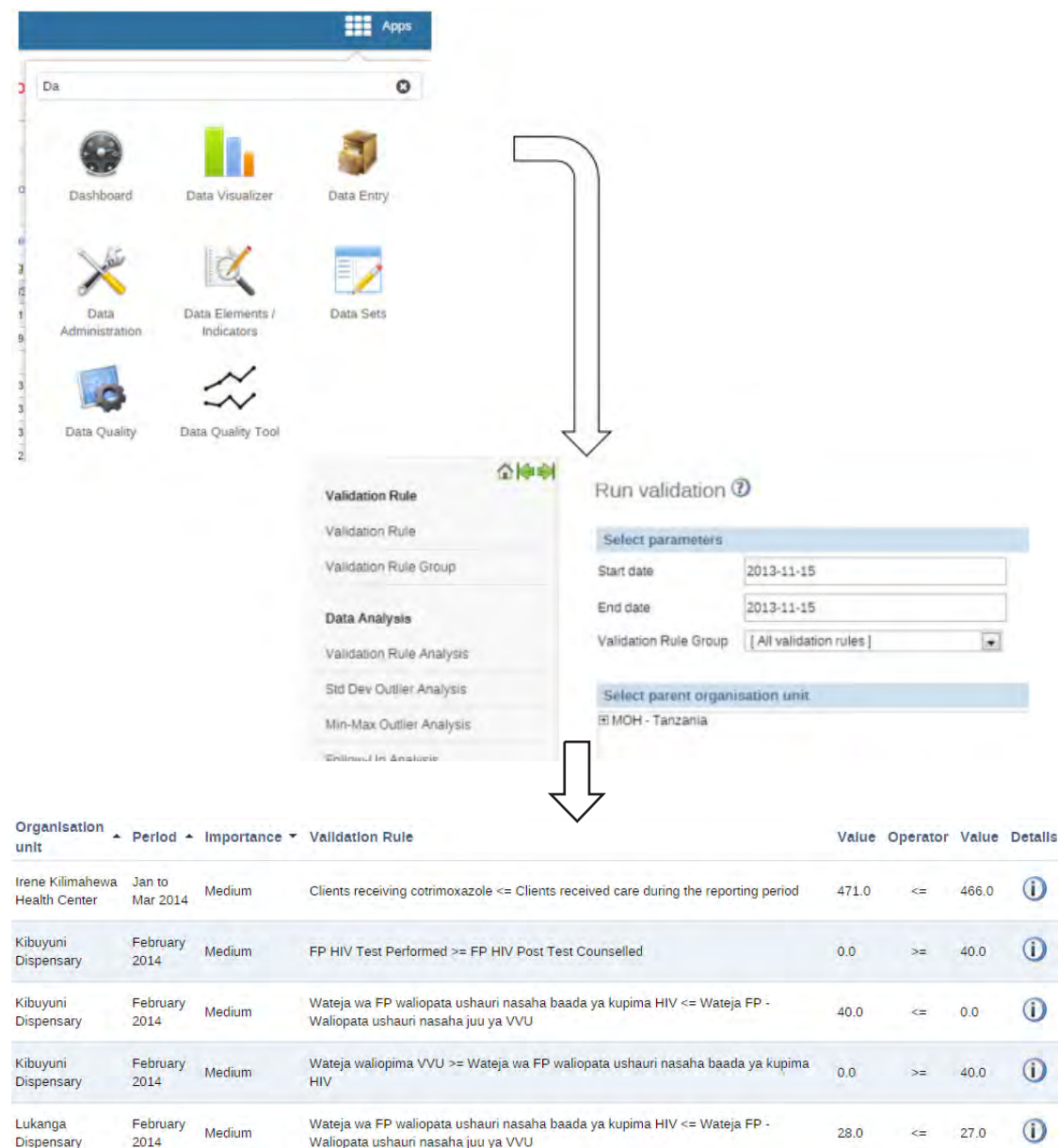
Figure 37 shows how to access the validation rules analysis.

Figure 37: Accessing the Validation Rules Analysis App in DHIS 2



Figure 38 shows what the output of a validation rules analysis looks like.

Figure 38: Output of a Validation Rules Analysis in DHIS 2



4.3.3.2 VALIDATION RULES IN DATA ENTRY

Validation rules can also be run in the course of entering data, before the data are considered “complete.” This will run all of the validation rules for the available selections (the organisation unit, data set, and period). At the end of each data entry form, there is a button for running validation rules. After data have been entered and before they are complete, the user can click “Run validation.”

Figure 39: “Run Validation” Button on the Data Entry Screen

13	Waliofanyiwa tathmini masaa 24 baada ya kuzaliwa	<input type="text"/>	<input type="text"/>	<input type="text" value="0"/>
14	Mama na Mtoto waliopeewa rufaa	<input type="text"/>	<input type="text"/>	<input type="text" value="0"/>

If there is no violation of any of the rules, then a message will appear that all of the rules have passed, similar to the message displayed in Figure 40. Otherwise, a screen showing the violated rules will be displayed, as shown in Figure 41.

Figure 40: Display When the Data Entry Screen Passes All Validation Rules

Validation

Validation Result

The data entry screen successfully passed validation

Figure 41: Display When the Data Entry Screen Fails One or More Validation Rules

Validation

Validation Result

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

Validation rule	Left side	Operator	Right side
DTC Treated >= DTC Severe Dehydration Treated	5.0	>=	7.0

4.3.3.3 ACHIEVING DATA QUALITY DIMENSIONS IN DHIS 2

DHIS 2 offers the following strategies to achieve data quality:

- Completeness and timeliness can be established by generating the reporting rate summary.
- Consistency can be tracked through the data element history, as shown in Figure 29.
- Data correctness can be established by performing validation rules analysis after data have been entered in the system.

Correct data are data that reflect the reality on the ground. Therefore, data correctness first and foremost depends on how careful service providers are in recording data using data collection tools to accurately reflect the services that they have provided to their clients.

4.3.3.4 ADVANCED DATA QUALITY ANALYSIS TECHNIQUES IN DHIS 2

Further data quality analysis in DHIS 2 can be done using the World Health Organization's Data Quality Tool, which can also be accessed through the apps menu. Using this tool, one can perform standard deviation outlier analysis, follow-up analysis, min-max outlier analysis, and gap analysis.

To generate **a report on outliers and missing data** in DHIS 2, follow the pathway below:

Apps -> WHO Data Quality Tool -> Analysis -> Outliers and Missing Data -> Selections -> Analyze

This will result in a report showing the standard deviation, missing values, and outliers, as shown in Figure 42.

Figure 42: Sample DHIS 2 Report on Missing Values and Outliers Analysis

Outliers and Missing Data

Data

Period

Orgunit

Analyze

Result

OptionsDownloadPrevious

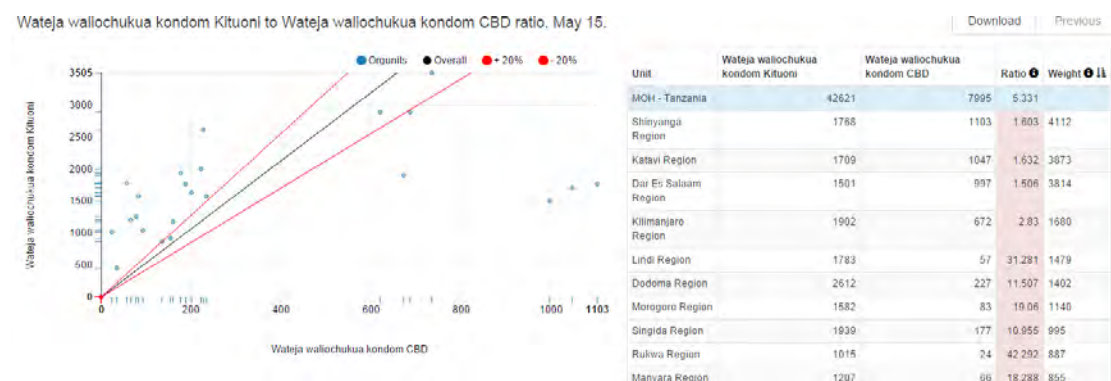
Unit	Data	2014	2015	Score		Weight		Total Lik
				SD	Z	Missing	Outlier	
Singida Region	Wanaonyonya Maziwa ya Mama na Kupatwa Chakula Kingine (MF) (KE)		147.0	0		147	0	147
Anusha Region	PNC watoto wenye jaundice (ME)		63.0	0		63	0	63
Mara Region	Wanaohudhuria Postnatal Wenye Fistula Waliohudhuria Huduma Baada ya Kujitunga (≈ 20)		44.0	0		44	0	44
Anusha Region	PNC watoto wenye jaundice (KE)		44.0	0		44	0	44
Morogoro Region	Wanaohudhuria Postnatal Wenye Fistula Waliohudhuria Huduma Baada ya Kujitunga (≈ 20)		29.0	0		29	0	29
Shinyanga Region	Wanaohudhuria Postnatal Wenye Fistula Waliohudhuria Huduma Baada ya Kujitunga (≈ 20)		28.0	0		28	0	28
Anusha Region	Wanaohudhuria Postnatal Wenye Fistula Waliohudhuria Huduma Baada ya Kujitunga (≈ 20)		25.0	0		25	0	25

To generate a **data consistency report**, follow the pathway below:

Apps -> WHO Data Quality Tool -> Analysis -> Consistency -> Selections -> Analyze

This will result in a report similar to the one shown in Figure 43.

Figure 43: Sample DHIS 2 Consistency Report



MODULE 5: **ANALYSIS AND USE OF HEALTH DATA**

Module Introduction

Just as having high-quality data to inform health systems and their programs is important, ensuring that decision makers have the necessary skills to use and analyse these data is important, too. This includes building capacity for data analysis, interpretation, visualization, and use, as well as understanding how to communicate the findings of data and collaborate with stakeholders who are involved with the programs.

This module provides an overview of the concept of data use; provides information on the fundamentals of data analysis; teaches participants how to use the pivot table, data visualizer, and GIS modules in DHIS 2; teaches participants how to interpret and communicate data; and discusses the importance of sustaining a data use culture and developing data use plans.

Module **Objectives**

At the end of this module, participants will:

- 1. Understand the basic concepts and importance of data use**
- 2. Understand the fundamental concepts of data analysis**
- 3. Know how to use the pivot table, data visualization tools, and GIS modules of DHIS 2**
- 4. Understand how to interpret and communicate data**
- 5. Be able to create a plan to sustain a culture of data use in their organisations**

Session 1: Fundamentals of Data Analysis

5.1.0 SESSION OBJECTIVES

By the end of the session, participants will be able to:

- Understand key concepts and terms relevant to data analysis
- Understand the process and key steps for analysing facility- and district-level data
- Understand how to present data for maximum impact

5.1.1 CONTEXT

Data are increasingly available in disaggregate formats (for example, by patient age and sex, and by facility location and type) at the health-facility level throughout Tanzania. Analysing these data will enable CHMTs and RHMTs to make evidence-based decisions to guide program planning and implementation. If we fail to use these data, we risk allocating resources poorly, which wastes valuable resources. We may fail to provide health services where they are needed most, and we may fail to identify and improve poorly functioning facilities.

5.1.2 KEY CONCEPTS

It is important to understand several key terms prior to conducting basic analyses. These terms are:

- Count
- Ratio
- Proportion
- Percentage
- Rate
- Mean
- Median
- Range (minimum and maximum)

Count

A count refers to the total number of events, or to the total number of clients served. It is the simplest way to report data. There is no denominator in a count. In DHIS 2, a count is referred to as a “data element.”

Example of a count: 5,000 male circumcisions were performed at health clinics in the past year in Region Y.

Ratio

A ratio is a comparison of any two numbers. Ratios can be expressed as:

- a/b
- a to b
- a per b
- $a:b$

A ratio gives us a simple comparison of two numbers. To calculate a ratio, divide the first item you are looking at by the second.

In the health sector, we commonly use ratios to look at the number of clinicians to patients, beds to clients, or service providers to facilities. If you wanted to say that there are four service providers per clinic, the ratio is expressed numerically as 4:1. This is not the same as saying 1 to 4 or 1:4. The order of the numbers matters.

Example of a ratio: In District X, 600 nurses work in 150 clinics. To find the ratio of nurses to clinics, we divide 600 by 150 and come up with 4. Thus, there are four nurses per clinic.

Proportion

A proportion is a ratio in which all individuals in the numerator are also accounted for in the denominator. A proportion is used to compare parts of the whole: for example, the proportion of all clients who stop taking their drugs.

Example of a proportion: In Clinic Z, 200 clients were in treatment last month. Of those 200, 40 stopped taking their drugs. What is the proportion of treatment failures to all treated? $40/200$ or $1/5$. That is, one in five clients stopped taking their drugs that month.

Percentage

A percentage is a simple way to express a proportion. It is calculated by multiplying the proportion by 100.

Example of a percentage: From the example above, we saw that one in five clients stopped taking their drugs. To express this as a percentage, we convert the fraction to a decimal ($1/5 = 0.20$) and then multiply by 100 ($0.20 \times 100 = 20\%$). Thus, 20 percent of clients stopped taking their drugs.

Rate

A rate is a proportion over a standard period. The numerator and denominator must be from the same period. In the health sector, we often use rates to talk about the frequency of an event during a specific period, such as a birth rate, mortality rate, or fertility rate.

Example of a rate: The neonatal mortality rate is the number of neonatal deaths per 1,000 live births. A neonatal death is defined as a death during the first 28 days of life.

- 8,000 children were born in Region Z over the past year. Forty of them died in the first 28 days of life.
- The neonatal mortality rate for Region Z in the past year was $40/8,000 \times 1,000 = \text{five deaths per } 1,000 \text{ live births.}$

Mean

The mean is the average of your data set: the value obtained by dividing the sum of a set of quantities by the number of quantities. The mean is the most frequently used measure to look at the central tendency of a data set.

The mean takes into consideration the magnitude of every value, which makes it sensitive to extreme values. If there are data in the data set with extreme values—extremely low or high in comparison with most other values in the data set—the mean may not be the most accurate method to use in assessing the point around which the observations tend to cluster.

Use the mean when the data are normally distributed (symmetrical).

To calculate the mean, add all of your figures and divide by the total number of figures.

Example of a mean: Six facilities in District A offer ANC services. The facilities had 22, 18, 30, 19, 37, and 33 clients each in the past month. On average, each facility saw a mean of 26.5 clients last month. $(22+18+30+19+37+33) = 159 \div 6 = 26.5$

Median

The median is the middle of a distribution. In other words, if a list of values is ranked from smallest to largest, then half of the values are greater than or equal to the median and the other half are less than or equal to it.

The median is *not* as sensitive to extreme values as the mean, because it takes into consideration the ordering and relative magnitude of the values. We therefore use the median when data are skewed.

Example of a median:

- Odd number of numbers, median = the middle number
 - Median of 2, 4, 7 = 4
- Even number of numbers, median = mean of the two middle numbers
 - Median of 2, 4, 7, 12 = $(4+7) / 2 = 5.5$

Range

The range provides you with the minimum and maximum values in a data set.

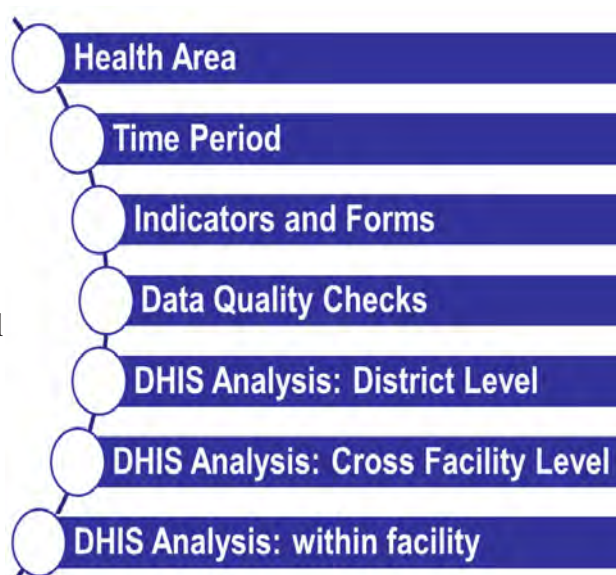
Example of a range: The six facilities in District A that offer ANC services saw 22, 18, 30, 19, 37, and 33 clients in the past month. The range of clients seen by the facilities is between 18 and 37.

5.1.3 KEY STEPS FOR DATA ANALYSIS

Many guides to analysing health data have been published. This section was heavily influenced by the World Health Organisation's *Analysis of Health Facility Data: Guidance for Managers and Analysts*. (The document should be online soon at www.who.org.)

In conducting your analysis, you have seven main tasks:

1. Select a health area.
2. Identify a period of time.
3. Review indicators and forms.
4. Conduct basic data quality checks.
5. Analyse the district-level data for each indicator (district-level analysis).
6. Compare facilities for a single indicator (cross-facility analysis).
7. Examine specific facilities in detail (within-facility analysis).



1. Select a health area.

For an analysis to have depth, often you will focus on each health area, one at a time. Health programs could include:

- Reproductive, maternal, and neonatal health
- Immunisation
- HIV and AIDS
- TB
- Malaria
- Other

2. Identify a period of time.

Once you've selected a health area, you must also identify the period being analysed. This will depend on your analysis's goals. If you are attempting to track whether or not your facilities are improving over time, you will need to examine multiple years. To see what additional support facilities might need this year, examining the past month or the past quarter might be sufficient. When preparing for the annual program review or creating next year's program plan, you would look at data from the past year.

The period being analysed could be:

- Past month
- Past quarter
- Past year
- Multiple months, quarters, or years

3. Review indicators and forms.

Once you know your period and your health area, you need to identify the specific indicators that will allow you to evaluate your progress in the health area, as well as targets for those indicators. Indicators, including their definitions and examples, were presented in Module 2, Session 3. For each key indicator you have selected, you should identify the numerator and denominator. You should also map each indicator data element to the HMIS form that is used to collect that data.

Being familiar with the relevant HMIS forms will ensure that you properly understand the source of the data. By identifying any challenges with those forms (for example, lack of reporting or misunderstood data elements) you will be better able to assess the quality of data that you are attempting to analyse. If the data are of very poor quality, sometimes the analysis can be irrelevant.

4. Conduct basic data quality checks.

In addition to reviewing the forms, there are a few other methods for rapidly checking the quality of indicator data in the forms. You could examine:

- Reporting rates
- Outliers
- Sex disaggregation (if appropriate)

5. Analyse the district-level data for each indicator (district-level analysis).

Analysis: District Averages

Once you have checked your data and ensured its sufficient quality, you can proceed to analyse it. For each indicator you have selected, first calculate the district average for the period you have selected. Compare the results with the district target, and identify which indicators are doing well and which are doing poorly. Write down your observations.

Analysis: Trends in District Average

In addition to examining the district performance during the current period, you can also examine trends over time. This enables us to identify indicators that are improving over time and getting worse over time, allowing us to better assess our programs and progress. To examine trends over time, create a line chart showing a given district's data over the past four years for each indicator. When examining trends over time, it is helpful to have data for at least three separate points in time.

6. Compare facilities for a single indicator (cross-facility analysis).

Analysis: Cross-Facility

Once you have a general sense of how your district is performing at the aggregate level, it is important to drill down, analysing each facility to see how it is performing and comparing it with the performance of the other facilities. When examining facility data, often you will find that a few facilities provide the majority of services and many more facilities provide limited services. The reason why a given facility offers limited services might be that the facility is small, or that its catchment population is small, or it could be because the facility has a programmatic issue. In doing your analysis, you may use your knowledge of the facility and the services it offers to interpret the data that you observe.

For most indicators, the numerator value is a service statistic count, while the denominator is an estimate of the relevant population eligible for the service. Currently, these population estimates are unavailable in the DHIS 2 at the facility level. Consequently, for any indicator involving population estimates as the denominator, you can only examine the numerator (service statistic count).

7. Examine specific facilities in detail (within-facility analysis).

Analysis: Within Facility

In addition to comparing facilities against one another, we can look carefully at a single facility's data. This type of analysis can be helpful either before or during supportive supervision to identify health areas, and specifically indicators, on which facility management should focus. In preparation, you should examine a summary report to see in which health areas the facility is doing well, and in which it is doing poorly.

Other Useful Types of Analysis

Analysis: Program Retention

In many programs, patients who receive an initial service are expected to receive follow-up “cascade” services. For these programs, examining each indicator in the cascade can help identify where program **dropout** is most common.

Examples of programs in which retention is important are immunisation, ANC, treatment of TB, and HIV care and treatment.

Let's look at an immunisation program for an example of retention. With certain immunisations, an individual needs multiple doses of a vaccine to be fully immunised. You see that children enter the immunisation service with their first dose—of polio vaccine, let's say. At this time, you can measure the coverage of your immunisation program by determining how many children access the polio vaccine.

However, if you stopped here, you would not be assessing the full effectiveness of your program. You need to measure how many of those children return two more times to complete the number of immunisations required for protection from polio. By calculating the difference between utilisation and coverage at each step of service provision, you can determine where you are losing your patients.

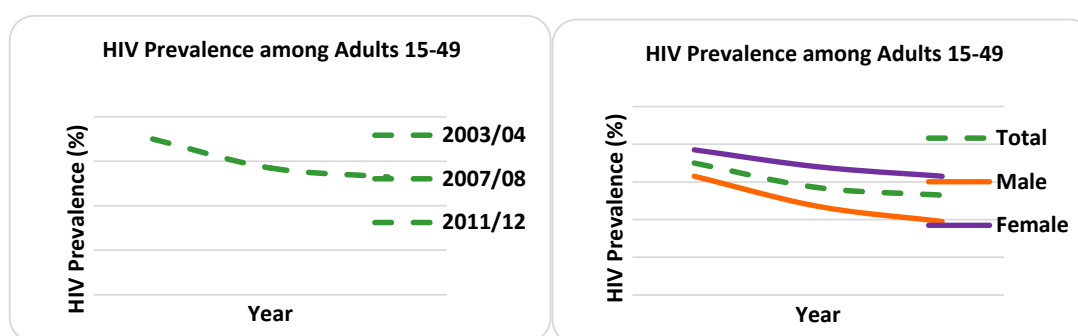
Analysis: Age and Sex Disaggregation

For each indicator, assess whether analysing it by age groups and sex would provide additional insight.

Age and sex disaggregation can help identify populations who are not being covered well by existing programs. Such disaggregation can help you find populations to focus on for outreach.

When you look at the graph on the left in Figure 44, you see HIV prevalence among 15–49 year olds in Tanzania from 2003 to 2012. You can see that the overall trend is decreasing.

Figure 44: HIV Prevalence among Adults 15–49, by Year and by Sex



What do you notice when you look at the graph on the right in Figure 44? In this second graph, it is easy to see that a significant difference between men and women in HIV prevalence exists.

5.1.4 DATA PRESENTATION AND VISUALIZATION

Raw data must be transformed into an easily understandable format to be helpful to health professionals and managers. The most common ways of displaying data are narratives, tables, and charts. Tables and charts can quickly summarise information for your audience, and help show trends or comparisons. Maps are another powerful way to visualise data.

Narrative

A narrative is a written description of a situation. A narrative should be supported with summary data, specifying a health indicator, period, and location. For example, a narrative might say: “In the past three months, health facilities in District A have reported 120 cholera cases.”

Tables

A table is the simplest way to summarise a set of observations. A table has rows and columns containing data, which can be in the form of absolute numbers or percentages or both. DHIS 2 can generate pivot tables or pre-set tabular reports to summarise data (see Session 3 in this module for details).

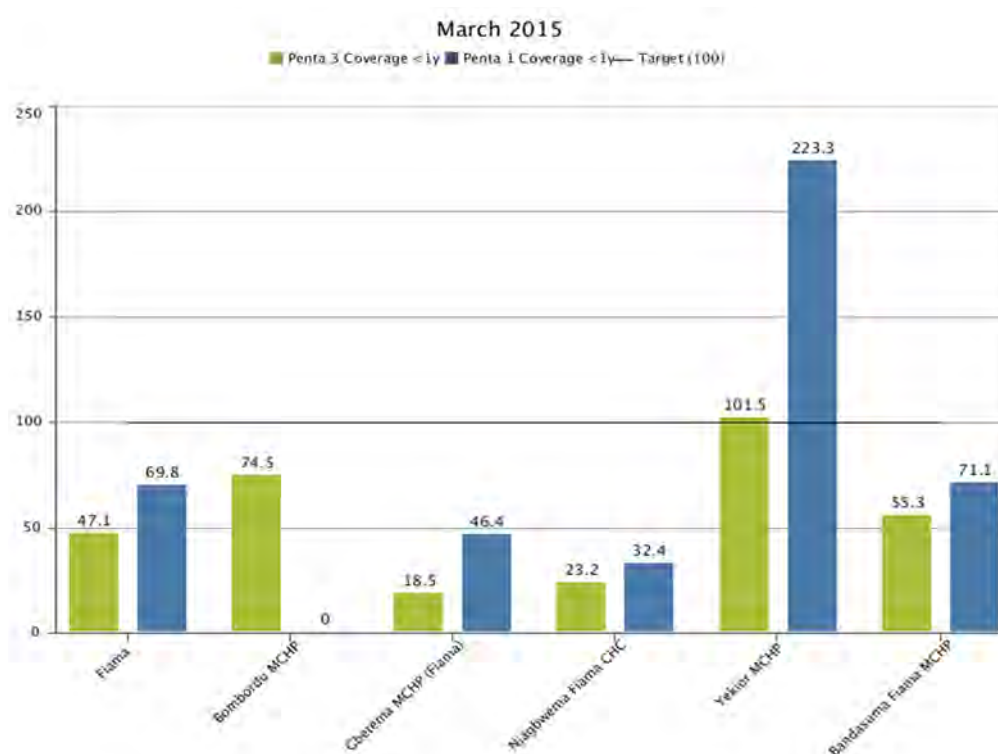
Charts

Charts are visual representations of numerical data and, if well designed, will convey the general patterns or trends in the data. Four main types of charts are:

- Bar chart
- Pie chart
- Line chart
- Radar (spider)

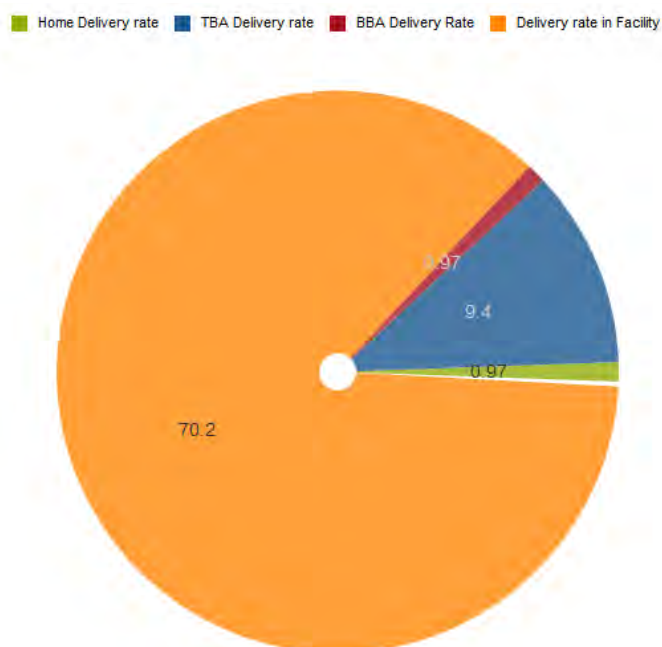
Bar charts allow us to compare facilities or districts with one another, or to compare data elements or indicators with one another.

Figure 45: Example of a Bar Chart



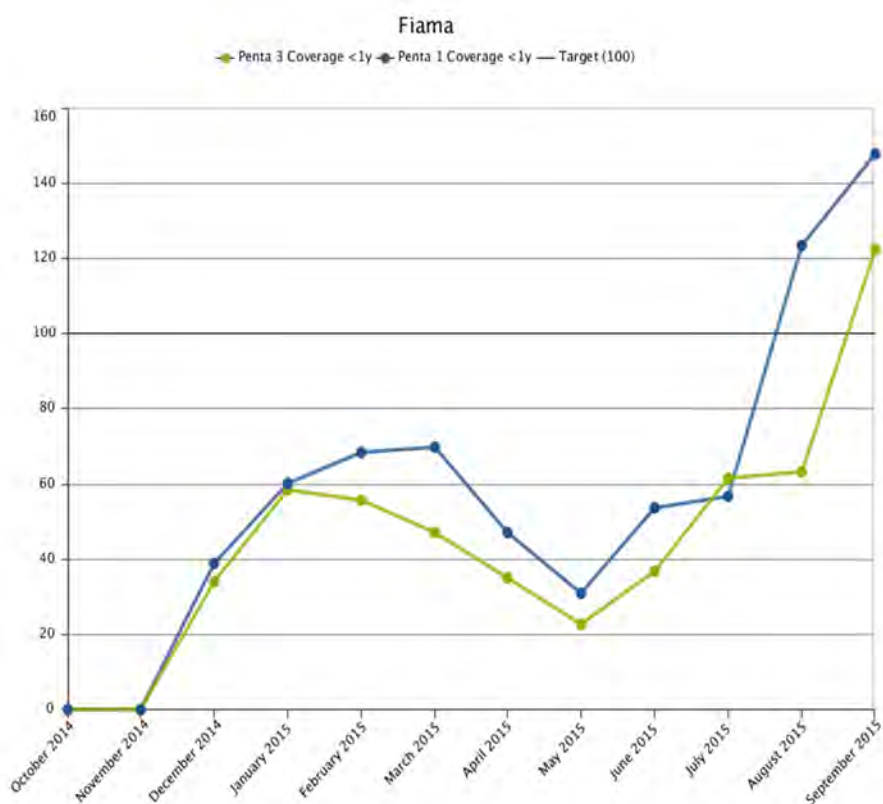
Pie charts show us proportions out of the whole.

Figure 46: Example of a Pie Chart



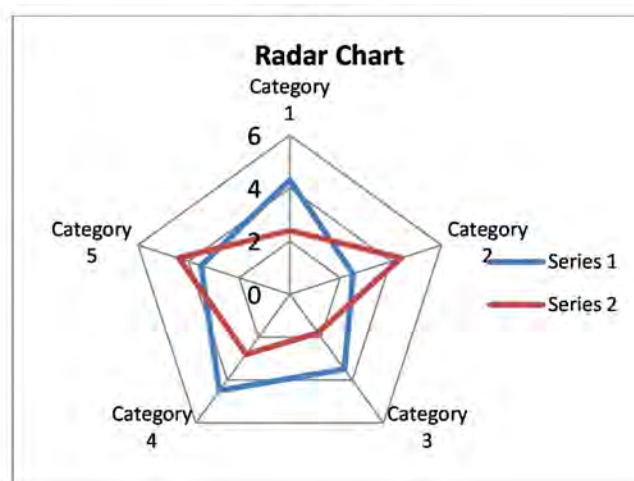
Line charts enable us to track and examine changes over time.

Figure 47: Example of a Line Chart



Radar charts allow us to examine data along multiple dimensions in a single format. The closer the chart is to the outer edge for each category, the better that category is performing.

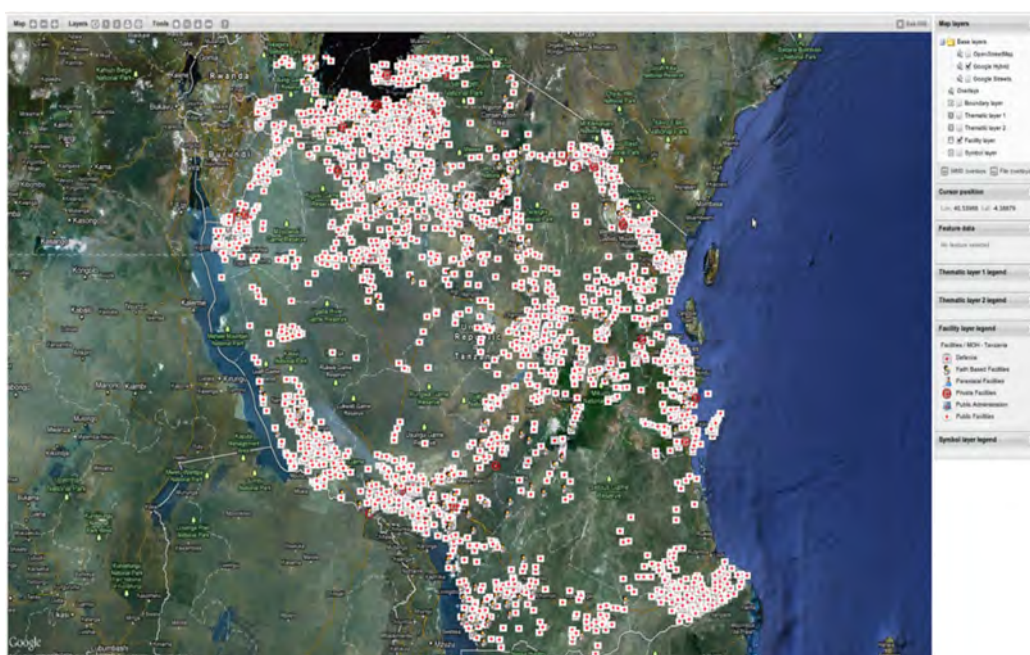
Figure 48: Example of a Radar Chart



Maps

Maps enable us to examine geographic variation. They show us patterns. Mapping data at the facility level requires access to each health facility's geographic coordinates. As of this writing, not all of these data are available in DHIS 2, so mapping facility data in the DHIS 2 is not yet recommended.

Figure 49: Example of a GIS Map



Session 2: Data Analysis with DHIS 2

5.2.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand the features of the Pivot Table, Data Visualizer, and GIS modules in DHIS 2
- Know how to analyse data using these modules in DHIS 2

5.2.1 PIVOT TABLES

5.2.1.0 INTRODUCTION

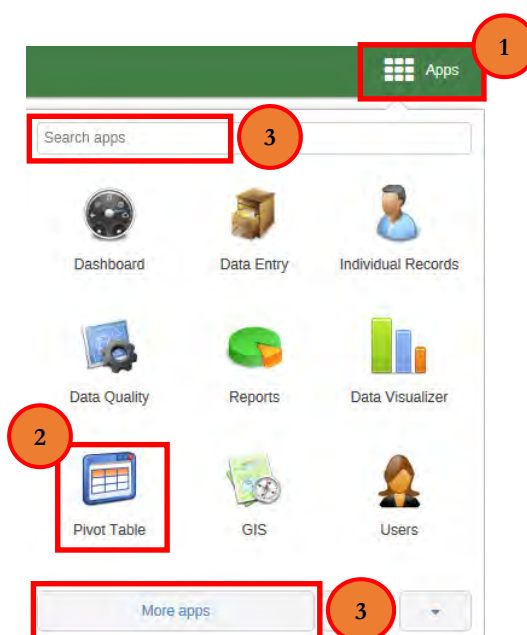
The pivot table is a dynamic tool among others in DHIS 2. Pivot tables arrange data in tabular formats, according to the data dimensions used in DHIS 2. This allows users to summarise, present, and analyse data in a user-friendly format.

5.2.1.1 ACCESSING THE PIVOT TABLES

To open the Pivot Table module, do the following:

1. Click on the “Apps” menu. A drop-down menu will appear listing the apps in DHIS 2.
2. Look for “Pivot Table” in the list and click on it to open it.
3. If it is not in the list, start typing *Pivot...* to search for the app, or click “More apps” to show all apps. “Pivot Table” should appear now, and you can click to open it.

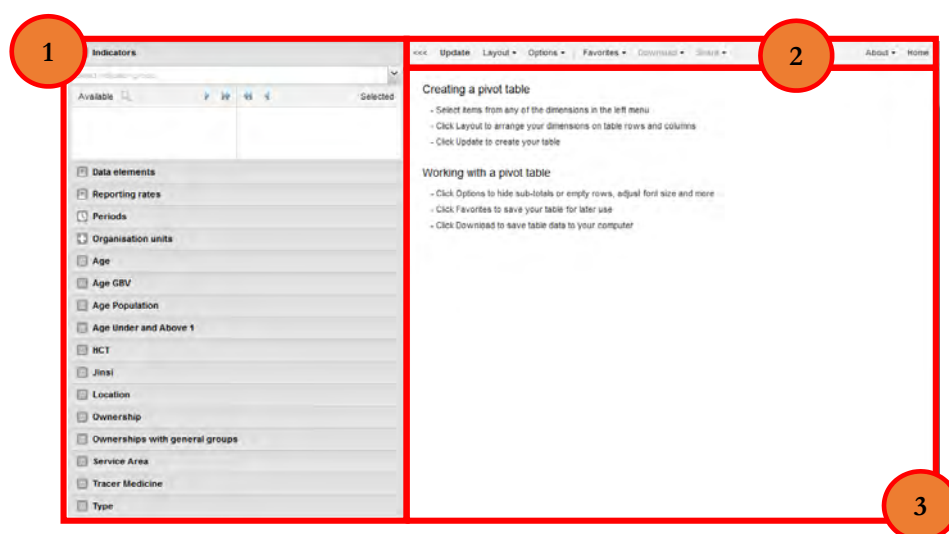
Figure 50: DHIS 2 Apps



The Pivot Table interface has three main components:

1. **The selection component:** to select what, where, and when
2. **The options component:** to select the format of the view—columns and rows
3. **The viewing component:** to display the results table

Figure 51: Main Components of the Pivot Table Interface



5.2.1.2 CREATING A PIVOT TABLE

We will use the following example to demonstrate how to create a pivot table:

Create a pivot table to compare delivery (*kujifungua*) status of malaria care in the Ilala, Kinondoni, and Temeke municipal councils in Dar es Salaam region for the past four quarters.

Figure 52: Example of a Pivot Table

Periods	Organisation units / Data elements	Waliojarajiwa Kujifungua	Waliojifungulia Nyumbani	Waliojifungua Kabla ya Kufika Kituoni (BBA)	Waliojifungulia kituoni	Total
Jan to Mar 2015	Ilala Municipal Council	14 033	90	219	8 858	23 200
	Kinondoni Municipal Council	3 641	32	147	8 172	11 992
	Temeke Municipal Council	9 153	23	212	9 351	18 739
		26 827	145	578	26 381	53 931
Apr to Jun 2015	Ilala Municipal Council	21 044	84	144	10 321	31 593
	Kinondoni Municipal Council	3 455	165	137	9 958	13 715
	Temeke Municipal Council	4 275	33	240	11 087	15 635
		28 774	282	521	31 366	60 943
Jul to Sep 2015	Ilala Municipal Council	14 229	339	106	7 739	22 413
	Kinondoni Municipal Council	3 270	8	81	7 273	10 632
	Temeke Municipal Council	4 573	68	181	8 805	13 627
		22 072	415	368	23 817	46 672
Oct to Dec 2015	Ilala Municipal Council					
	Kinondoni Municipal Council					
	Temeke Municipal Council					
	Total	77 673	842	1 467	81 564	161 546

1. Selecting “What” (Indicator, Data Element, or Reporting Rate)

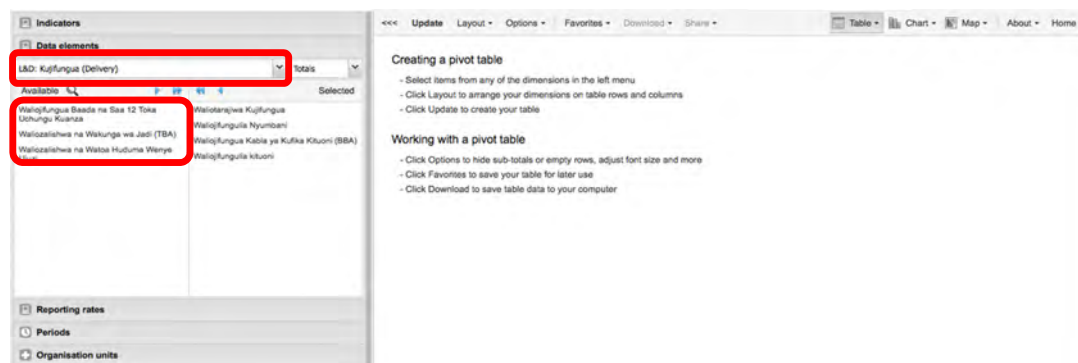
Indicator: To select an indicator, select the **indicator group** from the drop-down menu. Then select a specific indicator by double-clicking it, or use the arrow (▶) button to move the indicator from the left side of the window to the right side. Based on the data analysis need, more than one indicator can be selected from the list.

Data element: To select a data element, select the **data element group** from the drop-down menu. Then select a specific data element by double-clicking it, or use the arrow (▶) button to move the data element from the left side of the window to the right side. Based on the data analysis need, more than one data element can be selected from the list.

Reporting rate: To select a reporting rate, double-click it, or use the arrow (▶) button to move the reporting rate from the left side of the window to the right side. Based on the data analysis need, more than one reporting rate can be selected from the list.

For the task explained above, select *Kujifungua* (Kiswahili for “delivery”) from the drop-down as the data element group. Then select the four data elements as shown in the screenshot.

Figure 53: Selecting “What” (An Example of Selecting a Data Element)



2. Selecting a Period

Choose a fixed period or a relative period.

- To select a fixed period, start by selecting a **period type** from the period type list, then select the period by double-clicking it or use the arrow (▶) to select it.
- To select a relative period (that is, a period relative to the current date), tick the check-boxes next to each period. For the task at hand, check “Last 4 quarters” only.

Figure 54: Selecting a Period

3. Selecting an Organisation Unit

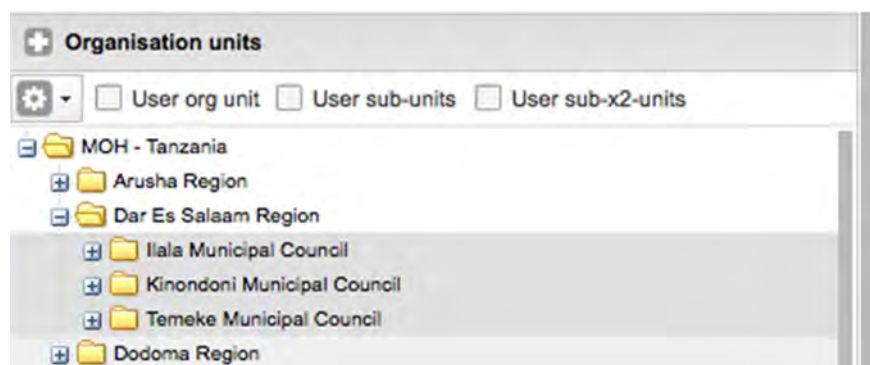
For the organisation unit dimension, you can select any number of desired organisation units. You may select the organisation unit by:

- **Levels:** Select “Regions,” “Districts,” or “Facility”
- **Groups:** Select “Private,” “Public,” or “Faith-Based”
- **Multiple selection:** To start, select “Organisation units” as the default.
 - This option also allows relative selections such as “User organisation unit” or “User sub-units” (“Children Organisation unit”) and “User sub-2x-units” (“User Grandchildren Organisation unit”).

Figure 55: Selecting an Organisation Unit

For the task at hand, select multiple organisation units, as follows.

Figure 56: Organisation Unit—Multiple Selection



4. Creating the Table

Click the “Update” button to create your table. The table may not have the dimensions “matched” to the filter, rows, or columns you had intended. The “Layout” button allows you to change the table to your desired specifications.

Figure 57: Generated Pivot Table for the Task

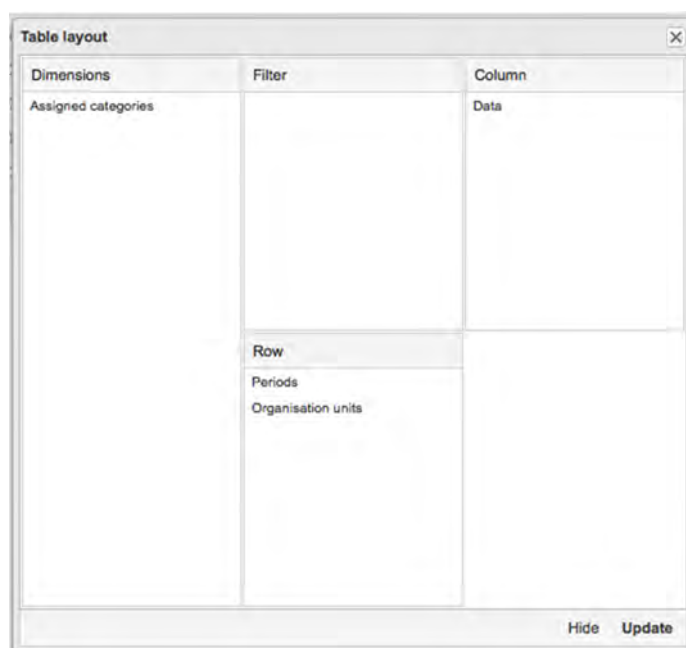
Periods / Data elements	Waliojarajiwa Kujifungua	Waliojifungulia Nyumbani	Waliojifungua Kabla ya Kufika Kituoni (BBA)	Waliojifungulia kituoni	Total
Jan to Mar 2015	26 827	145	578	26 381	53 931
Apr to Jun 2015	28 774	282	521	31 366	60 943
Jul to Sep 2015	22 072	415	368	23 817	46 672
Oct to Dec 2015					
Total	77 673	842	1 467	81 564	161 546

5.2.1.3 LAYOUT

The **layout** refers to the format of the table. You can rearrange items to change the layout of the table. For instance, you can click on “Organisation units” and drag that item 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 “Dimensions” and will be displayed together in the pivot table. For instance, after selecting indicators and data elements in the left menu, you can drag “Data” from the list of available dimensions to the “Row” dimension list in order to arrange your indicators and data elements as rows in the pivot table.

For the task at hand, you can click on “Organisation units” and drag that item to the “Row” list and the result will be the intended pivot table form.

Figure 58: Layout of the Pivot Table



5.2.1.4 OPTIONS

Several table options are available when you work with a pivot table. Open the options screen by clicking on “Options” in the top menu. The following options are available:

- **Show column/row totals:** You can display total values in the table for each row and column, as well as a grand total for all values in the table.
- **Show column/row subtotals:** You can display subtotals in the table for each dimension. In the screenshot above, notice how subtotals are generated for each of the periods in the “Period” dimension. Note that subtotals will be hidden for columns or rows if only one dimension is selected, because the values in that case are equal to the subtotals.
- **Show dimension items:** You can show the dimension names as part of the pivot tables.
- **Hide empty rows:** You can hide empty rows in the table. This is useful for large tables in which many of the dimension items do not have data, because it makes the table easier to read.
- **Aggregation type:** You can overwrite the default aggregation operator by selecting a different aggregation operator—for example, “Count,” “Min,” or “Max.”
- **Show hierarchy:** You can show the name of all ancestors for the organisation units: for example, “Tanzania/Mbeya Region/Rungwe District Council/Sanya Dispensary” for Sanya Dispensary. The organisation units are then sorted alphabetically, which will order the organisation units perfectly according to the hierarchy.
- **Display density:** You can control the size of the cells in the table, setting it to “Comfortable,” “Normal,” or “Compact.” The “Compact” option is handy for fitting large tables on one browser screen.

- **Font size:** You can control the size of the table text font, setting it to “Large,” “Normal,” or “Small.”
- **Digit group separator:** You can control the character used to separate groups of digits in the thousands, setting it to “Comma,” “Space,” or “None.”
- **Legend set:** You can show a colour indicator next to the values. Currently the GIS legend sets are being used.

For the task at hand, we can uncheck “row totals” in the data options, because they are not useful given the selected data elements. Also, we can check “hide empty rows” to remove empty rows, while leaving all other options with the default selection, as Figure 59 shows.

Figure 59: Table Options

Table options

Data

- ☒ Show column totals
- ☐ Show row totals
- ☒ Show column sub-totals
- ☒ Show row sub-totals
- ☒ Show dimension labels
- ☒ Hide empty rows

Aggregation type: By data element

Organisation units

- ☐ Show hierarchy

Style

Display density: Normal

Font size: Normal

Digit group separator: Space

Legend set: None

Parameters (for standard reports only) Show

Hide Update

Once you have set all options as required, click “Update” to generate the new pivot table.

Figure 60: Using Layout and Options to Customise Pivot Table Presentation

Periods	Organisation units / Data elements	Walilotarajiwa Kujifungua	Waliojifungulia Nyumbani	Waliojifungua Kabla ya Kufika Kituoni (BBA)	Waliojifungulia kituoni
Jan to Mar 2015	Ilala Municipal Council	14 033	90	219	8 858
	Kinondoni Municipal Council	3 641	32	147	8 172
	Temeke Municipal Council	9 153	23	212	9 351
		26 827	145	578	26 381
Apr to Jun 2015	Ilala Municipal Council	21 044	84	144	10 321
	Kinondoni Municipal Council	3 455	165	137	9 958
	Temeke Municipal Council	4 275	33	240	11 087
		28 774	282	521	31 366
Jul to Sep 2015	Ilala Municipal Council	14 229	339	106	7 739
	Kinondoni Municipal Council	3 270	8	81	7 273
	Temeke Municipal Council	4 573	68	181	8 805
		22 072	415	368	23 817
	Total	77 673	842	1 467	81 564

5.2.1.5 FAVOURITES

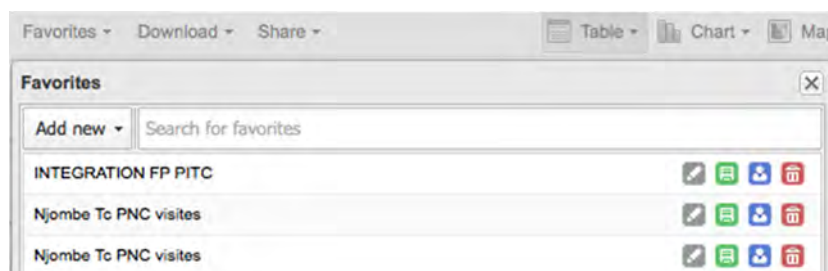
- After you have set up a pivot table, it may be convenient to save it as a favourite so you can easily run the pivot table in the future.
- To do so, click “Favorites” in the top menu; click “Add new”; give the favourite a descriptive name; and click “Create.”

Figure 61: Creating New Favourites



- You can search for favourites through the search input field at the top.
- To load an existing favourite, simply click the name of the favourite in the list.
- To rename a favourite, click the grey “Rename” icon next to the favourite on the list, change the name, and click “Update.”
- To overwrite an existing favourite with an updated pivot table, click the green “Overwrite” icon.
- To share a favourite with a user group, click the blue “Share” icon.
- To delete a favourite, click the red “Delete” icon.

Figure 62: Searching, Renaming, Overwriting, Sharing, and Deleting a Favourite



5.2.1.6 SHARING WITH OTHER USERS

Write an interpretation:

For certain analysis-related resources in DHIS 2, such as pivot tables, charts, and maps, you can create and share a data interpretation with other users. An interpretation is simply a link to the relevant resource together with a text expressing some insight about the data. DHIS 2 enables users to provide interpretations of a created pivot table and share them with other users and user groups. To write an interpretation, first save the table you want to share as a favourite and then follow these simple steps:

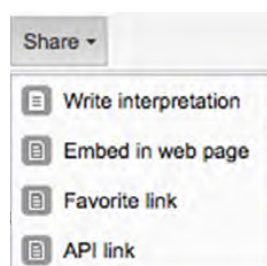
1. Open the table from “Favorites.”
2. Click “Share.”
3. Select “Interpretation.”
4. Write a comment, question, or interpretation of the table.

Share a favourites link or application programme interface link and embed it in the web page:

You can provide a link to access the table, an application programme interface link for developers, or a tag to embed the table on a web page. To do so, follow these simple steps:

1. Open the table from “Favorites.”
2. Click “Share.”
3. Select the desired action.

Figure 63: Sharing a Link or Tag



5.2.1.7 DOWNLOADING

The download function lets you download the pivot table in various formats (as shown in Figure 64) for such purposes as further analysis in Microsoft Excel and exchange of data with other systems through standard file exchange formats. Click “Download” and select the format that you need.

Figure 64: Downloading a Pivot Table



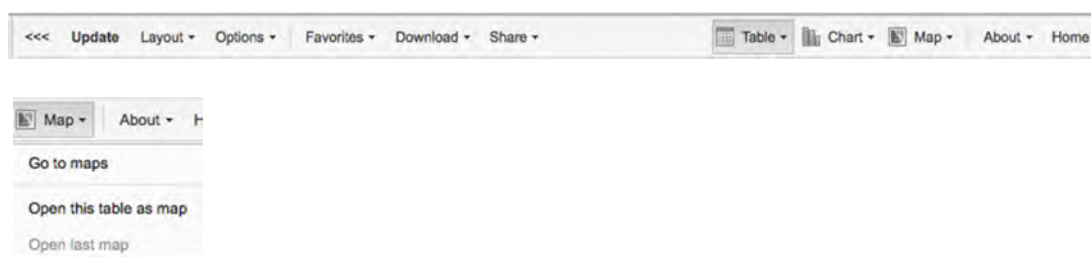
5.2.1.8 NAVIGATING TO CHART, MAP, AND HOME

While in the Pivot Table module, you may also navigate to the “Data Visualizer” and “Map” modules and to “Home” (the dashboard) through the “Chart,” “Map,” and “Home” menus that are displayed at the top right corner of Figure 65. You can also open the generated pivot table as a chart or map, just by clicking “Chart” or “Map.”

Figure 65: Chart Menu



Figure 66: Map Menu



Exercise 5.2.1 Using Pivot Tables to Analyse Data

Divide into four groups:

1. Create a pivot table showing the reporting rate for the postnatal form for the districts in a region of your choice for the year 2015. Your table should display districts in rows and the postnatal reporting rate in columns. Once you have created the table, save it as a favourite.
2. Create a pivot table showing the ANC first and fourth visits for the past financial year for a district of your choice. Save it as a favourite.
3. Using the pivot table developed in Question 1, drill down to the facility level.
 - a. Display the table with facilities as rows and their hierarchy.
 - b. Save this pivot table as a favourite.
 - c. Download the table as a plain data source (spreadsheet) and save it.

5.2.2 DATA VISUALIZER

5.2.2.0 INTRODUCTION

The Data Visualizer module, another of the data analysis tools in DHIS 2, lets you manage data analysis dynamically by traversing the parameters of analysis. With the data visualizer, you can freely select such contents of analysis as indicators, data elements, periods, and organisation units.

In general, the data visualizer has two design principles:

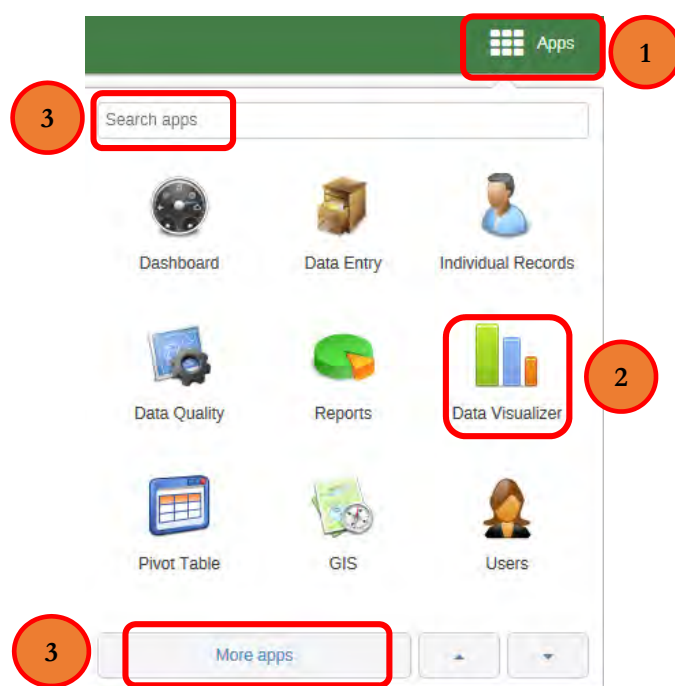
1. **Simplicity:** You can easily select the indicators, data elements, periods, and organisation units desired for the analysis and click “Update” to get the visualization.
2. **Efficiency:** The data visualizer is designed to be fast and work well with poor Internet connections. This is because charts are generated in the web browser and very little data are transferred over the Internet.

5.2.2.1 ACCESSING THE DATA VISUALIZER

To open the Data Visualizer module, take the following steps:

1. Click on the “Apps” menu. A drop-down menu will appear listing the apps in DHIS 2.
2. Look for “Data Visualizer” in the list; then click on it to open it
3. If it is not on the list, start typing **Data...** to search for the app or click “More apps” to show all apps. “Data Visualizer” should appear; now you can click to open it.

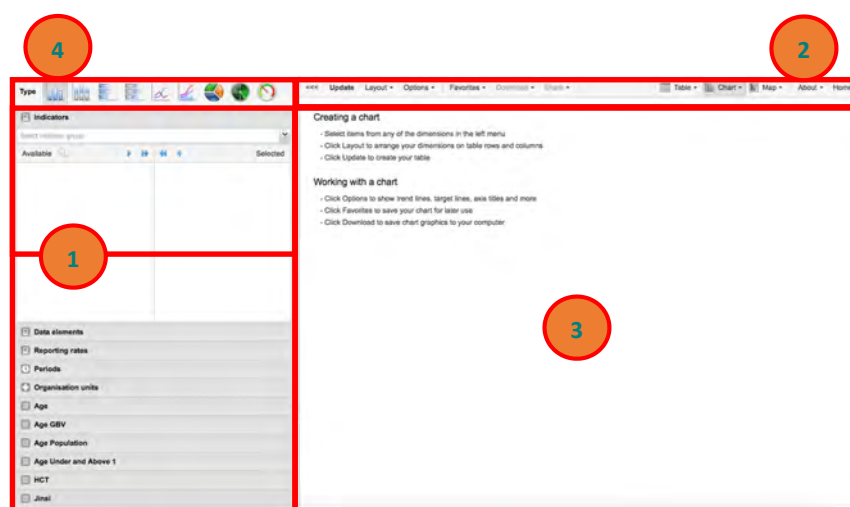
Figure 67: DHIS 2 Apps



The data visualizer interface has four main components:

1. **The selection component:** to select what, where and when
2. **The options component:** to select format of the view i.e. axis, legend, etc.
3. **The viewing component:** to display the results chart
4. **The chart type component:** to select the chart type

Figure 68: Main Components of the Data Visualizer

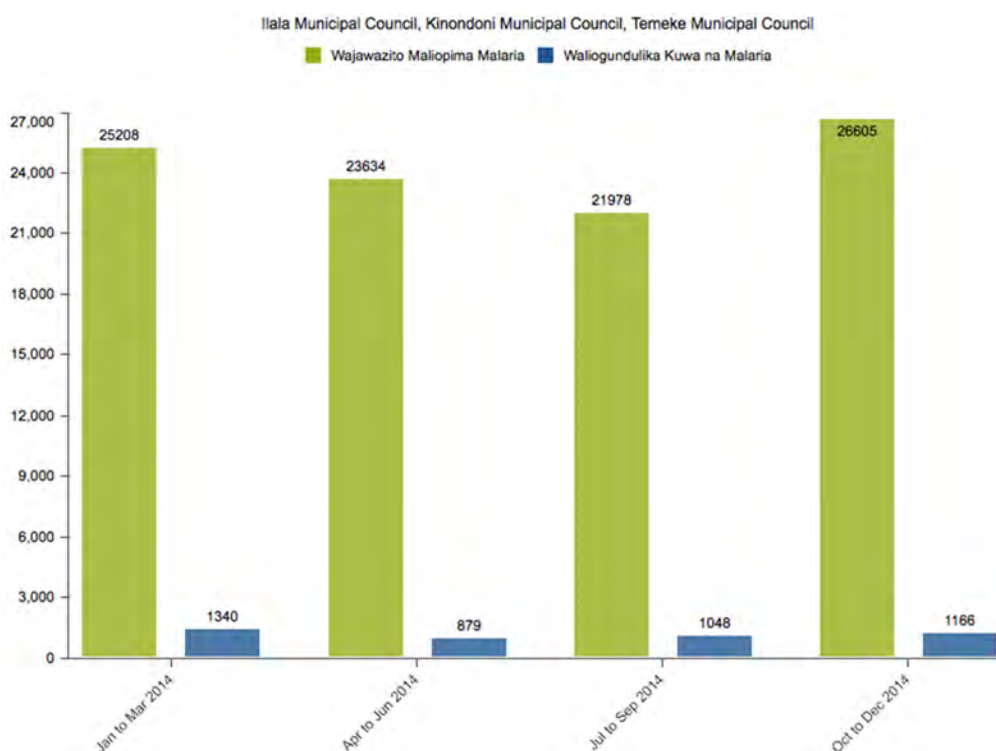


5.2.2.2 CREATING A CHART IN DATA VISUALIZER

We will use the following example to demonstrate how to create a chart in the Data Visualizer module:

Create a bar chart to compare “*Wajawazito waliopimwa malaria*” and “*waliogundulika kuwa na malaria*” for the four quarters of 2014 in all municipal councils in the Dar es Salaam region.

Figure 69: Example of a Chart



5. Selecting “What” (Indicator, Data Element, or Reporting Rate)

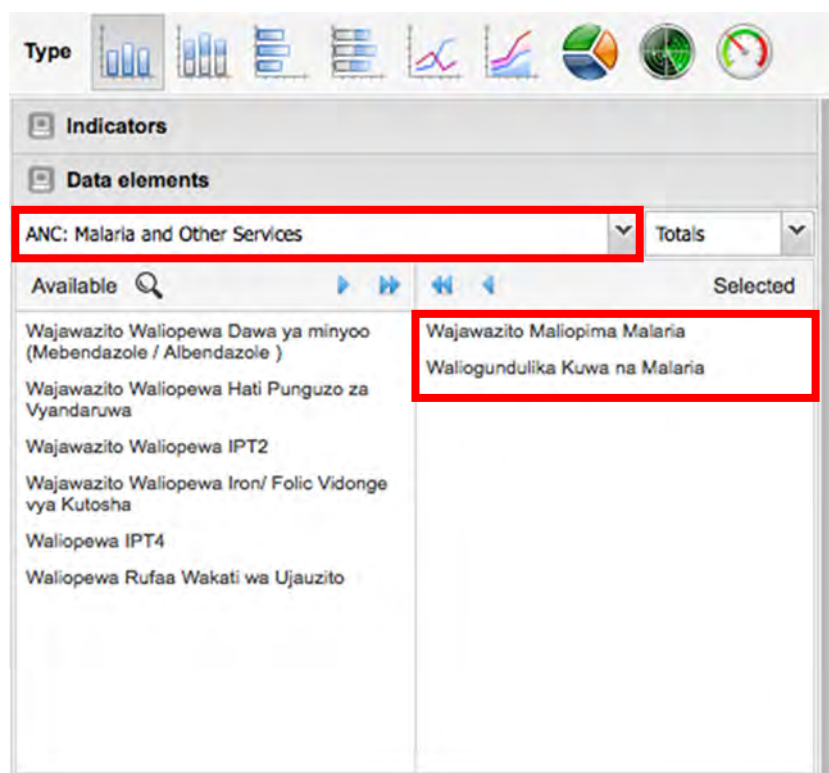
Indicator: To select an indicator, select the **indicator group** from the drop-down menu. Then select a specific indicator by double-clicking it, or use the arrow (▶) button to move the indicator from the left side of the window to the right side. Based on the data analysis need, more than one indicator can be selected from the list.

Data element: To select a data element, select the **data element group** from the drop-down menu. Then select a specific data element by double-clicking it, or use the arrow (▶) button to move the data element from the left side of the window to the right side. Based on the data analysis need, more than one data element can be selected from the list.

Reporting rate: To select a reporting rate, select by double-clicking it, or use the arrow (▶) button to move the reporting rate from the left side of the window to the right side. Based on the data analysis need, more than one reporting rate can be selected from the list.

For the example given above, select “ANC: Malaria and other services” as the data element group from the drop-down list. Then select the two data elements as shown in the figure below.

Figure 70: Selecting a Data Element



6. Selecting a Period

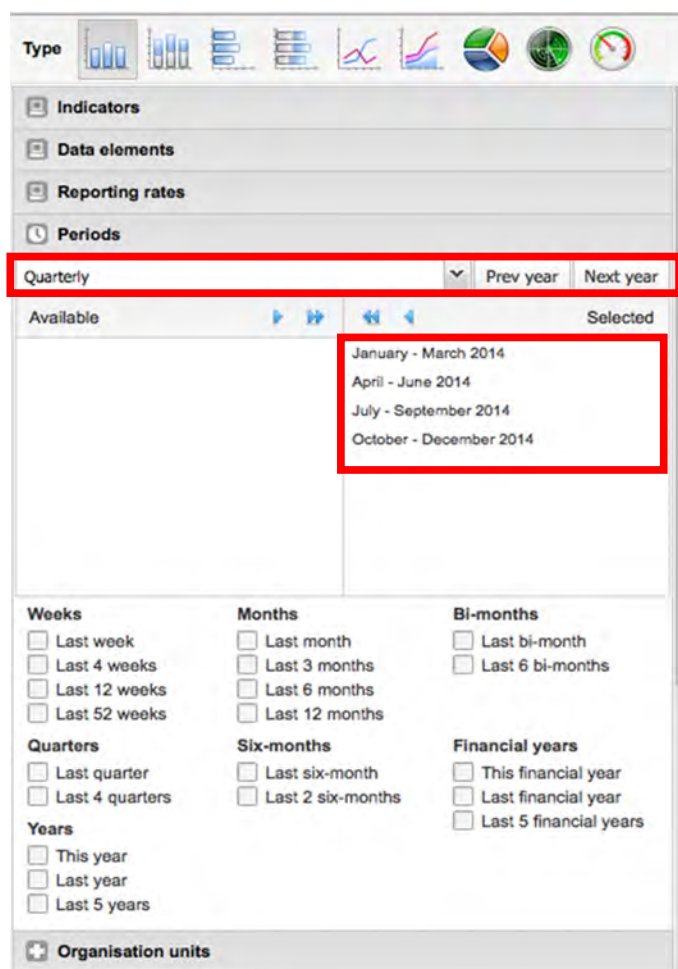
Choose either a fixed or a relative period.

- To select a **fixed period**, start by selecting a **period type** from the period type list, then select “Period” by double-clicking it or use the arrow (▶) to select it.
- To select **relative period** (that is, a period relative to the current date), tick the check boxes next to each period. For the task at hand, check “Last 4 quarters” only.

Then, follow these steps:

1. Select “Quarterly” from the “Periods” drop-down menu.
2. Click “Prev year” until it displays “2014 quarters.”
3. Double-click each quarter from the list on the left to select the one you want, or click on the double-arrow icon to select all quarters in the list.

Figure 71: Selecting a Period



7. Selecting an Organisation Unit

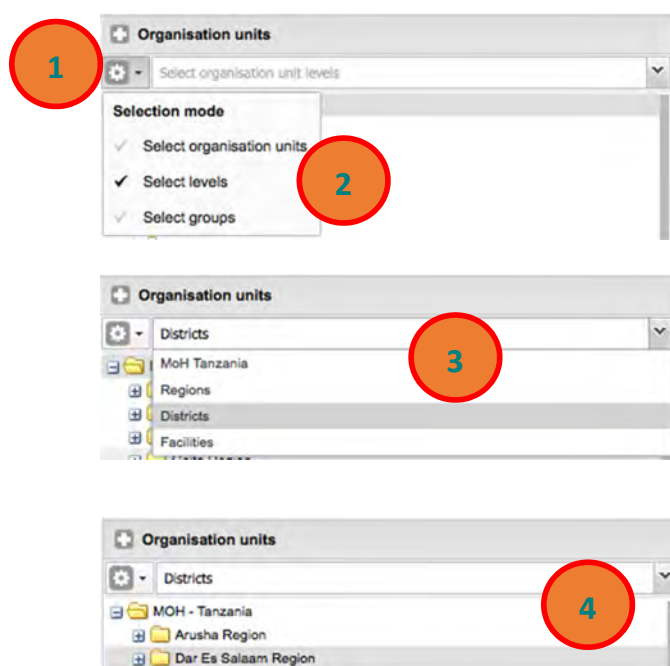
For the organisation unit dimension, you can select any number of desired organisation units. You may select “Organisation unit” by doing the following:

- **Levels:** Select “Regions,” “Districts,” or “Facility.”
- **Groups:** Select “Private,” “Public,” or “Faith-Based.”
- **Multiple selection:** To start, select “Organisation units” as the default.
 - This option also allows relative selection: for example, “User organisation unit” or “User sub-units” (“children Organisation unit”) and “User sub-2x-units” (“User Grandchildren Organisation unit”)

For the example given, follow these steps:

1. Click the “Selection mode” icon just below the label “Organisation units.”
2. Click “Select levels” as the selection mode.
3. Select “Districts” from the drop-down list.
4. Click “Dar es Salaam Region” from the organisation unit tree.

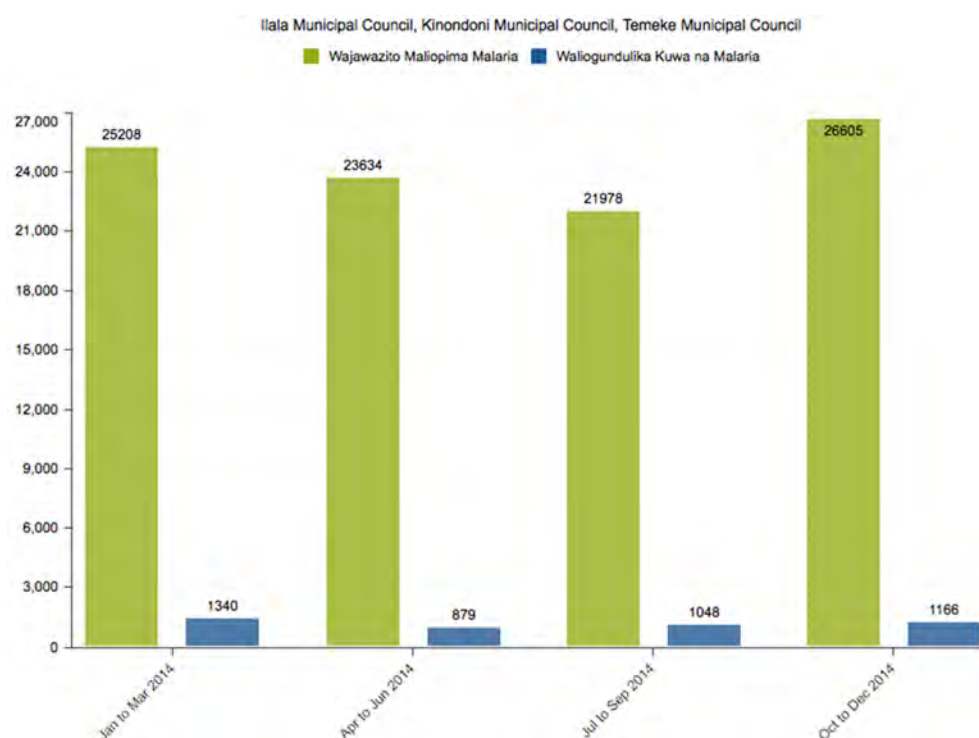
Figure 72: Selecting an Organisation Unit



8. Creating the Chart

Click “Update” to create your chart. The chart may not have the dimensions “matched” to the filter, series, or category you had intended. The “layout” button allows you to change the chart to your desired specifications.

Figure 73: Generated Bar Chart for the Task

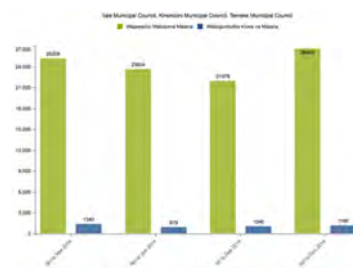


Selecting the Chart Type

The visualizer module provides nine different chart types, each with different characteristics. You can select the type of chart desired by clicking on one of the icons on the top left bar titled “Chart type.”

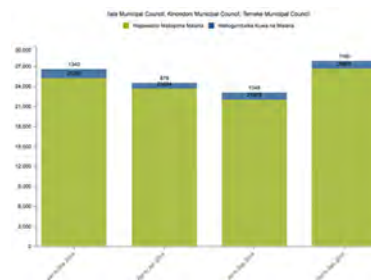
- **Column chart:** A chart that displays information as vertical rectangular columns with lengths proportional to the values they represent. This type of chart is useful for comparing the performance of different districts.

Figure 74: Column Chart



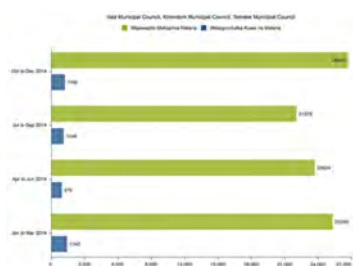
- **Stacked column chart:** A chart with vertical rectangular columns where bars representing multiple categories are stacked on top of one another. This type of chart is useful for displaying trends or sums of related data elements.

Figure 75: Stacked Column Chart



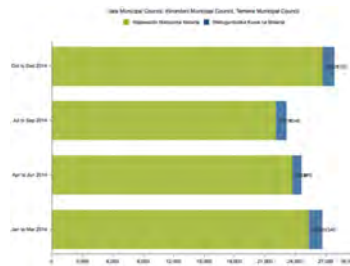
- **Bar chart:** A bar chart is similar to a column chart, except data are presented horizontally instead of vertically.

Figure 76: Bar Chart



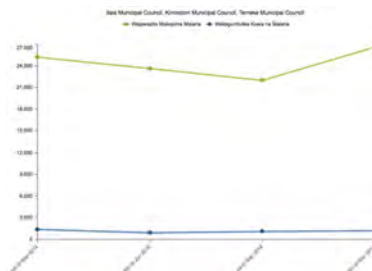
- **Stacked bar chart:** A stacked bar chart is similar to a stacked column chart, except data are presented horizontally instead of vertically.

Figure 77: Stacked Bar Chart



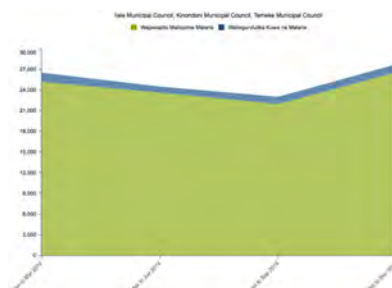
- **Line chart:** A graph that displays information as a series of points connected by straight lines. A line chart is also referred to as a time series. This type of chart is useful for showing trends in indicator data over multiple periods.

Figure 78: Line Chart



- **Area chart:** An area chart is derived from a line chart, with the space between the axis and the line filled with colours and the lines stacked on top of one another. This type of chart is useful for comparing trends of related indicators.

Figure 79: Area Chart



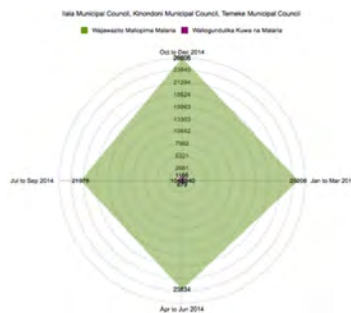
- **Pie chart:** A circular chart divided into sectors (or slices). This type of chart is useful for showing the proportion of data for individual data elements compared to the total sum of all data elements in the chart.

Figure 80: Pie Chart



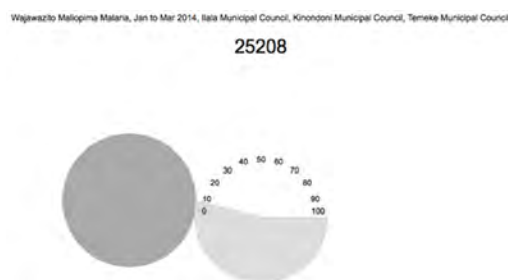
- **Radar chart:** A chart that displays multivariate data on axes that radiate from the same point. A radar chart is also known as a spider chart.

Figure 81: Radar Chart



- **Speedometer Chart:** A semi-circular chart that displays values out of 100 percent. A speedometer chart is also sometimes referred to as a gauge chart.

Figure 82: Speedometer Chart



5.2.2.3 LAYOUT

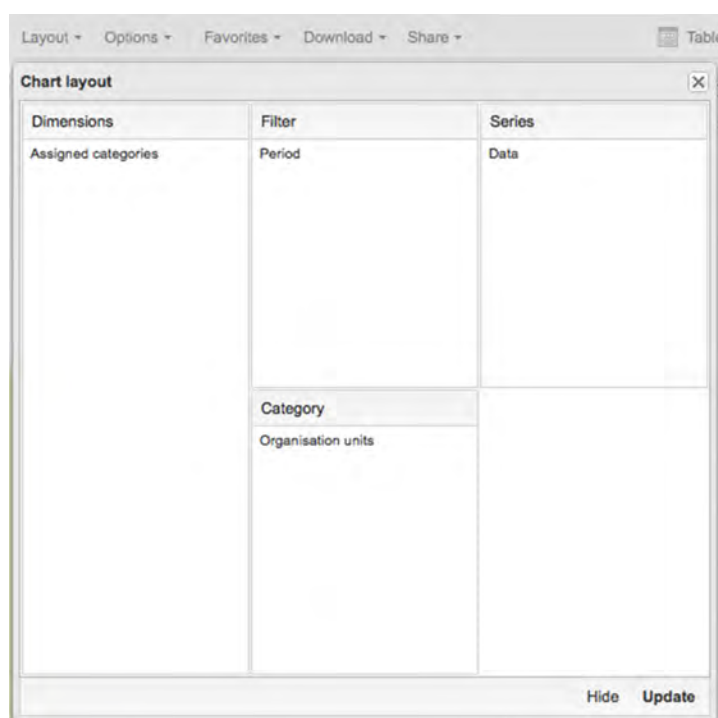
The **layout** refers to the format of the chart. You can rearrange items to change the layout. For instance, you can click on “Organisation units” and drag it to the category list in order to position the organisation unit dimension as a category in the chart. Note that indicators, data elements, and data set reporting rates are part of the common “Data” dimensions and will be displayed together in the chart. For instance, after selecting indicators and data elements in the left menu, you can drag “Data” from the available dimensions list to the series dimension list in order to arrange them as series in the chart.

“Series,” “Category,” and “Filter” can be described as follows:

- **Series:** A set of continuous, related elements (for example, periods or data elements) that you want to show in order to emphasise certain trends or relations in the data
- **Categories:** A set of elements (for example, indicators or organisation units) for which you want to compare data
- **Filter:** Because most charts are two-dimensional, a filter must be used on the third dimension in order to use only a single element for the chart to become meaningful.

For the example above, you can click on “Organisation units” and drag that item to the category list and the result will be a chart that has data for each municipal council in Dar es Salaam instead of data for each quarter of 2014.

Figure 83: Layout of the Chart



5.2.2.4 OPTIONS

Several chart options are available in the Data Visualizer module. Open the options screen by clicking on “Options” in the top menu. The following options are available:

- **Show values:** You can show the values above the series in the chart.
- **Hide empty category items:** You can hide category items with no data in the chart.
- **Show trend lines:** You can visualise how your data evolve over time. Trend lines help determine if performance is improving or deteriorating. They are useful when periods are selected as a category.
- **Target line value/title:** You can display a horizontal line at the given domain value. Target lines are useful when you want to compare your performance to the current target.
- **Baseline value/title:** You can display a horizontal line at the given domain value. Baselines are useful when you want to visualise how performance has evolved over time.
- **Sort order:** You can sort the values on your chart either from low to high or high to low.
- **Aggregation type:** You can define how the data elements or indicators will be aggregated within the chart.
- **Range axis max/min:** You can define the maximum and minimum values that will be visible on the range axis.
- **Range axis tick steps:** You can define the number of ticks that will be visible on the range axis.
- **Range axis decimals:** You can define the number of decimals that will be used for range axis values.
- **Range axis title:** You can display a label next to the range axis (also referred to as the Y axis). A range axis title can give context information about the chart: for example, the unit of measurement being used.
- **Domain axis title:** You can display a label below the domain axis (also referred to as the X axis). A domain axis title can give context information about the chart: for example, the type of periods listed.
- **Hide chart legend:** You can hide the legend to create more room for the chart itself.
- **Hide chart title:** You can hide the title of your chart.
- **Chart title:** You can type a title and it will appear above the chart.

For the example given above, check “Show trend lines” in the data options to show the trends in the data presented on the chart. Also, type the chart title “Wajawazito Wali-opimwa Malaria Dar es Salaam–2014,” while leaving all other options with the default selection, as shown in Figure 84.



5.2.2.5 FAVOURITES

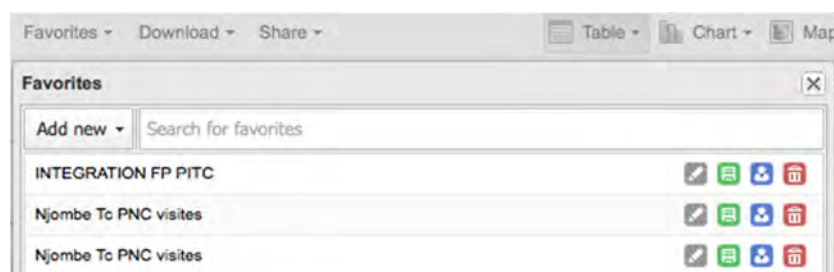
- After you have set up a chart, it may be convenient to save it as a favourite so you can easily run the chart in the future.
- To do so, click “Favorites” in the top menu; click “Add new”; give the favourite a descriptive name; and click “Create.”

Figure 86: Creating New Favourites



- You can search for favourites through the search input field at the top.
- To load an existing favourite, simply click the name of the favourite in the list.
- To rename a favourite, click the grey “Rename” icon next to the favourite in the list, change the name, and click “Update.”
- To overwrite an existing favourite with an updated chart, click the green “Overwrite” icon.
- To share a favourite with a user group, click the blue “Share” icon.
- To delete a favourite, click the red “Delete” icon.

Figure 87: Searching, Renaming, Overwriting, Sharing, and Deleting a Favourite



5.2.2.6 SHARING WITH OTHER USERS

Writing an interpretation:

For certain analysis-related resources in DHIS 2, such as pivot tables, charts, and maps, users can create and share a data interpretation with other users. An interpretation is simply a link to the relevant resource together with a text expressing some insight about the data. DHIS 2 lets you provide interpretations of a created chart and share it with other users and user groups. To write an interpretation, first save the chart you want to share as a favourite and then follow these simple steps:

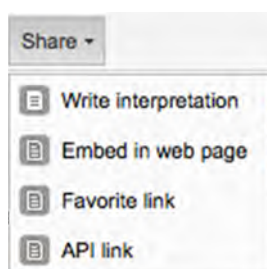
1. Open the chart from “Favorites.”
2. Click “Share.”
3. Select “Interpretation.”
4. Write a comment, question, or interpretation of the chart.

Sharing a favourites link or an application programme interface link or a tag to embed the chart in a web page:

You can provide a link to access the chart, an application programme interface link for developers, and a tag to embed the chart in a web page. To do so, follow these simple steps:

1. Open the chart from “Favorites.”
2. Click “Share.”
3. Select the action you want to take.

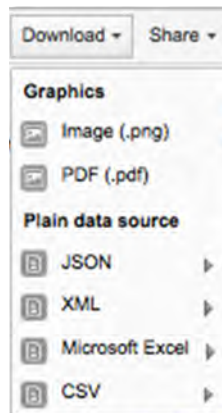
Figure 88: Sharing Links or Tags



5.2.2.7 DOWNLOADING A CHART

The download function allows you to download the chart in various formats (as shown in Figure 89) for such purposes as further analysis in Microsoft Excel and exchange of data with other systems through standard file exchange formats. To download, simply click “Download” and select the format that you need.

Figure 89: Downloading a Chart



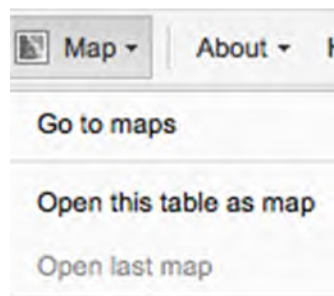
5.2.2.8 NAVIGATING TO PIVOT TABLE, MAP, AND HOME

While in the Data Visualizer module, you may also navigate to the “Pivot Table,” “Map,” and “Home” (dashboard) features through the “Table,” “Map,” and “Home” menus that are displayed at the top right corner (shown in Figure 90). You can also open the generated chart as a pivot table or map by clicking “Table” or “Map.”

Figure 90: Pivot Table Menu



Figure 91: Map Menu



Exercise 5.2.2 Using the Data Visualizer to Analyse Data

Divide into four groups:

1. Create a visualizer using a bar chart, for the following:
 - a. Family planning: HIV
 - i. Wenza katika FP waliopimwa VVU
 - ii. Wenza katika FP waliogundulika kuwa na VVU
 - iii. For 3 months of 2015 (January, May, September)
 - iv. All public facilities in a Municipal Council
 - b. Show values on the chart
 - c. Show the trend line
 - d. Show base value (10) and target value (100)
 - e. Label your axes accordingly
 - f. Give the bar chart a heading of your choice
 - g. Save it as a favourite
 - h. Download the chart as a PDF with name format and save it
2. Create a visualizer using a line graph for the following:
 - a. ANC
 - ii. Hudhurio la kwanza chini ya wiki 12
 - iii. Hudhurio la kwanza ANC Ujauzito wiki 12 au zaidi
 - iv. For all quarters of 2015
 - v. For all hospitals under a municipal council
 - b. Label your axes accordingly
 - c. Give the line graph a heading of your choice
 - d. Save it as a favourite
 - e. Download the graph as an image and save it

5.2.3 GEOGRAPHIC INFORMATION SYSTEM

5.2.3.0 INTRODUCTION

A geographic information system (GIS) captures, stores, manipulates, analyses, manages, and presents all types of geographic and geospatial data. GIS can be applied in modeling of HMIS reports, associating service statistics and disease outcomes with geospatial and other geographic information. In DHIS 2, the GIS module is used to merge data elements, indicators, and statistical reports with geographic/geospatial data for facility, district, and regional locations for the purpose of presenting the resulting information on maps.

The GIS module in DHIS 2 can be used to analyse data to:

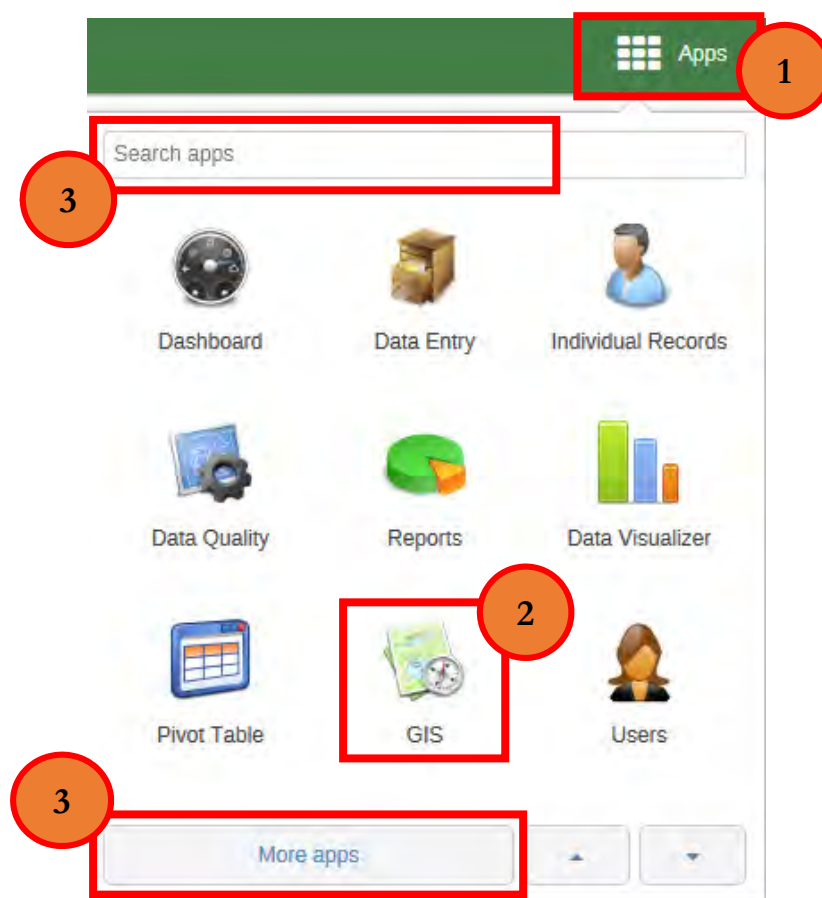
- Visualise distributions of:
 - Health facilities per district/region/nation
 - Health workers per facility/district/region/nation
 - Disease occurrence and outbreaks per region/district/ward
- Show breakdowns of health facilities per region or district based on:
 - Ownership (government, private parastatals, FBOs, and so forth)
 - Types (hospitals, dispensaries, health centres, and clinics)
 - Geographic barriers and health inequalities
- Visualise periodic reporting of disease occurrence:
 - Monthly
 - Quarterly
 - Semi-annually
 - Annually
- Identify geographic barriers and health inequalities

5.2.3.1 ACCESSING THE GIS

To open the GIS module, do the following:

1. Click on the “Apps” menu: A drop-down menu will appear listing the apps in DHIS 2.
2. Look for “GIS” in the list and click to open it.
3. If it is not on the list, start typing **GIS** to search for the app or click “More apps” to show all apps. GIS should appear now, and you can click on it to open it.

Figure 92: DHIS 2 Apps



The GIS interface has three main components:

1. Layer Overview

- In the top right corner, there is a panel called “Layer stack/opacity.” If you are online, you will see “Google Streets,” “Google Hybrid,” and “Open Street Map” at the bottom of this panel. These can be used as background maps or layers.
- Switch between the three of them by checking the checkbox. By unchecking the box, you can hide the background completely.
- If you want to see the background with reduced opacity, you can set the visibility to something lower than 100 percent in the “Number” box to the right.
- The four thematic layers are the vector layers, which you can use for thematic mapping.
- “Event,” “Facility,” and “Boundary Layers” are the vector layers for events, facilities, and boundary mapping.
- The panels below hold the map legends when you create a thematic map. A legend explains the link between values and colours on your map.

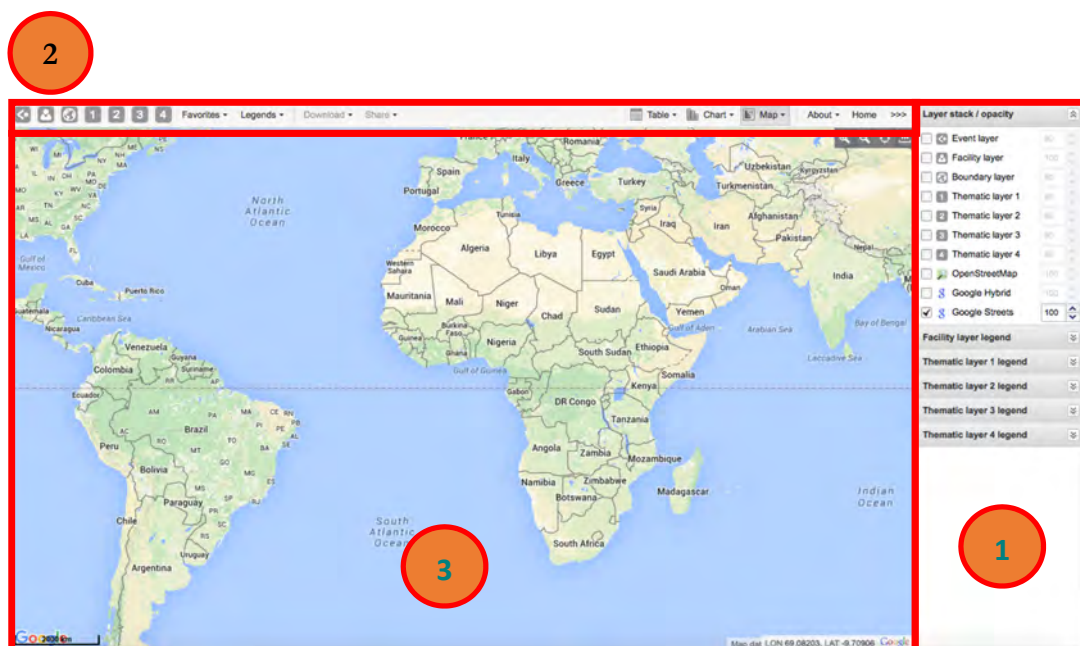
2. Map Toolbar

- The first three icons from the left represent the “Event,” “Facility,” and “Boundary” layers, which you can use to set events, facilities, and boundary layers.
- The next four icons (“1,” “2,” “3,” and “4”) from the left represent the vector layers, which are the starting point of the GIS application.
- Further to the right, there is “Favorites.” Use this feature to save your maps for use later. Saving a map as a favourite also gives you the opportunity to share it with other users as an interpretation or to put it directly on the dashboard.
- “Legend”: Create your own legend sets to ensure meaningful maps.
- “Download”: Export the maps as PNG images.
- “Share”: Share your favourites as map interpretations with other users.

3. Map View

- On the top right corner of the map view port, you will find four buttons: “Zoom in,” “Zoom out,” “Zoom to visible extent” (automatically adjusts the zoom level and map centre position to put the data on your map in focus), and “Measure distances.”
- The current longitude and latitude position of the mouse cursor is displayed in the bottom right corner of the map view port.

Figure 93: GIS Interface Main Components



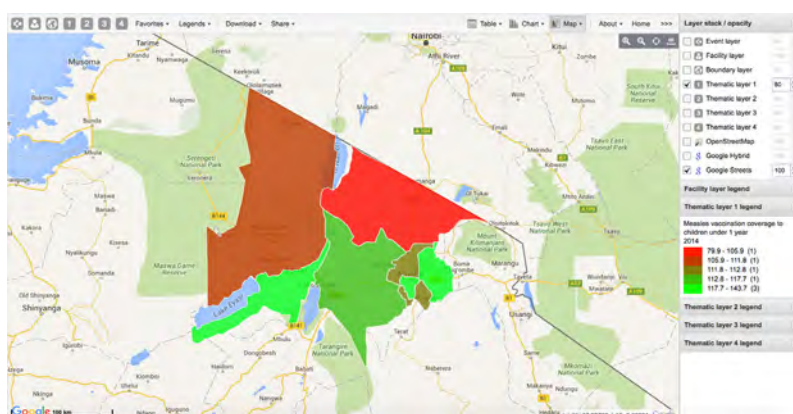
Note: The selection components address the three basic questions “what, when, and where,” and the viewing component displays different views.

5.2.3.2 CREATING A MAP

We will use the following example to demonstrate how to create a map using the GIS module:

Create a map of Arusha Region showing measles vaccination coverage of children under one year of age. Use the default legend to show the coverage per district for the region for the year 2014.

Figure 94: Example of a Map



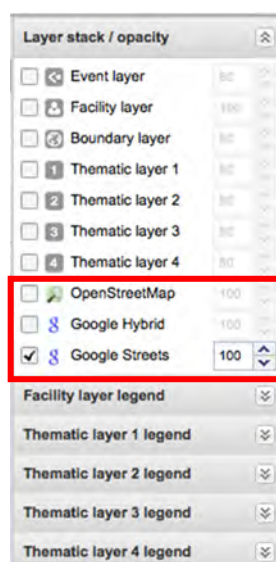
Selecting Background Maps/Layers

If you are online, you can select one of the following to get background maps or layers:

- Google Streets (the default)
- Google Hybrid
- Open Street Map

If you want to see the background with reduced opacity, you can set the visibility (in the number box to the right) to something less than 100 percent.

Figure 95: Selecting Background Maps/Layers

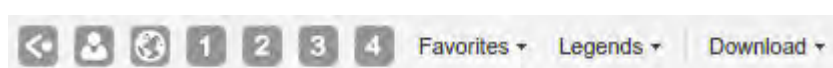


5.2.3.3 EDITING LAYERS

In the GIS module, there are several layers—event layer, facility layer, boundary layer, and thematic layer—that must be selected in order to perform data analysis. The basic ones are the boundary layer, which specifies the geographic boundary of the given selection (in other words the “where” dimension), and the thematic layer, which specifies the data dimensions that you want to present on the map (in other words, the “what” and “when” dimensions). Depending on the type of map you would prefer for your analysis, the facility layer and the event layer are available to specify the level of data to be used as dimensions for your map. To select any layer, tick the box with the name of that layer in the “Layer stack/opacity” panel shown in Figure 95.

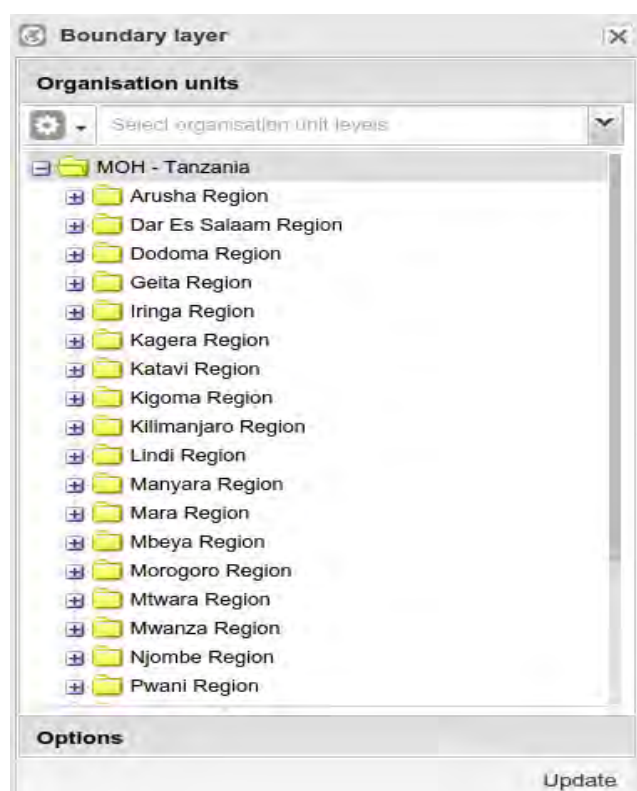
The top-left panel menu is where you will specify actual dimensions and format the presentation of the map using legends, labels, and so forth.

Figure 96: Map Toolbar



This bar presents several options. After ticking in the panel on the right the type of layer you want, you must then select the corresponding data dimension. Next, click “Update” to view the map. On the same bar you will also find defined legend options, as well as options to save your map as a favourite or download it as an image.

Figure 97: Boundary Layer



The boundary layer allows users to specify the geographic boundary for the required map for analysis. The boundary of a map may be a district, region, or nation.

Figure 98: Thematic Layer

The screenshot shows a window titled "Thematic layer 1" with a close button (X). It contains several sections: "Data and periods" with fields for "Value type:" (set to "Indicator"), "Indicator group:", "Indicator:", "Period type:" (with left and right arrow buttons), and "Period:". Below these are three tabs: "Organisation units", "Legend", and "Options". At the bottom right is an "Update" button.

The thematic layer allows users to define the “what” and “when” parts of the data dimensions to be analysed. The “what” part consists of the data elements, indicators, and reporting rates. The “when” part consists of options for periods such as months, quarters, or years.

Figure 99: Facility Layer

The screenshot shows a window titled "Facility layer" with a close button (X). It contains a section "Organisation unit group icons" with a "Group set:" dropdown menu currently showing "Organisation unit group set". Below this is a large empty list area. At the bottom are two tabs: "Organisation units" and "Options". At the bottom right is an "Update" button.

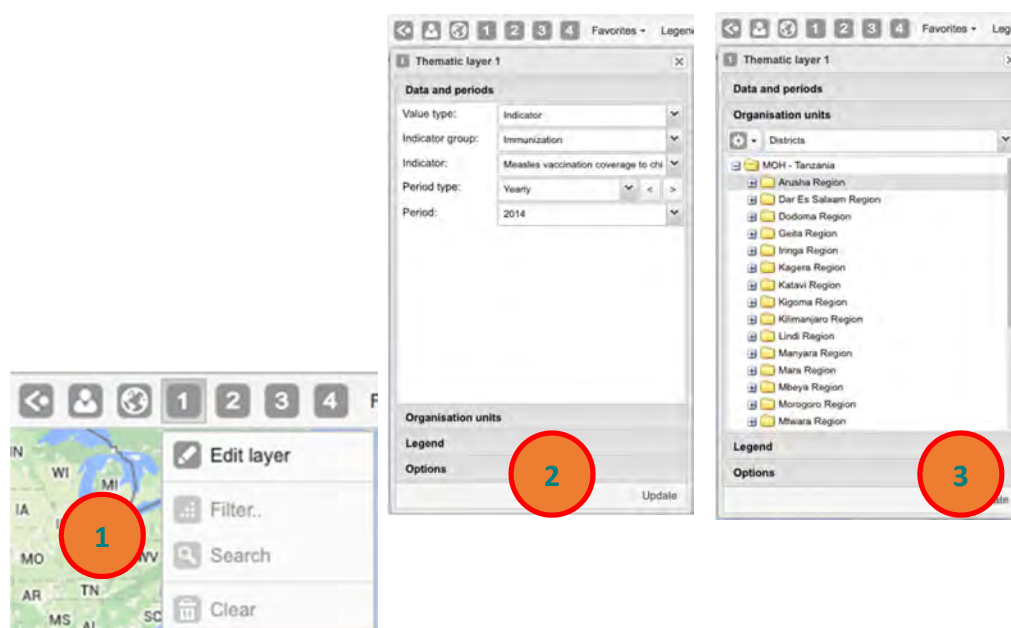
The facility layer allows users to define the set of facilities to be analysed or viewed (by type or ownership). It also allows selection of the geographic unit of analysis—districts, regions, and so forth.

For the task described in 5.3.3.2, we will use “Thematic layer 1” to present the data on the map by following the steps below:

1. Select a layer from the toolbar; then edit the layer (in this case, “Thematic layer 1”).
2. Select “Data” (“Indicator,” “Data Element,” or “Reporting Rate”) and “Period.”
 - Select the value type (in this case, “Indicator”).
 - Select the group or data set appropriate to the selected value type (in this case, “Immunisation”).
 - Select the “Indicator” or “Data Element,” depending on the selected value type (in this case, the indicator “Measles vaccination coverage to children under 1 year”).
 - Select the “Period type” (in this case, “Yearly”).
 - Select “Period” based on the selected period type (in this case, “2014”).
3. Select “Organisation units.”
 - Select selection mode (in this case, “Select levels”).
 - Select the appropriate level for the selection mode (in this case, “Districts”).
 - Select the organisation unit or units you want from the “Organisation units” tree (in this case, “Arusha Region”).

You may skip “Legends” and “Options” and click “Update.” By doing so, the default legend will be used and the thematic layer will have no label. The map shown in Figure 102 will be presented.

Figure 100: Editing Thematic Layers



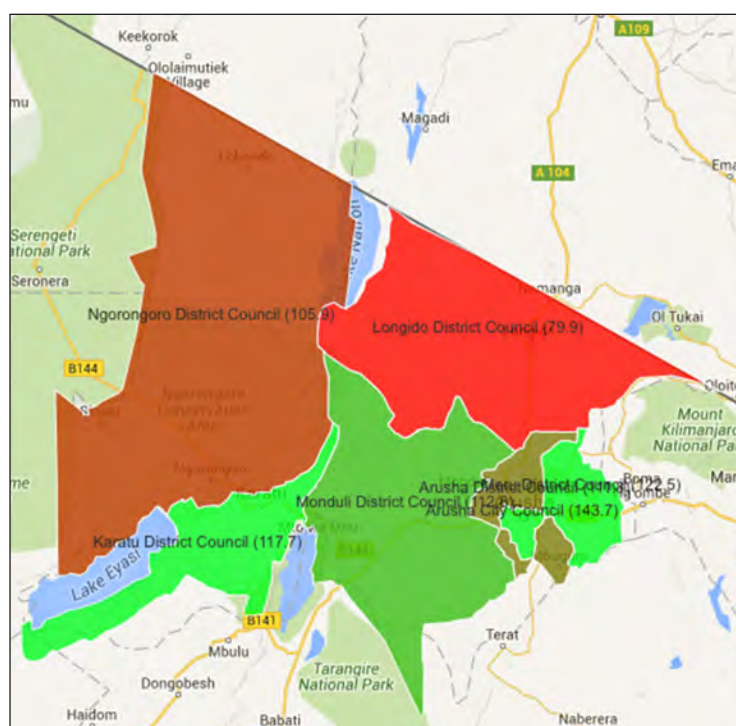
5.2.3.4 SETTING LABELS

1. Select the thematic layer you wish from the toolbar (for the task at hand, select “Thematic layer 1”); then edit the layer.
2. Select “Options.”
3. Check “Show labels.”
4. You may set the font size and colour, and whether you want boldface or italics.

Figure 101: Setting the Label for the Map



Figure 102: An Example of a Map with District and Indicator Value Labels

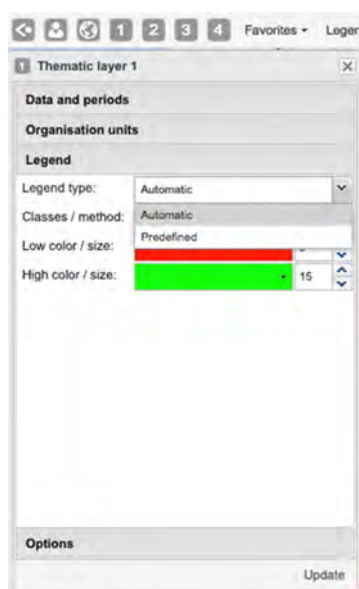


5.2.3.5 EDITING AUTOMATIC LEGENDS

You can customise an automatic legend, if necessary. To do so, follow these steps:

1. Select the desired thematic layer from the toolbar (for the given example, select “Thematic layer 1”); then edit the layer.
2. Select “Legend.”
3. Select “Automatic” from “Legend type.”
4. Select the “Classes” you need and set the “Low color” and the “High color.”
5. Click “Update.”

Figure 103: Editing Automatic Legends



5.2.3.6 CREATING PREDEFINED LEGEND SETS

You can select an existing “Predefined” legend, as well, but this first needs to be created. To create a predefined legend, follow these steps:

1. Click “Legend” on the map toolbar.
2. To create a new set, click “Add new.”
3. First, give the “Legend set” a name: in this case, “Vaccination coverage.”
4. Create the legends you want in your legend set.
 - The first one could be “Low bad” (name), 0 (start value), 50 (end value), red (color). Click “Add legend” and the new one should appear in the list.
 - Then create “Medium”/50/80/yellow, “High good”/80/100/green, and finally “Too high”/100/10000/grey.
 - Now, click “Create” in the bottom right corner.

Note: If your legend set has overlapping legends (for example, 0–50 and 40–80), you will not be allowed to proceed. If your legend set has a gap between the legends (for example, 0–50 and 60–80), you will get a warning, but will be allowed to proceed.

Figure 104: Predefined Legend Sets

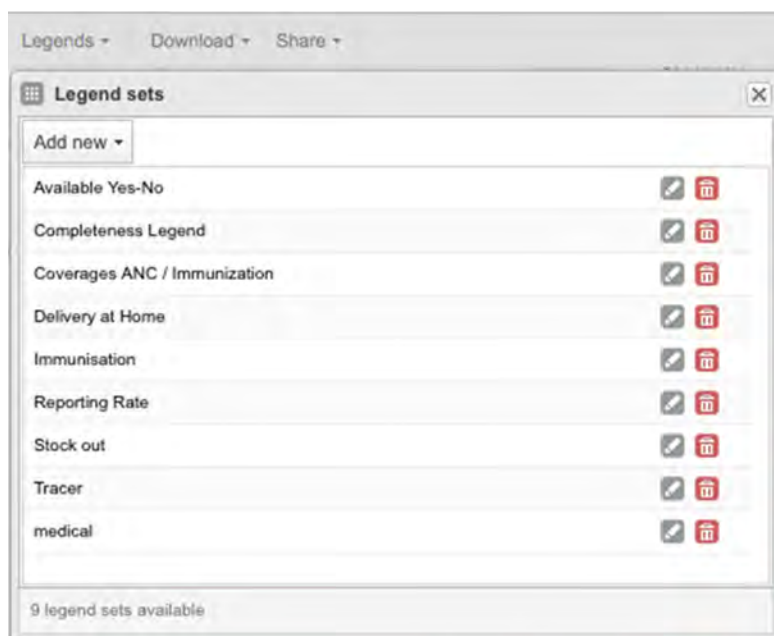
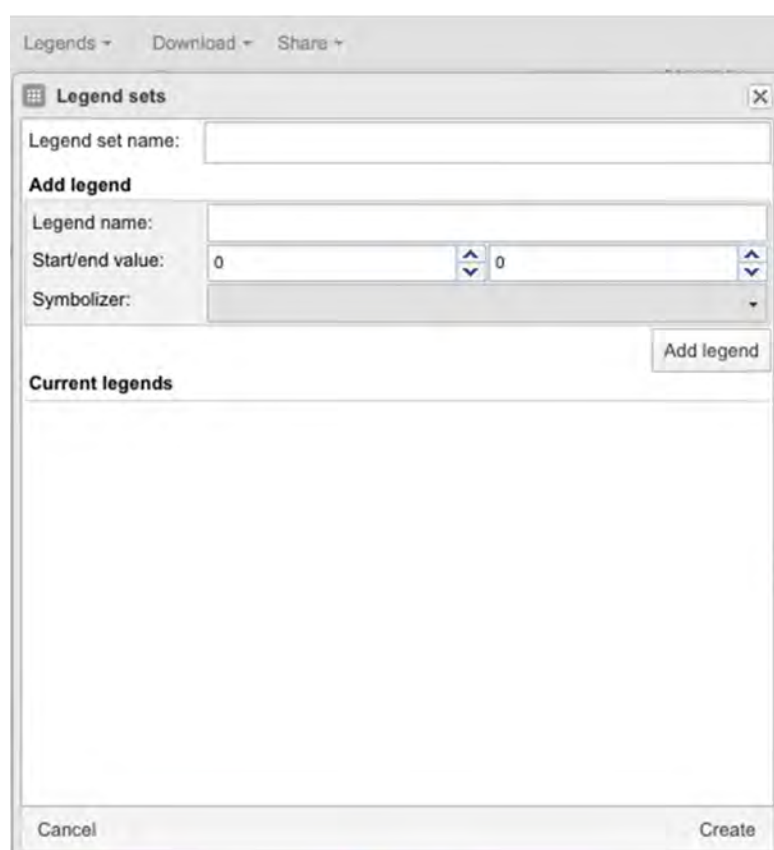


Figure 105: Creating a New Predefined Legend Set



5.2.3.7 FAVOURITES

- After you have set up a map, it may be convenient to save it as a favourite so you can easily run the map in the future.
- To do so, click “Favorites” in the top menu; click “Add new”; give the favourite a descriptive name; and click “Create.”

Figure 106: Creating New Favourites



- You can search for favourites through the search input field at the top.
- To load an existing favourite, simply click the name of the favourite in the list.
- To rename a favourite, click the grey “Rename” icon next to the favourite in the list, change the name, and click “Update.”
- To overwrite an existing favourite with an updated map, click the green “Overwrite” icon.
- To share a favourite with a user group, click the blue “Share” icon.
- To delete a favourite, click the red “Delete” icon.

Figure 107: Searching, Renaming, Overwriting, Sharing, and Deleting a Favourite



5.2.3.8 ADDING A MAP TO THE DASHBOARD

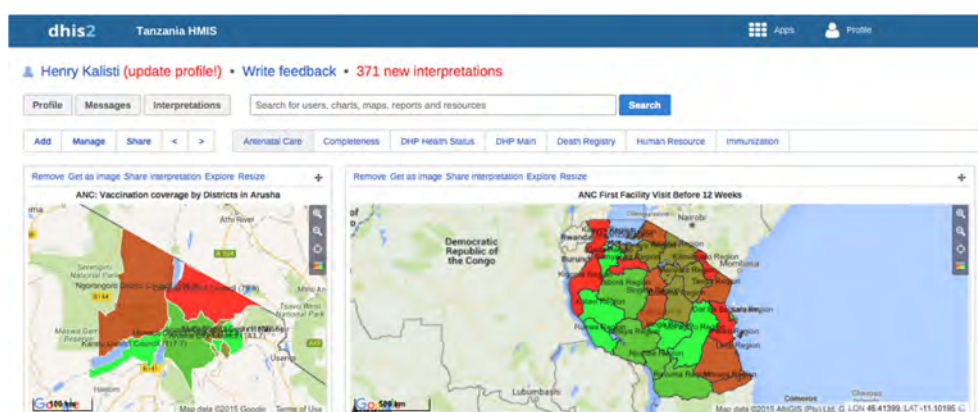
Dashboards allow users to quickly display and access data stored in DHIS 2. To display a map on the dashboard, after saving the map, go to the “Home” screen and take the following steps:

1. Select “Dashboard.”
2. Type the map’s name in the “Search for favorites” window.
3. Click “Add.”

After adding a map to the dashboard, you can do the following:

- Drag and drop to reposition the map on the dashboard.
- Click “Resize” to change the size of the map.
- Click “Explore” to go to the GIS module to customize the map.
- Click “Share interpretation” to write a comment about the map.
- Click “Remove” to delete the map from the dashboard.

Figure 108: Displaying a Map on the Dashboard



5.2.3.9 SHARING A DATA INTERPRETATION WITH OTHER USERS

Write an interpretation:

For certain analysis-related resources in DHIS 2, such as pivot tables, charts, and maps, users can create and share a data interpretation with other users. An interpretation is simply a link to the relevant resource together with a text expressing some insight about the data. DHIS 2 enables users to provide interpretations of a map and share them with other users and user groups. To write an interpretation, first save the map you want to share as a favourite, and then follow these steps:

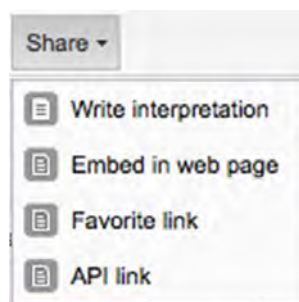
1. Open the map from “Favorites.”
2. Click “Share.”
3. Select “Interpretation.”
4. Write a comment, question, or interpretation related to the map.

Sharing a favourite or application program interface link and embedding it in the web page:

To create a link to access the map, an application program interface link for developers, or a tag to embed the map on a web page, follow these steps:

1. Open the map from “Favorites.”
2. Click “Share.”
3. Select the appropriate action.

Figure 109: Sharing a Link or Tag

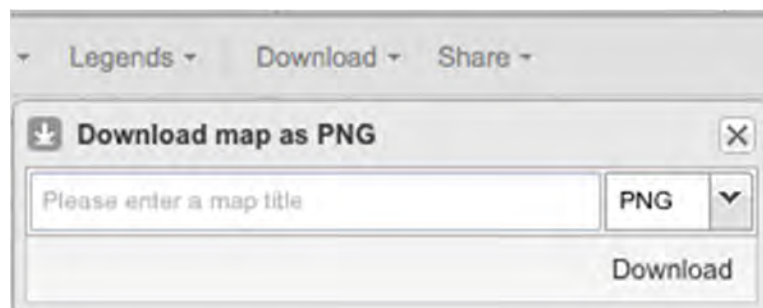


5.2.3.10 DOWNLOADING A MAP

The download function allows a user to download the map as a picture (PNG) or in PDF format. To download, follow these steps:

1. Click “Download.”
2. Enter a map title.
3. Select the format you want (PNG or PDF).
4. Click “Download.”

Figure 110: Downloading a Map



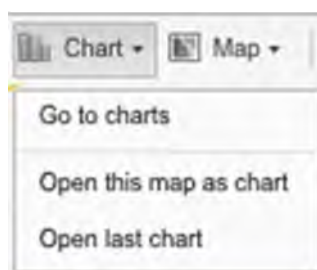
5.2.3.11 NAVIGATING TO CHART, PIVOT TABLE, AND HOME

While in the GIS module, you may also navigate to the Data Visualizer and Pivot Table modules and to the home screen (the dashboard) through the “Chart,” “Table,” and “Home” menus displayed at the top right corner (as shown in Figure 111). You can also open the generated map as a chart or pivot table by clicking “Chart” or “Table.”

Figure 111: Table Menu



Figure 112: Chart Menu



Exercise 5.2.3 Using the GIS Module to Analyse Data

Part 1:

Create a map of a region showing the following:

1. Immunisation: measles vaccination coverage of children under one year of age. (Use the default legend to show the coverage per district for the region for the year 2015.)
2. Display labels for the district and indicator values.
3. Save as a favourite.
4. Download the file as pdf.

Part 2:

1. Using the facility layer, present a list of all facilities by organization unit, type, group, and set for the entire region.
2. Assuming the catchment area for each facility is 1,000 meters, show the circular area with radius in meters.
3. Using the boundaries layer, display boundaries of districts in the region so the facilities can clearly be seen where they belong in districts.
4. Save as a favourite.
5. Download it as a PNG

Part 3:

Mention one reason for the use of each of the layers below in GIS:

1. Facility layer
2. Boundary layer
3. Thematic layers 1, 2, 3, and 4

Session 3: Data Use Overview

5.3.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Understand the value of data-informed decision making
- Understand the context of decision making
- Understand the importance of sharing information and providing feedback

5.3.1 CONTEXT

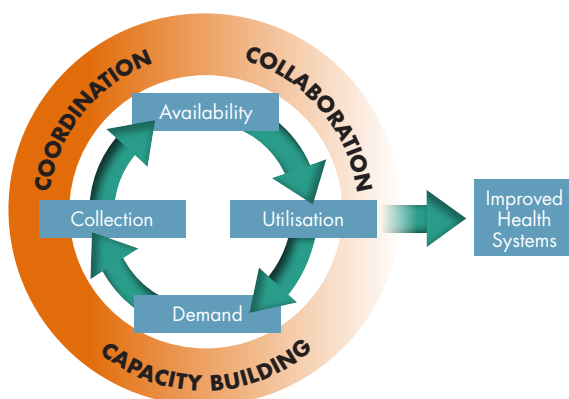
- It is important for governments to make the best use of their limited resources to have the highest impact on improving public health. The need to develop strategies, policies, and interventions that are based on quality data and information is urgent.
- Data requirements from government and donors have grown exponentially, to the point where some providers and implementing partners have pages and pages of forms to fill out daily.
- Rarely are data used sufficiently to monitor programs and make decisions beyond individual patient care. This is a huge lost opportunity, because data are critical to the program improvement and decision making process.

5.3.2 WHAT IS DATA USE?

Data use is the act of using and reviewing data in a specific decision making process. Some examples of decision making processes where data can (and should) be used are:

- Creating or revising a program or strategic plan
- Developing or revising a policy
- Providing advocacy for a policy or program
- Allocating resources
- Monitoring a program

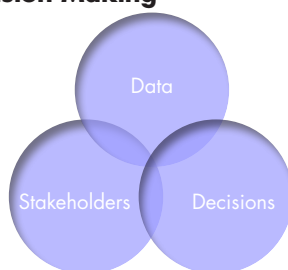
Figure 113: The Cycle of Data Demand and Use



The cycle is grounded in the assumption that the more positive experiences a decision maker has in using information to support a decision, the stronger the decision maker's commitment will be to improving data collection systems and continuing to use the information they generate.

5.3.3 THE CONTEXT OF DECISION MAKING

Figure 114: The Elements of Decision Making



To make a decision, three elements are critical:

1. Data
2. Decisions
3. The involvement of stakeholders

Stakeholders

- A **stakeholder** is anyone who has a stake—that is, an interest of some sort—in your program. We often think of government agencies, policymakers, funding agencies, and even implementers or providers as stakeholders.
- Stakeholders often fall into two groups: data users and data producers.

Decisions

There are four main types of decision areas in the health sector. They pertain to:

- Program design and evaluation
- Program management and improvement
- Strategic planning
- Advocacy and policy development

Program Design and Evaluation

- **Design:** Select messages for prevention campaigns.
- **Evaluation:** Determine if new program approaches are needed to ensure that health impact objectives are met.

Program Management and Improvement

- **Management:** Determine if the program is meeting its process objectives.
- **Improvement:** Develop new strategies to increase coverage.

Strategic Planning

- Identify areas of greatest need—geographic locations, marginalized populations, and gender disparities, for example.
- Determine human resource allocation.
- Determine which services of those offered have the greatest impact.

Advocacy and Policy Development

- Identify and quantify underserved populations.
- Identify focus areas for new policies.

Data

The point of this training is collecting, analysing, and using data. These topics are covered extensively in other modules and sessions.

Table 5. Action Plan for Addressing Barriers to Data Use

Barrier	Intervention	Steps involved	Person responsible	Other stakeholders	General timeline

Table 5 is an action plan to address barriers to data use. As you can see, first the barrier is described and then the proposed intervention. The plan then breaks out the steps involved, as well as the person responsible for each step and a timeline for completion. To be successful, an action plan should be developed and sanctioned by those who will implement it.

5.3.4 SHARING INFORMATION AND PROVIDING FEEDBACK

- Often when data are analysed, the information is not shared with stakeholders who need it for decision making.
- Feedback ensures that those who collect the data benefit from the collection as much as those requesting the data.
- Exchanges of data between data collectors and data users also help to pave a path between data collectors and users at all levels of the health system.

Examples of Feedback

- Sharing information within a facility or organisation
- Sharing aggregated service provision data from facilities within a district or between provinces
- Meetings of a facility and its supervising agency to review and discuss information
- Meetings of donors and nongovernmental organisations to review information and discuss challenges and opportunities
- Sharing information related to disease burdens or to gender differences among those who receive services

Session 4: Data Interpretation and Communication

5.4.0 SESSION OBJECTIVES

By the end of the session, participants will:

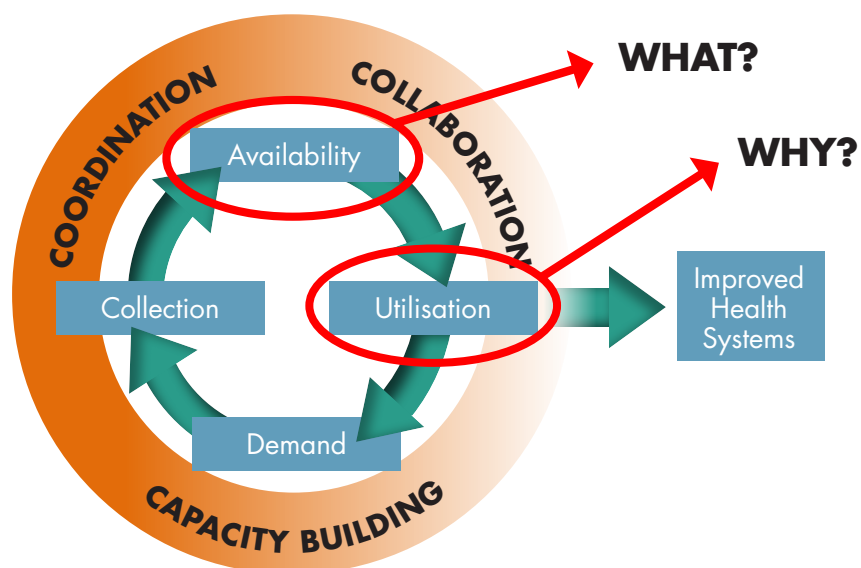
- Be able to interpret data
- Be able to use results to develop and improve programs
- Be able to devise a communication strategy
- Be able to develop communication products

5.4.1 DATA INTERPRETATION

In the data interpretation process, we move from defining **what** is happening to determining **why** it is happening, in order to determine the following:

- Relevance
- Implications
- Next steps

Figure 115: The Data Interpretation Process



5.4.2 THREE STAGES OF DATA INTERPRETATION

Stage 1: Question

- Is our program meeting its objectives?

Stage 2: Analysis

- How do my program targets compare with actual program performance?

Stage 3: Interpretation

- Why have we (or have we not) achieved the target?
- What does this mean for our programs?

5.4.3 PROCESS OF INTERPRETATION

Figure 116: The Process of Interpretation



Understand the Relevance of the Findings

- Does performance of the indicator meet the target?
- How far from the target is it?
- How does current performance compare to that of other facilities? Regions? Years?
- Are there any extreme highs or lows in the data?
- Are there any other patterns or trends?
 - Are there differences between men and women, or between subpopulations?
- Why have we or have we not achieved the target?
- What do the results mean for our program?

Seek Reasons for the Findings

- Seek additional information to confirm your findings.
- Put your findings in the context of the program.
 - Are healthcare workers fully recording data?
 - Have we collected data from all service delivery sites?

- Are targeted communities aware of the services?
- Do all groups have access to and feel welcome at the service points? (For example, are any groups discriminated against, or lacking transportation or autonomy to attend the clinic?)

Consider Other Data

- Look at other program indicator findings.
- Go from the **what** to the **why**.

Conduct Further Research

There may be gaps in the data you have considered. Conduct further research if that is warranted.

5.4.4 GROUP ACTIVITY: REPRODUCTIVE, MATERNAL, NEWBORN, AND CHILD HEALTH SCORECARDS

1. Create a pivot table for your district with the **district average** of each reproductive, newborn, maternal, and child health indicator.
2. Select **one indicator** for detailed interpretation. Explain why you picked that indicator.
3. Create a **column chart** showing that indicator's performance across all health facilities in a district from January–June 2015.
4. Select **one facility** that is not meeting targets. Choose **one target** to focus on.
5. Create a **line chart** showing that indicator's performance, by sex if possible (January–June 2015)
6. Go through the data interpretation process described earlier. What is the target? What is the performance? Why has the facility not achieved the target? What other data can you consider? What further research can you conduct? How can you help the facility meet its targets?

5.4.5 THE SIX ELEMENTS OF AN EFFECTIVE COMMUNICATIONS STRATEGY

1. Set communication objectives.
2. Identify the audience you want to reach.
3. Develop a message.
4. Select a communication channel.
5. Consider advantages and challenges.
6. Assess information use.

1. Set Communication Objectives

- What do you want your audience to do with the information?
- Clearly state your message and recommendations.
 - What are the data saying?
 - What actions would you like to see happen?
- The objectives need to be **achievable** and **measurable**.

2. Identify the Audience

- Analyse stakeholders and identify whom you need to reach with your messages.

3. Develop the Message

- Develop a message for the policymaker.
- Adapt your message for beneficiaries.

4. Identify Communication Channels

- Research the policymaker's past activities.
- Network and develop relationships.
- Understand the policymaker's preferred method of communication.
- Seek media attention to rally public support.
- Understand what your opponents' arguments are.

5. Assess the Effects of Communication Efforts

- Did the audience you wanted to reach see and understand the message?
- Did they understand that you based the message on data?
- Did they act on the recommendation?
- Have they evaluated the impacts of the action?
- Has the program's status changed?

5.4.6 COMMUNICATION PRODUCTS: ONE-PAGE DATA SUMMARY REPORT

A one-page data summary report is a concise way to interpret data, communicate the results of the interpretation, discuss the implications for the data, and develop recommendations.

Include the following information in a data summary report:

- Program
- Strategic objective(s) of the program
- Performance indicators
- Baseline for each indicator
- Target for each indicator

Much of this information can be presented and discussed by sex, if appropriate. If analyses revealed differences in sex, be sure to include this when discussing baselines, targets, variance, and implications.

- Actual performance for each indicator
- Variance for each indicator
- Reason for variance for each indicator
- Implications for program performance
- Recommendations

5.4.7 COMMUNICATION PRODUCTS: ELEVATOR SPEECH

An elevator speech is a brief, to-the-point speech that is meant to be given in the time it takes to ride in the elevator with someone. Elevator speeches should be definitive and avoid technical jargon. They should also anticipate opposition with prepared responses.

Elements of an elevator speech:

- Introduce yourself and your organisation.
- State the topic and why it is important.
- Ask for support.
- Present three to four facts.
 - Play to the heart.
 - Show how the efforts will save money and lives.
- Thank the listener.
- Explain how you will follow up with the listener.

Session 5: Sustaining a Data Use Culture

5.5.0 SESSION OBJECTIVES

By the end of the session, participants will:

- Be able to define culture & culture of information use
- Be able to describe key elements of data use culture
- Be able to describe the factors affecting culture of information use
- Be able to develop an action plan to sustain a culture of information use

5.5.1 INTRODUCTION TO CULTURE AND A CULTURE OF INFORMATION USE

The goal of this session is to familiarise health workers at different levels with the meaning of “data culture” and “culture of information use” as key elements of a health management information system at all levels. Health workers are responsible for sustaining, supporting, and upholding the use of health data to improve the quality of health services.

5.5.2 WHAT IS CULTURE?

The word *culture* can be defined in the following ways:

- How things are done when nobody is looking
- The ideas, customs, and social behaviour of a particular people or society
- The characteristics and knowledge that a group of people express in their language, religion, cuisine, social habits, music, and arts

5.5.3 WHAT IS A CULTURE OF INFORMATION USE?

A culture of information use can be realized when an organisation believes in continuous improvement and uses data routinely for that purpose. RHMTs and CHMTs that have strong data cultures emphasise collaboration as the keystone of their success. Empowering health facility staff and other health workers to make data-informed decisions for which they will be held accountable helps to sustain that facility's culture of information use.

5.5.4 WHAT ARE THE KEY ELEMENTS OF A DATA USE CULTURE?

Data use culture rests on the following elements:

- Commitment
- Vision
- Beliefs
- Accountability
- Collaboration
- Modelling

5.5.5 FACTORS INFLUENCING A CULTURE OF INFORMATION USE

A number of factors influence information use, and they can be categorized as individual and nonindividual factors.

5.5.5.0 INDIVIDUAL FACTORS

- Commitment
- Dedication
- Attitudes
- Faith

5.5.5.1 NONINDIVIDUAL FACTORS

- Environment
- Colleagues
- Organisational norms
- Policy and discipline

5.5.6 TEAM ACTIONS THAT AFFECT A CULTURE OF INFORMATION USE

The culture of information use is affected by team or group actions, such as:

- Regular data reviews, forums for data use, and dissemination by region and district
- Exchange visits among facilities at different levels for data use
- Identification of DDU champions
- Quarterly data summaries from the councils/regions
- Documentation and communication of data use successes: for example, program and policy decisions clearly linked to analysis of HMIS data

5.5.7 CREATING A DATA DEMAND AND USE ACTION PLAN

When developing a DDU action plan, you need to identify the following:

- Challenges
- Actions to address these challenges
- The people responsible for taking these actions
- The time frame for taking these actions
- The resources needed to accomplish these actions

Finally, you will have to monitor the results to see whether the actions are implemented in accord with the plan.

Table 6: District DDU Action Plan Matrix

Name of the District: _____

S/No	Challenge	Action	Person Responsible	Time Frame	Resources



APPENDIX: Health Sector Strategic Plan: July 2015–June 2020 (HSSP IV) Indicators

Source: Tanzania Ministry of Health and Social Welfare (MOHSW). (2015). Health sector strategic plan: July 2015–June 2020 (HSSP IV). Dar es Salaam, Tanzania: MOHSW.

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Health Status											
Mortality											
Neonatal mortality rate	The number of deaths during the first 28 completed days of life per 1,000 live births in a given year or other period	Number of children who die within the first 28 completed days of life	Number of live births ÷ 1,000	26 (TDHS 2010)	16	TDHS Census	TDHS, census intervals	Impact	res sex wea edu	BRN RMNCAH	SDG GRL100
Infant mortality rate	The number of infants who die before completing the first year of life per 1,000 live births in a given year or other period	Number of deaths within the first year of life.	Number of live births ÷ 1,000	45 (Census 2012)	35	TDHS Census SPD SAVVY	TDHS, census intervals SAVVY (annual)	Impact	res sex wea edu		MDG GRL100
Under-five mortality rate	The number of children who die within the first five years of life per 1,000 live births in a given year or other period.	Number of deaths within the first five years of life.	Number of live births ÷ 1000	81 (TDHS 2010)	55	TDHS Census SAVVY	TDHS, census intervals SAVVY (annual)	Impact	res sex wea edu	RMNCAH	MDG SDG GRL100

Target not adjusted to reflect projected funding.

Sources:

SAVVY = Sample Vital registration with Verbal autopsY

SPD = Sentinel Panel of Districts

TDHS = Tanzania Demographic and Health Survey

THMIS = Tanzania HIV & Malaria Information Survey

Disaggregation Categories

brn = BRN implementation

edu = educational level of mother or patient/client

rbf = results-based finance

res = residence: health facility, district, region, zone, urban/rural

sex = female/male

star = star rating

wea = wealth quintile

Used in National Monitoring Procedures

NACP SP = National AIDS Control Program Strategic Plan

NMCP SP = National Malaria Control Program Strategic Plan

NTLCP = National Tuberculosis & Leprosy Control Program

Nut TWG = Nutrition Technical Working Group

PAF = partnership agreement framework

PER = performance expenditure review

RMNCAH = RMNCAH One Plan II

Used in International Monitoring Procedures

GRL100 = Global Reference List (100 indicators)

MDG = Millennium Development Goals

SDG = Sustainable Development Goals

UHC = Universal Health Coverage

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Maternal mortality ratio	<p>The number of women who die of causes related to pregnancy or delivery per 100 000 live births in a given year or other period.</p> <p><i>Causes of maternal death:</i> any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy</p>	Number of female deaths from any cause of maternal death	Number of live births x 100,000	432 (Census 2012)	292	TDHS Census SAVVY (CoD)	TDHS, census interval SAVVY (annual)	Impact	res wea edu	BRN RMNCAH	MDG SDG GRL100
Life expectancy at birth	The average number of years that a newborn could expect to live, if he or she were to pass through life exposed to the sex- and age-specific death rates prevailing at the time of his or her birth, for a specific year, in a given country, territory, or geographic area (Calculated from life tables)			61 F: 63 y M: 60 y (Census 2012)	Trend	census	census interval	Impact	res sex wea edu	Vision 2025	SDG GRL100

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Fertility											
Total fertility rate	The average number of children a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the fertility rates of a given period and if they were not subject to mortality (expressed as number of children per woman)	Sum of age-specific fertility rates for age groups within the 15–49 year-olds age group		5.2 (Census 2012)	Trend	TDHS census SAVVY	TDHS interval census interval SAVVY (annual)	Impact	res wea edu		GRL100
Service delivery											
Reproductive Health											
Contraceptive prevalence rate (modern methods)	<i>Survey:</i> Percentage of women ages 15–49 years who are currently using, or whose sexual partner is using, at least one modern method of contraception, regardless of the method used <i>HMIS:</i> The percentage of women ages 15–49, regardless of marital status, who have received at least one modern method of contraception from a health facility during the year, regardless of the method used	Number of active modern contraceptive users x 100	Number of women ages 15–49 <i>Survey:</i> women surveyed <i>HMIS:</i> women in catchment area	All methods: 36% Modern methods: 27.4% (TDHS 2010) 48% (HMIS 2014)	All methods: 60% Modern methods: 45% (TDHS) 60% (HMIS)	HMIS TDHS	HMIS Annual TDHS interval	Outcome	res wea method edu star brn rbf	BRN RBF RMNCAH	SDG GRL100

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Adolescent fertility rate Adolescence fertility (pregnant before 20 years of age)	Annual number of births to women ages 15–19 per 1,000 women in that age group	Annual number of births to women ages 15–19	Total number of women ages 15–19 ÷ 1,000	116 (TDHS 2010)	80 per 1,000 women	TDHS Population Census SAVVY	TDHS interval census interval SAVVY (annual)	Outcome	res wea edu	RMNCAH	MDG SDG GRL100
Antenatal care coverage: before 12 weeks of the fetus's gestational age	Percentage of pregnant women who start ANC before 12 weeks of the fetus's gestational age	Number of pregnant women who start ANC before 12 weeks of the fetus's gestation age x 100	Estimated number of pregnant women	15% (< 4 months TDHS 2010) 15% (HMIS 2014)	40% (< 4 months TDHS) 40% (HMIS)	HMIS TDHS (< 4 months)	HMIS (Monthly) TDHS interval	Outcome	res wea edu star brn rbf	BRN RBF RMNCAH	
Antenatal care coverage: 4 visits	Percentage of pregnant women who received antenatal care 4 or more times in a given period	Number of pregnant women who received antenatal care 4 or more times x 100	Estimated number of pregnant women	43% (TDHS 2010) 40.42% (HMIS 2014)	60% (TDHS) 60% (HMIS)	HMIS TDHS	HMIS (Monthly) TDHS interval	Outcome	res wea edu star brn rbf	BRN RBF RMNCAH	MDG GRL100
Institutional delivery coverage <i>PAF</i> : Percentage of councils in which at least 60% of births take place in health facilities	Percentage of live births delivered in a health facility during a specified period	Number of live births delivered in health facilities x 100	Projected number of live births	50% (TDHS 2010) 54.7% (HMIS 2014)	65% (TDHS) 65% (HMIS)	HMIS TDHS	HMIS (Monthly) TDHS interval	Outcome	res wea edu star brn rbf	PAF BRN RBF RMNCAH	GRL100
Percentage of deliveries assisted by health professionals	Percentage of deliveries assisted by health professionals (doctors, clinical officers, nurses, nurse midwives)	Number of deliveries assisted by skilled attendants	Projected number of live births	51% (TDHS 2010)	60%	TDHS	TDHS interval	Outcome	nat		MDG GRL100

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Postnatal care: within 7 days after delivery	Percentage of mothers and babies who received postpartum care within 7 days of childbirth (regardless of place of delivery)	Number of mothers and babies who received postpartum care within 7 days of childbirth x 100	Projected number of live births	I: 56% M: 57.35% (HMIS 2014)	I: 68% M: 70% (HMIS 2014)	HMIS TDHS	HMIS (Monthly) TDHS interval	Outcome	res wea edu star brn rbf	BRN RBF RMNCAH	
BEmONC at dispensaries and health centres	Percentage of 1) dispensaries and 2) health centres that can provide BEmONC as defined in EHP	Number of 1) dispensaries and 2) health centres that can provide BEmONC as defined in EHP	Total number of 1) dispensaries and 2) health centres	1) 20% 2) 39% (SARA 2012)	1) 70% 2) 70%	special study	study interval	Input	res star brn rbf	BRN RMNCAH	
CEmONC at health centres and hospitals	Percentage of 1) health centres and 2) hospitals that can provide CEmONC as defined in EHP	Number of 1) health centres and 2) hospitals that can provide CEmONC as defined in EHP	Total number of 1) health centres and 2) hospitals	1) 9% 2) 73% (SARA 2012)	1) 50% 2) 100%	special study	study interval	Input	res star brn rbf	BRN RMNCAH	
Vaccinations											
Vaccination rate: measles under one year	Proportion of children under 1 year of age who received measles vaccine in a given year or other period.	Total number of children under 1 year of age vaccinated against measles x 100	Total number of children under 1 year of age targeted in the period	75% (TDHS 2010) 90.51% (HMIS 2014)	90% (TDHS) 90% (HMIS)	HMIS TDHS	HMIS (Monthly) TDHS interval	Outcome	res sex wea edu star brn rbf	RBF RMNCAH	MDG GRL100
Vaccination rate: Penta3 under one year	Proportion of children under 1 year of age who received Penta3 vaccine in a given year or other period	Total number of children under 1 year of age vaccinated 3 times against DPT—Hb x 100	Total number of children under 1 year of age targeted in the period	86% (TDHS 2010) 82.07% (HMIS 2014)	90% (TDHS) 90% (HMIS)	HMIS TDHS	HMIS (Monthly) TDHS interval	Outcome	res sex wea edu star brn rbf	RMNCAH	GRL100

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Vitamin A supplementation coverage	<p><i>Survey:</i> Proportion of children 6–59 months who received 1 dose of vitamin A in the past 6 months.</p> <p><i>HMIS:</i> Ratio of Vitamin A doses given to children 12–59 months in past 12 months to number of children 12–59 months</p>	<p><i>Survey:</i> Total number of children ages 6–59 months who received 1 dose of vitamin A in the past 6 months x 100</p> <p><i>HMIS:</i> Number of Vitamin A doses given to children 12–59 months in past 12 months</p>	<p><i>Survey:</i> Total number of children ages 6–59 months in the sample</p> <p><i>HMIS:</i> Number of children 12–59 months</p>	<p>61% (TDHS 2010)</p> <p>51% (HMIS 2014)</p>	<p>75% (TDHS)</p> <p>65% (HMIS)</p>	<p>HMIS</p> <p>TDHS</p>	<p>HMIS (Monthly)</p> <p>TDHS interval</p>	Outcome	res sex wea edu star brn rbf	<p>RBF</p> <p>RMNCAH</p>	GRL100
Nutrition											
Children under 5 who are underweight	Proportion of children under five who are underweight (weight for age)	Number of children who are underweight (weight-for-age less than -2 standard deviations of the WHO Child Growth Standards median) among children ages 0–4 years x 100	Number of children under five years of age	16% (TDHS 2010)	11% (TDHS)	TDHS	TDHS interval	Impact	res wea edu	Nut TWG	MDG
Children under 5 who are stunted	Proportion of under-fives who are stunted (height for age)	Number of children who are stunted (height-for-age less than -2 standard deviations of the WHO Child Growth Standards median) among children ages 0–4 years x 100	Number of children under 5 years of age	42% (TDHS 2010)	27% (TDHS)	TDHS	HMIS (Monthly) TDHS interval	Impact	res wea edu	Nut TWG	GRL100

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Incidence of low birthweight among newborns	Percentage of live births that weigh less than 2,500 g out of the total number of live births during the same period	Number of live births that weigh less than 2500 g x 100	Number of live births	7.3% (HMIS 2014) 6.9% (TDHS 2010)	<2% (TDHS & HMIS)	HMIS TDHS	HMIS (Monthly) TDHS interval	Output	res wea edu star brn rbf	Nut TWG RMNCAH	GRL100
Percentage of pregnant women with anaemia	Percentage of women (15–49 years of age) who have haemoglobin concentration <11 g/dl)	Number of cases of women who are anaemic	Number of women ages 15–49 who have haemoglobin concentration <11 g/dl	59% (TDHS 2010)	35% (TDHS&HMIS)	HMIS (to be added)	Monthly	Impact	res wea edu	Nut TWG	GRL 100
HIV/AIDS											
HIV prevalence among 15–24 year olds	Percentage of young people ages 15–24 who are living with HIV	Number of people ages 15–24 who were tested to be HIV positive x 100	Total population (tested) in the age group 15–24 year olds	15–19: 1.0%; 20–4: 3.2% (THMIS 2012)	15–19: 0.8%; 20–24: 2.4% by 2017 (NACP)	THMIS	THMIS interval	Impact	age	NACP SP	MDG GRL100
ARV coverage	Number and percentage of eligible adults and children currently receiving antiretroviral therapy (ART)	Number of adults and children eligible for ART receiving ART (disaggregated under 5 and over 5 and sex) x 100	Estimated number of eligible adults and children	Adults: 60%; Children: 25% in 2012 (NACP)	Adults: 95%; Children: 80% by 2017 (NACP)	model + RHIS	Annual	Outcome	Sex, Age: <1 1-4 5-14 15+	NACP SP	MDG SDG GRL100
Prevention of mother-to-child transmission of HIV (PMTCT)	Percentage of HIV-positive pregnant women receiving ARVs to reduce the risk of PMTCT	Number of HIV-positive pregnant women receiving ART for PMTCT x 100	Number of HIV-positive pregnant women	65% in 2012 (NACP)	90% in 2017 (NACP)	model + RHIS	Annual	Outcome	New to ART; already on ART	NACP SP RBF RMNCAH	MDG GRL100

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Malaria											
Intermittent preventive therapy for malaria during pregnancy (IPTp)	<i>Survey:</i> Proportion of mothers who received 2 doses of IPTp during last pregnancy <i>HMIS:</i> Proportion of mothers who received 2 doses of IPTp during pregnancy during a specified period	<i>Survey:</i> Number of mothers receiving 2 or more doses SP during last pregnancy within past 2 yrs <i>HMIS:</i> Number of mothers receiving 2 or more doses SP during pregnancy	<i>Survey:</i> Number of mothers surveyed who had a live birth in past 2 years <i>HMIS:</i> Total number of first ANC visits	33% (THMIS 2012) 40.83% (HMIS 2014)	40% (THMIS) 45% (HMIS)	TDHS TMIS and other household surveys HMIS	TMIS & TDHS intervals HMIS (Monthly)	Output	res wea edu star brn rbf	RBF NMCP RMNACH	GRL100 (3 doses)
Use of long-lasting insecticide-treated nets (LLIN)	Proportion of vulnerable groups (pregnant women 15–49 years of age, children under 5) sleeping under an LLIN the previous night	Number of children <5 or pregnant women ages 15–49 sleeping under ITN night before survey	Number of children <5 or pregnant women ages 15–49 who reside in surveyed households	<5 yrs: 71% PW: 73% (THMIS 2012 & NMCP 2015)	<5 yrs: 75% PW: 80%	TDHS TMIS and other household surveys	TMIS & TDHS intervals	Outcome	res edu wea	NMCP	MDG GRL100
Children with blood test in febrile illness	Proportion of children under 5 (2–59 months) who had a blood test taken in febrile illness in past 2 weeks	Number of children under 5 (2–59 months) who had a blood test taken in febrile illness in past 2 weeks x 100	Number of children under 5 (2–59 months) who had a febrile illness in past 2 weeks	25% (THMIS 2012)	80% (HMIS)	TDHS TMIS and other household surveys	TMIS & TDHS intervals	Outcome	res edu wea	NMCP	
Confirmed malaria cases	Proportion of confirmed malaria cases out of total malaria cases (clinical + confirmed)	Number of confirmed malaria cases x 100	Total number of malaria cases (clinical + confirmed)	64% (HMIS 2014)	95% (NMCP)	HMIS	Monthly	Outcome	res <5 >5		

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Malaria parasite prevalence among children 6–59 months	Percentage of children ages 6–59 months who test positive for malaria by microscopy	Number of children positive by microscopy x 100	Number of children tested by microscopy x 100	4.1% (THMIS 2012)	<1% (NMCP)	TMIS and other household surveys	TMIS intervals	Impact	res edu wea	NMCP	GRL100
Tuberculosis and Leprosy											
Case detection rate for all forms of tuberculosis (TB) The term “rate” is used for historical reasons; the indicator is actually a ratio (expressed as percentage) and not a rate	The proportion of estimated new and relapse TB cases detected in a given year under the internationally recommended tuberculosis control strategy The term “case detection,” as used here, means that TB is diagnosed in a patient and is reported within the national surveillance system, and then to WHO	The number of new and relapse TB cases diagnosed and treated in national TB control programmes and notified to WHO x 100	WHO's estimate of the number of incident TB cases for the given year: available at www.who.int/tb/data	56% in 2013 (NTLCP)	72%	NTLCP HMIS WHO	Annual	Outcome	res star brn rbf	NTLCP	GRL100
Treatment success rate for all forms of TB	Proportion of all TB cases, all forms, bacteriologically confirmed plus clinically diagnosed, successfully treated among all TB cases registered for treatment during the specified period	Number of TB patients who successfully completed treatment x 100	Number of tuberculosis cases registered for treatment	90% in 2013 (NTLCP)	>90%	NTLCP HMIS	Quarterly	Outcome	res star brn rbf	NTLP	GLR100
Disability grade at leprosy diagnosis	Proportion of patients with disability grade 2 among newly diagnosed leprosy patients	Number of patients with disability grade 2 at diagnosis x 100	Number of newly diagnosed leprosy cases	13% in 2013 (NTLCP)	7%	NTLP HMIS	Quarterly	Impact	res star brn rbf	NTLCP	

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Children among newly detected cases	Proportion of patients under 15 years of age among newly diagnosed leprosy patients	Number of patients under age 15 x 100	Number of newly diagnosed leprosy cases	5% in 2013 (NTLCP)	<2%	NTLCP HMIS	Annual	Impact	res star brn rbf	NTLCP	
Infectious and non-communicable diseases											
Obesity and overweight among adults	<p>Percentage of adults 25–64 years of age who are overweight (defined as having a BMI ≥ 25 kg/m²)</p> <p>Percentage of adults ages 25–64 who are obese (defined as having a BMI ≥ 30 kg/m²)</p>	<p>Number of adults ages 25–64 who are overweight (defined as having a BMI ≥ 25 kg/m²) x 100</p> <p>Number of adults ages 25–64 who are obese (defined as having a BMI ≥ 30 kg/m²) x 100</p>	Adult (24–65 years of age) population surveyed	<p>o'weight: 26.0%</p> <p>M: 15.1% F: 37.1%</p> <p>Obese : 8.7%</p> <p>M: 2.5% F: 15.0%</p> <p>(STEPS 2012)</p>	no increase in obesity (NCD AP)*	STEPS	STEPS interval	Impact	sex	NCD	SDG GRL100
Raised blood pressure among adults	Percentage of adults ages 25–64 with BP > 140/90 or are currently on BP medication	Number of adults (24–65 years) with BP $\geq 140/90$ or are currently on BP medication x 100	Adult (24–65 years of age) population surveyed	26.0% M: 25.4% F: 26.5% (STEPS 2012)	reduced by 25% 19.5% M: 19.1% F: 19.9% (NCD AP)*	STEPS	STEPS interval	Impact	sex	NCD	SDG GRL100
Raised glucose/diabetes among adults	Percentage of adults ages 25–64 with raised fasting blood glucose (capillary whole blood value ≥ 6.1 mmol/L (110 mg/dl)) or are currently on medication for raised blood glucose	Number of adults (ages 24–65) with raised fasting blood glucose (capillary whole blood value ≥ 6.1 mmol/L (110 mg/dl)) or are currently on medication for raised blood glucose x 100	Adults (ages 24–65) population surveyed	9.1% M: 8.0% F: 10.0% (STEPS 2012)	reduced by 10% 8.2% M: 7.2% F: 9.0% (NCD AP)*	STEPS	STEPS interval	Impact	sex	NCD	SDG GRL100

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Cervical cancer screening	Proportion of women ages 30–50 who were screened for cervical cancer with visual inspection with acetic acid/vinegar (VIA)	Total number of women ages 30–50 who were screened with VIA x 100	Number of women ages 30–50	11% (HMIS 2014)	tbd	HMIS	Monthly	Output	res star brn rbf		SDG GRL100
Social Welfare											
Direct Services											
Children in need of care and protection who received services	Proportion of vulnerable children and children in need of care and protection provided with appropriate services from the social welfare office in collaboration with other key service providers, disaggregated by type of service: most vulnerable children (MVC); victims of violence, abuse, neglect, and exploitation (VANE); juvenile offenders; children with disabilities	Number of eligible children who received services as determined by the assessed needs x 100	Number of children in need of care, protection, and support services reported to the social welfare offices or other local government authorities	27.6% (Census 2012)	50%	HMIS (to be added); Gender and Children Desk Register; Police Register	Annual	Outcome	res MVC; VANE; juvenile offenders; people with disabilities		
Adults in need of care and protection who received services	Proportion of adults who are elderly, disabled, with matrimonial cases, or living in poor households who received appropriate services from the social welfare office, other local government authorities, or nonstate actors, disaggregated by type of service.	Number of eligible adults (elderly, disabled, or extremely poor) who received services as determined by the assessed needs X 100	Number of eligible adults (elderly, disabled, and extremely poor) who sought services from the social welfare offices or other local government authorities (health facilities/One Stop Centres, schools) and police	Elderly: 5.6% Disabled: 5.8% (Census 2012)	Elderly: 50% Disabled: 50%	HMIS (to be added); Police Register	Annual	Outcome	res Elderly Poor People with disabilities		

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Capacity											
LGAs with improved capacity to provide quality welfare and protection services[Proportion of LGAs with improved coordination of prevention and response services to children and adults in need of welfare and protection services. (LGAs will be considered to have improved capacity if they observe staffing, training, and budgeting norms): Disaggregated by MVC committees (MVCCs) and district child protection teams (DCPTs) and adult services X 100	Total number of LGAs that have coordinated mechanisms for the provision of preventive and responsive services	Total number of LGAs	70% have MVCCs without increased resources; 18% have DCPTs with increased resources	100% of all the districts have improved capacity to coordinate the services	HMIS CPMIS Programmes	Outcome	Annual	DCPTs MVCCs adult services		
Health facilities providing birth registration and birth certification services	Proportion of health facilities that are implementing the new decentralized system for registration of births and issuance of birth certificates X 100	Number of health facilities consistently registering births and issuing birth certificates x 100	Total number of health facilities in regions where RITA has decentralized the new birth registration services	0% (RITA)	30% in regions rolling out the new system	RITA HDSS	tbd	Output	res star brn rbf registration; certification		
Health Systems											
Financial											
Share of total expenditure allocated to Health	Proportion of government expenditures allocated to health in total government expenditures x 100	Total on-budget health budget	Total on-budget government budget	9.1% (PER, 2014)	15% (Abuja target)	Ministry of Finance (MOF) data in PER	Annual	Input		HFS	

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Enrollment in social health insurance schemes	Proportion of population enrolled in any of the following schemes: NHIF, NSSF-SHIB, CHF, TIKA, CHIF, and others	Population enrolled in any of the following schemes: NHIF, NSSF-SHIB, CHF, TIKA, CHIF, and others	Total population	19% (NHF data 2013)	50%	PER	Annual	Output	res (others for survey data)	HFS	UHC
Human Resources											
Doctors and AMOs per 10,000 people	Number of medical officers/assistant medical officers per 10,000 population	Number of medical officers/ assistant medical officers available	Total population ÷ 10,000	0.75	1.19	HRHIS	Annual	Input	region council		
Nurses and midwives per 10 000 people (excluding nursing officers and assistant nursing officers)	Number of nurses and midwives per 10,000 population (excluding nursing officers and assistant nursing officers)	Number of nurses and midwives available	Total population ÷ 10,000	3.27	3.92	HRHIS	Annual	Input	region council		
Pharmacists per 10,000 people	Number of pharmacists per 10,000 population	Number of pharmacists available	Total population ÷ 10,000	0.14	0.22	HRHIS	Annual	Input	region council		
Density of clinicians —entire country <i>BRN</i> : monitors 9 critical regions	Number of Med. Specialists Medical Officers / Assistant Medical Officers and Clinical Officers / Assistant Clinical Officers Dental Officers / Assistant Dental Officers Dental Therapist per 10 000 population	Number of Med. Specialists MOs / AMOs and COs / ACOs Dos / ADOs and DTs available	Total population ÷ 10 000	2.58 (HRHIS & TIIS 2014)	3.5	HRHIS	Quarterly	Input	zone region council facility HI type star brn rbf	BRN	

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Density of nurses and midwives—entire country (BRN monitors 9 critical regions <i>PAF</i> : Reduced proportion of councils with nurses and midwives < 3 per 10 000 population)	Number of Nurses and Midwives per 10 000 population	Number of Nurses and Midwives available	Total population ÷ 10 000	5.60 (HRHIS & TIIS 2014)	7.5	HRHIS	Quarterly	Input	zone region council facility HI type star brn rbf	BRN PAF	
Density of skilled HRH (defined as clinicians and nurses/midwives) entire country	Number of clinicians and nurses/midwives per 10 000 population	Number of clinicians and nurses/ midwives available	Total population ÷ 10 000	8.18 (HRHIS & TIIS 2014)	11.0	HRHIS	Quarterly	Input	zone region council facility HI type star brn rbf	BRN	
Logistics											
Availability of medicines and health products	Continuous availability of 10 tracers (medicines, vaccines, medical devices) for essential health interventions in a facility for a reporting month (3 types of analysis 1) LGA: Number of tracers available per facility, on average, for reporting period 2) BRN: Percentage of facilities having all 10 tracers 3) Programmes: Percentage of facilities having specified tracer	1) Total number of tracers available in facilities (X reporting months) 2) Number of facilities having all 10 tracers; 3) Number of facilities having specified tracer	(1, 2, and 3) Number of facilities (X reporting months)	31% (HMIS 2014)	55%	HMIS	Monthly	Input	zone region council facility HI type star brn rbf	BRN	

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Facilities											
Utilization											
Outpatient attendance	New outpatient department (OPD) cases per capita in a given year or other period	Total number of outpatients presenting for a new condition	Total population	0.64 (HMIS 2014)	0.8	HMIS	Monthly	Output	res HI type star brn rbf	RBF	GRL100
Service quality											
3-star rated facilities	Percentage of primary health facilities with 3-star rating or higher	Number of primary health facilities with 3-star rating or higher x 100	Total number of primary health facilities	NA	50%	HMIS	Monthly	Output	zone region council facility HI type star brn rbf	BRN	
Council Management											
Council annual health plan (CCHP)	Percentage of councils whose annual plans were approved according to first-round assessment criteria	Number of councils whose annual plans were approved according to first-round assessment criteria X 100	Total number of councils	20% (CCHP Annual Plan 2014)	45%	HMIS (to be added)	Annual	Output	zone region council		

Indicator	Definition	Numerator	Denominator	2015 Baseline	2020 Target	Data Source	Frequency	Type	Disaggr	Nat'l	Int'l
Environment											
Clean water	Proportion of population using an improved drinking water source	Number of people using an improved water source: piped water, public tap, tube well, dug well, protected spring, or rainwater x 100	Total number of people in sample	56% (Census 2012)	70%	Census TDHS	Census interval TDHS interval	Output	urban/rural		MDG SDG GRL100
Sanitation	Proportion of population using an improved sanitation facility	Number of people using an improved sanitation facility: flush toilet, ventilated improved pit latrine (VIP), or pit latrine x 100	Total number of people in sample	14% (Census 2012)	30%	Census TDHS	Census interval TDHS interval	Output	urban/rural		MDG SDG GRL100
HMIS Performance											
Completeness	Proportion of expected reports (ANC, L&D, child health, OPD, IPD, FP) submitted in a given year or other period	Number of reports received in a given year or other period	Number of reports expected in a given year or other period	90% (HMIS 2014)	95%	HMIS	Monthly	Output	zone region council facility HI type star brn rbf		

