FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

MINISTRY OF HEALTH

INFORMATION USE TRAINING MODULE

POLICY, PLANNING AND MONITORING & EVALUATION DIRECTORATE

JUNE 2018

PARTICIPANTS MANUAL

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

MINISTRY OF HEALTH

POLICY, PLANNING AND MONITORING & EVALUATION DIRECTORATE

INFORMATION USE TRAINING MODULE

PARTICIPANTS MANUAL

CONTENTS

FOREWORD

The Federal Ministry of Health is currently implementing the Health Sector Transformation Plan (HSTP), a five year strategic plan from 2015/16-2019/20. Information Revolution is one of the four transformation agendas of HSTP with the objective of maximizing the availability, accessibility, quality, and use of health information for decision making processes through the appropriate use of ICTs to positively impact the access, quality, and equity of healthcare delivery at all levels.

Improving data quality and promoting the culture of information use is at the center of the information revolution agenda. As a result, the Policy, planning and Monitoring &Evaluation Directorate (PPMED) of the FMOH has developed this information use training manual which can be helpful for health workers and managers at all levels of the health system. It will be a useful guide to improve information use for decision making at health centers, hospitals, woreda Health Offices, Zonal Health Departments, Regional Health Bureaus and other health institutions.

I would like to thank Monitoring and Evaluation Case team experts at PPMED, experts from RHBs, Universities and partner organizations for their great contribution in the finalization of this manual.

Biruk Abate

Director of Policy, Planning and Monitoring & Evaluation Directorate,

Federal ministry of Health

ACKNOWLEDGEMENTS

This manual is developed with inputs from a number of experts from FMOH, RHBs and partner organizations. The Policy, Planning and Monitoring & Evaluation Directorate of the Federal Ministry of Health is grateful for all who have been involved in the preparation of this manual. We are grateful to the following partner organizations that have mostly been involved in the process: JSI/DUP, ICAP-Ethiopia, JSI/HMIS Scale up project and JSI/L10K for their contribution in the finalization of this manual.

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

AHU	Administrative Health Unit
AIDS	Acquired Immuno Deficiency Syndrom
ANC	Antenatal Care
ARM	Annual review Meeting
CD4	Cluster of differentiation 4
CHW	Community Health Worker
DDDU	Data Demand and Data Use
DHIS	Distinct Health Information System
DHS	Demographic and Health Survey
DOT	Directly Observed Therapy
EDHS	Ethiopia Demographic and Health Survey
EMR	Electronic Medical Record
FMoH	Federal Ministry of Health
HC	Health Center
HCWs	Health Care Workers
HEW	Health Extension Worker
HF	Health Facility
HIS	Health Information System
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HP	Health Post
HSTP	Health Sector Transformation Plan
ICD	International Classification of Disease
IQR	InterQuartile Range
LQAS	Lot Quality Assurance Sampling Methodology
M&E	Monitoring & Evaluation
NCoD	National Classification of Disease
OPD	Outpatient Department
PMT	Performance Monitoring Team
PMT	Performance Monitoring Team
PNC	Postnatal Care
PRISM	Performance of Routine Information System Management
RDQA	Routine Data Quality Assessment
RHB	Regional Health Bureau
RHIS	Routine Health Information System

SARA	Service Availability and Readiness Survey
SBA	Skilled Birth Attendant
SD	Standard Deviation
SNNPR	Southern Nations, Nationalities and Peoples Region
TB	Tuberculosis
TB	Tuberculosis
ToT	Training of Trainers
WHO	World Health Organization
WoHO	Woreda Health Office
ZHD	Zonal Health Department

SECTION-1

INTRODUCTION

SECTION 1: INTRODUCTION

1.1. MODULE DESCRIPTION

The Federal Ministry of Health (FMoH) of Ethiopia introduced the Health Sector Transformation Plan (HSTP) which focuses on addressing quality and equitable distribution of health service delivery for all (1). Owing to the observed gap in the health sector, information use has been given substantial prominence in the HSTP as part of information revolution which is one of the four transformation agendas in the current HSTP.

Information Revolution refers to the phenomenal advancement in the methods and practice of collecting, analyzing, presenting, and disseminating information that can influence decisions in the process of transforming health service delivery. It entails a radical shift from traditional methods of data utilization to a systematic information management approach powered by a corresponding level of technology and improved culture of information use.

The Information Revolution is not only about changing the techniques of data and information management; it is also about bringing fundamental cultural and attitudinal change regarding perceived value and practical use of information. Revolutionizing the availability, accessibility, quality, and use of health information for decision-making processes, through the appropriate use of information communication technology, can ultimately impact the access, quality, and equity of healthcare delivery at all levels in Ethiopia.

Bringing cultural transformation in data use is the most challenging part of the information revolution agenda as it requires addressing barriers that are linked to technical, organizational and behavioral factors. The decision-making and problem-solving behavior of data users can heavily influence the ultimate use of data for service delivery improvements. Both data producers and users function in an organizational context that can support or hinder them to use information for action.

Ethiopia has demonstrated standardized comprehensive health management information system (HMIS) which is one of the cross-cutting attributes in the health systems building blocks that been implemented since 2008 to capture core indicators used to monitor the provision of health services and ultimately improve health status of the population. Since then some improvements have been observed with regards to information use for evidence-based decision making. However, information use culture is far behind the expectations.

This information use training manual is developed to improve information use and the culture of use of information at all level of the health system. It is also expected to enable health care providers and managers at all levels of the health system to monitoring performance and identify barriers to provision of equitable and quality of health services and ultimately design solutions to improve performance of the health system.

This training manual aims at building the skills and knowledge of health professionals, data generators and HMIS focal persons and health system mangers on data demand and information and to promote use of information by identifying priorities to monitor the progress made and act accordingly. Use of other data sources is also promoted to complement HMIS data for more in-depth understanding of health and health related situations and problems.

1.2. TOPICS COVERED

- Basic concepts on Information use
- Data analysis, visualization and interpretation
- Information use for action
- Information use platforms
- M&E of information use

1.3. LEARNING OBJECTIVES

At the end of this module participants will be able to:

- Explain the basic concepts of data demand and use and determinants of data use at different levels of the health system
- Describe common health metrics and its application for information use
- Develop skills on data analysis, interpretation, presentation, use and dissemination at all levels of the health system
- Describe common platforms and forums for information use
- Describe different information products and channels of information dissemination
- Elaborate key information use related indicators and M&E mechanisms

SECTION 2

BASIC CONCEPTS OF INFORMATION USE

SECTION 2: BASIC CONCEPTS OF INFORMATION USE

Session Objectives

At the end of this session participants will able to:

- Understand basic concepts of data demand and use
- Describe principles of data demand and use
- Identify determinants of data demand and use
- Explain data demand and use intervention development steps
- Apply data use constraints assessment tool and its use

Session duration: 4 hours

2.1. BASIC CONCEPTS OF DATA DEMAND AND USE

In practice, it is difficult to distinguish between data demand and Information use and one may choose to treat them as parts of a single process. However, Demand is a concept distinct from Use.

Data Demand

The term data demand is related to the value stakeholders attach to data regardless of the use of data. We say that data demand exists if:

- Specific questions are raised and data are considered to answer them
- And/or a decision needs to be made and data are sought to inform it
- The decision –maker understands what kind of information is needed to inform the decision
- The decision-maker proactively seeks out that information

Information use

The term data /information use refers to the use of data in the decision-making process. A decision maker uses information if he/she:

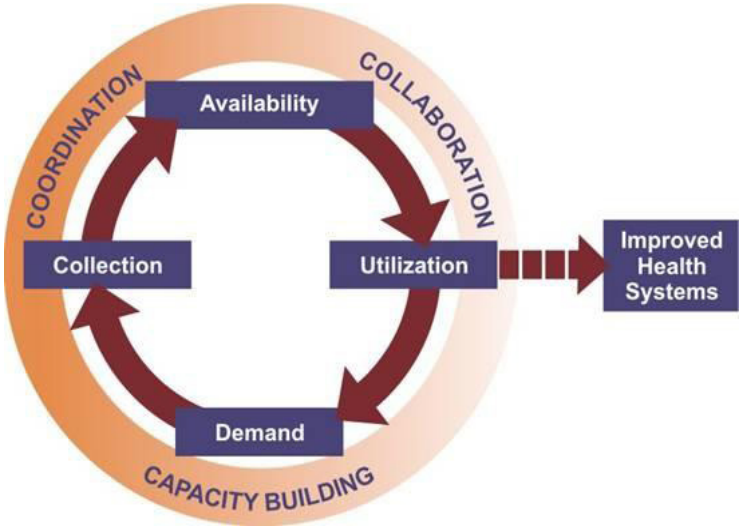
- Is aware of the decision he/she is about to make or question to be answered
- Relevant information is explicitly considered in the decision making process, even if the quality of data is sub-optimal.

Data use is defined as: The process through which decisions makers and stakeholders explicitly consider information in one or more steps of the process of policymaking, program planning and management, or service provision, even if the final decision or action are not based on that information.

Culture of information use: The perceived value of individuals and organizations on the role of information for informed decision making

2.2. DATA DEMAND AND USE CONCEPTUAL FRAMEWORK

Evidence-based decision making practice is influenced by demand for health information, the collection and analysis processes, availability of data to decision makers, and collaborative discussions among stakeholders using data.



The figure presents a framework for data demand and use as a cycle that connects data demand to use through the intermediate steps of data collection and analysis and ensuring the availability of health information.

The overarching principle of the framework is that evidence-based decision making will promote the achievement of improved health outcomes. Data demand and use conceptual framework is presented as a cycle starting from demand to utilization (which directly affects demand); embedded in the cycle is the decision-making process.

Figure 1. Conceptual framework for data demand and use

(From Measure evaluation)

Reviewing the entire process that leads to Information use in a health facility or administrative structure helps to understand factors that inhibit Information use.
The framework illustrates the entire cycle of evidence-based decision making and indicates that when there is data demand,

- The necessary resources are invested to collect that data
- Once collected, data will be analyzed and synthesized into a usable form and made available
- Once available, the data will be used to inform health programs and systems performances

The outer circle explains how this process get done and demonstrates the need for building capacity of human resources to improve data management, coordination among different units and different levels of the health system and most importantly discussions between data generators and users. Once managers have positive experience in using data, they will become increasingly committed to improving the data management processes and continue to use data.

2.3. INFORMATION USE AT COMMUNITY LEVEL

Who Uses the Data?

Brainstorm on who will use the data that CHWs collect at the community level. (Note: The data collected at the community level could include data generated through CHIS, data from the activities of the women development army, inter-sectoral collaboration, community feedbacks etc)

The data collected at the community level could be used to;

Community Health Extension Workers (CHEWs)

- Identify individual patients/clients and households
- Identify missed opportunities
- Promote continuity of care
- Plan outreach activities
- Follow up on referrals
- Detect early warning signals of disease outbreaks etc

Community

- Monitor met and unmet community health needs
- Advocacy: for services, resources, service utilization, community participation
- Accountability

2.4 INFORMATION USE AT FACILITY LEVEL AND ADMINISTRATIVE LEVEL

Key concepts on usage of data at facility level and administrative level

Key points

- **Facility level** – facilities need information on the coverage or amount and quality of services, resources availability including human resources, patients' satisfaction with the service etc … These kind of data informs facilities in planning and managing health services, program's performance and resources.
- **Administrative levels** – need information on service coverage, burden of disease, disease occurrences, staff performance, resource availability etc … for planning, policy formulation, performance measurement and improvement, designing interventions, developing strategies, and formulating policies etc …

- Health facilities play a key role in both data collection as well as using the data for improving the quality and volume of services they provide
- As part of the functions of performance monitoring team, health facilities organizes a meeting to review data every month before sending out the integrated monthly report to the district level.

2.5. USAGE OF DATA TO INFORM POLICY, STRATEGY AND PROGRAM PLANNING

Key points

- Using data to **populate a report** to send to the national level or to a donor is not Information use. That is data reporting. The **presentation of data** at a technical conference also is not Information use, as we define it. That is data dissemination.
- Both data reporting and data dissemination are important precursors to Information use, but they are not linked specifically to decision-making processes.
- A common Information use approach among each of these tasks is that each review of data is linked to a specific decision-making process

Uses of data for informing health programs:

- To design or revise a program or strategic plan
- To formulate or revise a policy
- To advocate support for a policy or a program
- To allocate resources equitably

Role of Data-Use Interventions in Health Systems

The ultimate vision of the health system is to improve health outcomes. According to the WHO framework, this involves strengthening the WHO six building block (Service delivery, Health workforce, Medical products, vaccines, and technologies, Financing, Leadership and governance, Health information system itself) that makes up a health system through an informed process:

In order to achieve this outcome, there must be a concerted effort in the form of data demand and use interventions that aims to: -

- Improve individual skills
- Organizational capacity, attitudes, and behavior,
- Ensure organizational procedures, policies, and support mechanisms are institutionalized and functioning.

Data-Demand-and-Use Interventions development steps

The following steps should be followed to develop a data-demand-and-use intervention:

1. **A data-use assessment looks at the technical, behavioral, and organizational factors that affect decision making.**
    - The assessment identifies barriers to Information use and develops plans to overcome them.
2. **Identify, engage, and involve Information users and producers.**
    - The output of this activity is greater collaboration between Information users and data producers.
3. **Conduct activities to improve data quality:**
    - Data quality assessments
    - Trainings in data entry, management, and quality assessments
    - Development of data quality protocols and standard operating procedures

4 **Conduct activities to improve data availability:**

- Linking many databases together to make them interoperable
- Developing data dissemination and communication plans
- Putting in place feedback mechanisms for data and information sharing
- Producing a national system to register and make accessible new research

5 **Identify information needs:**

- Identify upcoming decisions and questions needed to plan programs
- Link decisions and questions to data sources, and identify any data gaps
- Create a plan to manage the review of data linked to program questions and take action based on recommendations

6 Build capacity in Information use core competencies, which enable a person to apply:

- Skills in data analysis, interpretation, synthesis; presentation, and developing a communication strategy
- Ability to advocate Information use activities
- Implementation of data-demand-and-use procedures, guidelines, policies, and support mechanisms

7 Strengthen an organization's data-demand-and-use infrastructure. Examples are:

- Ensuring that the organizational mission and vision reflect data demand and use
- Advocate funding for data-demand-and-use activities
- Institutionalize working groups to review data and identify data needs
- Develop guidelines for information user and producer engagement in M&E activities and program review
- Refine procedures for cleaning, managing, storing, and sharing data
- Revise job descriptions to clarify information use roles

Determinants of Information use

A "determinant" as a determining or causal element or factor directly linked to data demand and use in decision making. The Performance of Routine Information System Management (PRISM), identifies three main determinants of health information use:

- The technical aspects of data processes and tools,
- The behavior of individuals who produce and/or use data, and
- The system/organizational context that supports data collection, availability and use.

In addition to the three determinants of decision making, there are other factors that can negatively affect the decision-making process that include political, cultural, and social factors. Factors that affect data demand and use are different in different contexts and may require a different type of intervention or combination of interventions to facilitate Information use. Thus, routine information use constraint assessment at different levels and designing interventions to address those constraints is instrumental to continually improve information use by applying information use assessment tools (Annex 1).

Technical Determinants

A system without a sound technical design, well-trained people, and clear norms and standards cannot produce the information needed to informing decisions. Thus, improving the use of data focuses mainly on introducing or upgrading technical skills, changing the design of the data system, or revamping the technology used to improve the availability and quality of data.

The followings are among the common technical constraints for underutilization of data:

- There may be a lack of technical skills in HIS core competencies or computer literacy;
- There may be a lack of ICT equipment's;
- The design of the data system may pose constraints to actually using the data;
- The definition of indicators may not be appropriate for use or may be more responsive to reporting needs than the needs of programs; and finally,
- A lack of data quality assurance protocols can result in data that stakeholders do not trust.

Determinants at the Organizational level

The wider environment in which health system decisions are made includes the institutions and stakeholders that influence information users, as well as the data collectors and users. Organizational factors, such as:

- lack of clarity about roles and responsibilities for information use,
- failure to actively promote the value of evidence-based decision making,
- lack of norms or standards with respect to data quality, and
- Ambiguity surrounding the flow of information throughout the system. Have a direct influence on the use of data.

Behavioral determinants

Data can also be underutilized because of the behaviors of health workforce. The attitude, motivation, lack of information use culture and value the decision makers attach to information will play a big role in determining if data are used. Influencing many of these behavioral factors will require interventions that go beyond simple training that improves knowledge and skills in understanding data and its use. Behavioral factors give crucial insight into the way in which health workers, managers and policymakers use information (or fail to do so).

SECTION 3

DATA ANALYSIS, PRESENTATION/ VISUALIZATION AND INTERPRETATION

SECTION 3: DATA ANALYSIS, PRESENTATION/VISUALIZATION AND INTERPRETATION

Contents:

- Key concepts of data analysis
- Metrics/Indicators of health and health related events
- Data organization and data visualization techniques
- Data interpretation

Objectives:

At the end of this section, participants will be able to:

- Define data analysis, presentation and interpretation
- Describe the purposes of data analysis, presentation and interpretation
- Define statistical key concepts in data analysis
- Calculate different programmatic performance measures
- Describe different ways to best summarize and present data
- Determine and choose the appropriate format for data presentation/visualization
- Develop graphs that display performance measures
- Read and interpret tables and graphs

Time needed: 12 hours

3.1 BASICS CONCEPTS OF DATA ANALYSIS

Key points: Data related terms and concepts

Variable: The characteristics/attribute of a person, object, or event that can take on different values.

Measurement: The assignment of values such as numbers, names or events according to a set of rules

Data: Aggregate/collection of variables as a result of measurement or counting. It is the raw facts that are collected and form the basis for what we know.

Data element:

- It is a basic unit of information built on standard structures having a unique meaning and distinct units or values.
- It represents the "WHAT" dimension, it explains what is being collected or analyzed
- Data elements can be broken into three main categories
    - Concepts/ Individual data elements: Found on data collection instruments, including clinical data entry fields: Example: Age, sex…
    - Measures/ Single-step calculations: Counts, sums, or other simple calculations used as a first step in data aggregation and processing
    - Indicators/ Calculations with numerators and denominators: One or more measures are used as a more advanced step in data aggregation and processing

Indicators (from M&E perspective):

- Are clues and markers as to how close we are to our path and how much things are changing
- Are variables that measure one aspect of a program/project or health outcome

Information:

- The product/result of transforming or processing data
- Data arranged/organized in meaningful pattern to describe a particular situation or condition.

What is the difference between data analysis and interpretation?

Data analysis is the process of systematically applying different techniques to describe, summarize and compare data. It is the iterative process of examining data for patterns, trends, and comparisons. **Interpretation** involves looking at the information and making sense of it. It is the process of assigning meaning to the data. Interpretation involves examining how our program is performing in terms of our objectives and targets; how our program is performing compared with benchmarks and compared to other institutions, and how we can improve our services. Data interpretation is about assessing our findings against adopted criteria.

Let us see the concepts of analysis and interpretation with an example. Suppose the HIV/AIDS department of Adama hospital wants to know if the hospital's ART program is performing well or not. The program manager will perform the following:

1. The manager will define the actual ART performance by calculating ART program related indicators. He/she will also look at the ART targets set at the beginning of the fiscal year. Then the program manager will compare the ART target with the actual performance for the specific time period. Performing all this is called "data analysis".

2. Using the above analysis, further exploration of the findings should be done to better understand the relevance of the findings to the program and how the findings are going as per the plan. The potential reasons for the findings should be explored. At this step, you have moved from the 'what' is happening in the ART programs to the 'why' it is happening. This second step is called "interpretation".

In this session, the details of data analysis and the data analysis techniques will be dealt. After this, data interpretation will be described.

Types of Data

Data are broadly classified into two types, namely: Qualitative (categorical) and quantitative (numerical data).

1. **Qualitative data:** data that can be identified by name or categories. It is divided into two; nominal and ordinal.

- ***Nominal data*:** consists of "naming" observations or classifying them into various mutually exclusive and exhaustive categories, for instance, sex, marital status, Woreda/Sub-city, HIV test result, treatment outcome of management of sever acute malnutrition (Recovered, died, non-respondent, medical transfer, transfer out, unknown).

- ***Ordinal data*:** Whenever observations are not only different from category to category, but can be ordered according to some criteria i.e. when order among categories becomes important. e.g. WHO HIV clinical staging (stage I, Stage II, stage III and stage IV). In some situations, we have data that are first arranged from **highest to lowest** according to **magnitude (frequency**). This type of data is known as **ranked data**. This type of data helps to indicate the relative position within the group. E.g. Top ten causes of health facility morbidity

2. **Quantitative data:** A quantitative data is one that can be measured & expressed numerically and they can be of two types; either discrete or continuous. The values of a discrete variable are usually counts presented in terms of whole numbers, such as the number of episodes of diarrhea in the first five years of life. A continuous variable is a measurement on a continuous scale. Examples include weight, height, blood pressure, age, etc.

Basics of Quantitative data analysis

As described in the previous sections, there are two types of data: quantitative and qualitative. Both qualitative and quantitative data can be analyzed in different ways. In this section, we will learn about quantitative data analysis techniques.

Measuring events such as diseases, health events and health services is at the heart of public health. It is important for public health surveillance, monitoring, evaluation and resource allocation. In this section, you will learn about the common terminologies that we usually use during quantitative data analysis. There are a number of quantitative data analysis techniques that includes frequency distribution and summary statistics; trend analysis, inference statistics etc. This section will cover more about frequency distribution and summary statistics.

Methods of data summarization

Summary statistics and frequency distribution: careful examination of the frequency distribution of a variable is a crucial type of analysis that allows us to calculate summary statistics that are intended to capture the essential features of a distribution**.** Summary statistics usually focus on deriving the measure indicating the overall location of a distribution (e.g. how sick, poor or educated a study population is, on average) OR to indicate the extent of variation within a population. Analysis of quantitative data essentially involves the use of techniques to summarize distribution and also estimate the extent to which they relate to other variables. For example: - In hospital X, we may summarize the distribution of birth weights by calculating the frequency of low, normal and high birth weight newborns [which means that we have summarized the distributions of birth weight in hospital X]. If we also calculate the frequency of the economic status of the mothers of those newborns, we could also estimate the strength of a possible relationship between economic status of mothers and birth weight of newborns [which means that we are estimating the extent to which two variables, i.e, birth weight of infants and economic status of mothers, are related].

1. **Measures of central tendency**

Mean: The first and most common concept in statistics is the mean. The mean is a “central tendency measure” which describes a typical value in the data. It is also known as the average and is easy to compute: it’s merely the sum of all the values, divided by the count of how many values you have.

When using the mean, it’s important to beware of the tragedy of averages. Looking at just the mean will oftentimes hide large variation in the data, leading to incorrect conclusions. For example, if you calculated the mean value of a particular indicator at a national level, the performance may look good. However, if you looked at the data by regions, you may find that there are only a few high-performing regions while the rest are low-performing. This is why it’s important to look at the full distribution.

Median: The median is simply the 50th percentile, the values where 50% of all values are below it and 50% are above it. The median is another central tendency measure like the mean, but it doesn't necessarily equal the mean. This is because the mean is sensitive to outliers. If you add one value to a dataset that is much, much higher than the other values, then the mean may increase drastically. On the other hand, the median may not move by much.

When there is an odd number of value, the median is the middle value. When there is an even number of values, the median is the average of the two mid-point values.

For example, for the data set {2, 4, 7, 12}, you add 4+7 to get 11, and then divide that by 2 to get 5.5. The median for this list is 5.5. For the data set {5, 8, 11}, the median for this list is 8.

Remember: with the median, you have to order the figures before you can calculate it.

Table 1. CD4 count of HIV/AIDS patients

Clients	CD4 count
Client 1	9
Client 2	11
Client 3	100
Client 4	95
Client 5	92
Client 6	206
Client 7	104
Client 8	100
Client 9	101
Client 10	92

Hint: We can see that there are a few outliers that may skew the data, so we want to use the median. If we order the values in the table, we get: 9, 11, 92, 92, 95, 100, 100, 101, 104, 206.

Since there is an even number of observations, the median is calculated as: 95+100 = 195/2 =97.5

Mode: Another measure of central tendency is the mode. The mode is simply the value that appears most commonly in the dataset. Sometimes, there is only one mode (i.e. a unimodal distribution). However, sometimes there are two (bimodal) or more modes. Modes are very important to understand because if there is a bimodal or greater system, using the median or mean to describe the typical value may not be valid-you may choose a value in between the multiple modes, which means that it might be one of the least common values in the dataset.

Percentiles: Let's say you are given a value in a dataset that has 1000 total values in it, and you are told this value is the 10th percentile. That means ~10% of the total values fall below or less than this value, and ~90% of values fall above it. Thus, there are ~100 values below this value, and ~900 values above it, making this value the ~100th value in the dataset. Thus, percentiles are a quick and easy way to describe where a

certain value falls in the distribution. Percentiles are also oftentimes used as ranges. For example, analysts will often look at the range of values from the 25th percentile to the 75th percentile. This range is known as the Interquartile Range (IQR).

2. **Measures of dispersion**

Range: It is defined as the difference between the largest and the smallest observations in the data set. It is the simplest measure and can be easily understood. Being determined by only the two extreme observations, use of the range is limited because it tells us nothing about how the data between the extremes are spread. Further, interpretation of the range depends on the number of observations; when the number of observations increase, the range can get larger.

Variance: the technical definition of variance is the average of the squared differences from the mean, but all it really does is to give you a very general idea of the spread of your data. Here are some examples of the variance of different datasets:

- The data set {12, 12, 12, 12, 12} has a variance of zero (the numbers are identical).
- The data set {12, 12, 12, 12, 13} has a variance of 0.167; a small change in the numbers equals a very small variance.
- The data set {12, 12, 12, 12, 130} has a variance of 2784.8; a large change in the numbers equals a very large variance.

To calculate the variance for a sample of the data, you can use the following procedure:

1. Find the mean (the average).
2. Subtract the mean from each number in the data set and then square the result. The results are squared to make the negatives positive. Otherwise negative numbers would cancel out the positives in the next step. It's the distance from the mean that's important, not positive or negative numbers.
3. Sum up the squared differences and divide by n-1 (where n is the number of values that have in your dataset).

Standard Deviation: the standard deviation is merely the square root of the variance. While variance gives you a rough idea of spread, the standard deviation is more concrete, giving you exact distances from the mean. This is because the standard deviation is expressed in the same units as the mean, whereas the variance is expressed in squared units.

In other words, the variance of a data set measures the mathematical dispersion of the data relative to the mean. However, though this value is theoretically correct, it is difficult to apply in a real-world sense because the values used to calculate it were squared. The standard deviation is much easier to work with

and interpret because it gives a value that is in the same units as the original values.

Here is an image that compares a high standard deviation/high variance distribution with a low standard deviation/low variance distribution:

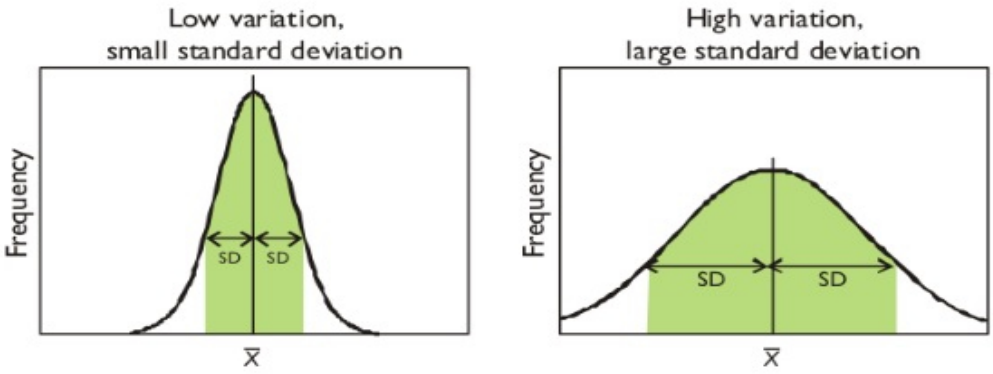


Figure 2. Illustration of the level of variation

Notice that the low standard deviation (SD) distribution is much narrower, while the larger SD distribution is wider.

Outlier Detection

The most effective way to perform an outlier search is to produce a frequency histogram or a box plot. Here is a description of these two types of visualizations along with an illustrative example:

Frequency histogram: can be applied to understand the distribution of a data set (skewed or symmetrical)

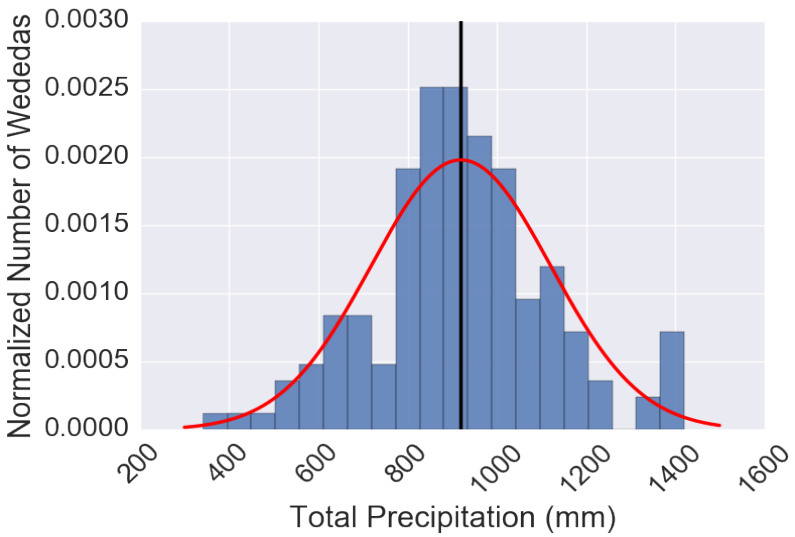


Figure 3. Histogram showed a normally distributed data set

Box plot/box-and-whisker plot (diagram)

Boxplots or box–whisker diagrams are really useful ways to display your data. It can be used to convey a fair amount of information about the distribution of a set of data. At the center of the plot is the median, which is surrounded by a box the top and bottom of which are the limits within which the middle 50% of observations fall (the interquartile range). The box shows the distance between the first and the third quartiles. The end lines show the minimum and maximum values respectively. Sticking out of the top and bottom of the box are two whiskers which extend to the maximum and minimum scores respectively.

We can use a boxplot which is another very useful graph for spotting outliers and greatly compresses data to show difference within and between groups. Box plot is used to show:

- Average measurements in terms of medians
- Variation in the form of ranges and interquartile range (difference between the 1st and 3rd quartile)
- The three quartiles
- Minimum and maximum values
- Outliers

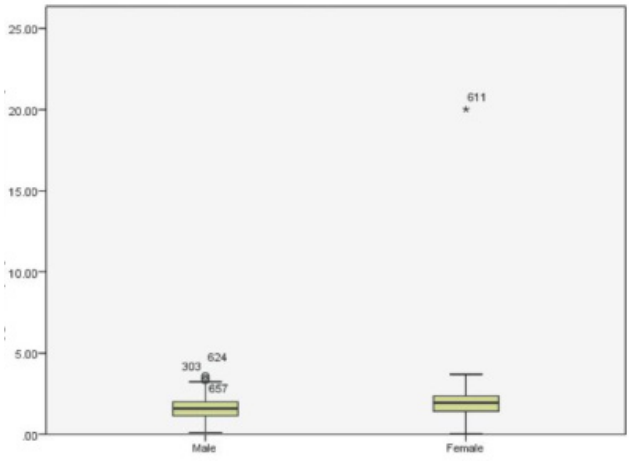


Figure 4. Box plot example to show outlier data value

Figure 4 shows a separate boxplot for the men and women for a hypothetical data. One important thing to note is that the outlier that we detected is shown up as an asterisk (*) on the boxplot and next to it is the number of the case (611) that's producing this outlier. We can also tell that this case was a female.) If we go to the data and locate this case (611), it reveals a score of 20.02, which is probably a mistyping of 2.02. We'd have to go back to the raw data and check. We'll assume we've checked the raw data and it should be 2.02, so replace the value 20.02

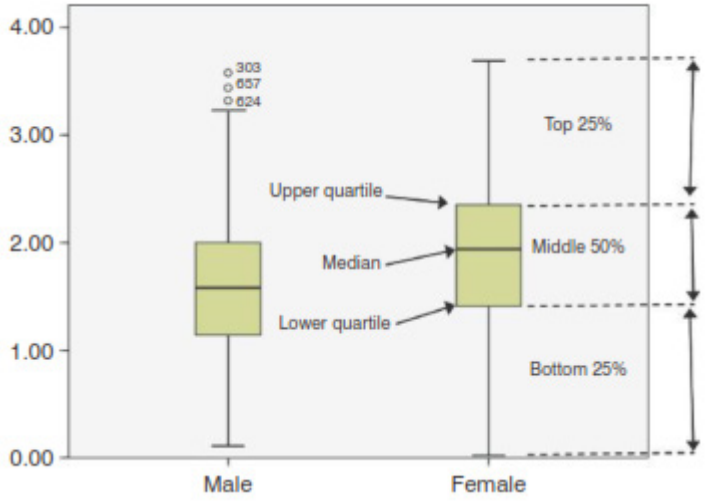


Figure 5. Box plot after outlier data value is removed

Figure 5 shows the boxplots for after the outlier has been corrected. Let's look now in more detail about what the boxplot represents. First, it shows us the lowest score (the bottom horizontal line on each plot) and the highest (the top horizontal line of each plot). Comparing the males and females we can see they both had similar low scores (0, or very smelly) but the women had a slightly higher top. The lowest edge of the tinted box is the lower quartile; therefore, the distance between the lowest horizontal line and the lowest edge of the tinted box is the range between which the lowest 25% of scores fall. The box (the tinted area) shows the interquartile range: that is, 50% of the scores are bigger than the lowest part of the tinted area but smaller than the top part of the tinted area. These boxes are of similar size in the males and females. The top edge of the tinted box shows the value of the upper quartile; therefore, the distance between the top edge of the shaded box and the top horizontal line shows the range between which the top 25% of scores fall. In the middle of the tinted box is a slightly thicker horizontal line. This represents the value of the median.

The median for females is higher than for males, which tells us that the middle female scored higher than the middle male.

Boxplots show us the range of scores, the range between which the middle 50% of scores fall, and the median, the upper quartile and lower quartile score. Like histograms, they also tell us whether the distribution is symmetrical or skewed. If the whiskers are the same length then the distribution is symmetrical (the range of the top and bottom 25% of scores is the same); however, if the top or bottom whisker is much longer than the opposite whisker then the distribution is asymmetrical (the range of the top and bottom 25% of scores is different). Finally, you'll notice some circles above the male boxplot. These are cases that are deemed to be outliers. Each circle has a number next to it that tells us in which row of the data editor to find that case. In Chapter 5 we'll see what can be done about these outliers.

3.2 METRICS OF HEALTH AND HEALTH RELATED DATA

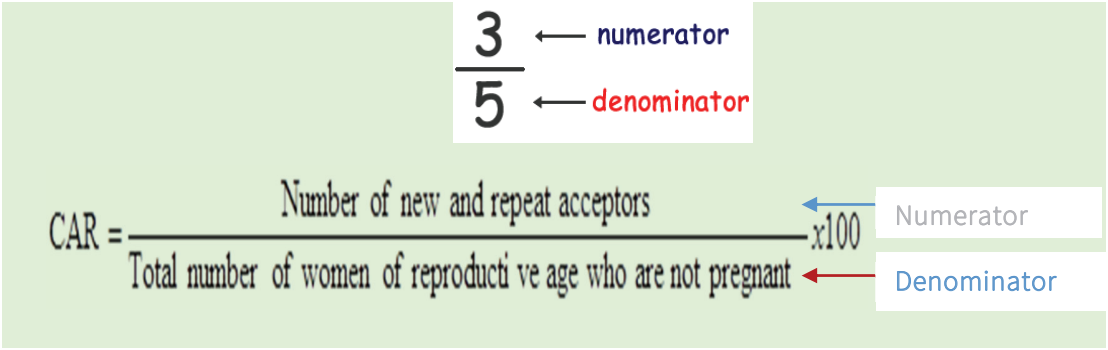
The most important part of what comprises an indicator is the metric. The metric is the precise explanation of the data and the calculation that will give the measurement or value of the indicator. In other words, it specifies the data that will be used to generate the value, and how the data elements will be manipulated to come up with a value. A good metric clarifies the single dimension of the result that is being measured by the indicator. A good metric does this in such a way that each value measured for the indicator is exactly comparable to values measured at another time.

Types of metrics

Ratios, proportions and rates are measures frequently used to define the health of our communities and the services that we are providing. Ratios, proportions, and rates all include both a numerator and a denominator. Therefore, we will start with the concepts of numerators and denominators before we proceed to ratios, proportions and rates.

Numerators and denominators: During calculation of indicators, we usually set up fractions. Numerator is the top number and denominator is the bottom number in a fraction. In public health, numerator is often the number of health events and/or services that we provided.

Example: In the calculation of the indicator "Contraceptive Acceptance Rate", the numerator is "the total number of new and repeat acceptors" and the denominator is "the total number of women in the reproductive age group who are non-pregnant".



In order to clearly understand the above indicator, we need to be clear about both the numerator and denominator. For the HMIS indicators, numerators are taken from the routine HMIS reports (weekly, monthly, quarterly and annual reports); denominators can be taken from the population data in most cases, and may be from HMIS reports. In the above CAR example, the denominator should be from population data. If we know the total population of our catchment population and the conversion factor for expected non pregnant women in the reproductive age group, we can set the denominator for the calculation of the above "CAR" indicator.

Example 2:

Institutional maternal death = Number of maternal deaths in facility X 100

Total number of deliveries in the facility

In this case, both the numerator and the denominator are captured from monthly HMIS report.

We use various tools to measure the frequency of the occurrence of disease, death and other health related conditions and health services in a population. Some of the measures include: counts (raw number), ratios, proportions and rates. We will discuss about each measure as follows.

1. **Absolute Numbers (counts)**

This is the simplest and most frequently performed quantitative measurement. It describes the number of persons who received a particular service or who have a particular disease, event or characteristic. It is the number of entities, events, or some other countable phenomenon, for which the question "how many" is relevant.

- Number of maternal deaths
- Number of leprosy cases detected

Uses of simple counts:

- Helpful to understand the total number of people who receive a certain service or who have a certain type of disease or event
- Mainly useful to monitor the occurrence of important infectious diseases, especially outbreaks
- Used to draw epidemic curve of new cases of a disease over time.

There are many indicators that are collected as part of routine HMIS which are used as measurement tools in a form of numbers or counts.

Examples of HMIS indicators which are described in count forms (These are only few of the HMIS indicators. Refer to your HMIS Indicators Reference Guide to identify HMIS indicators which are in count forms):

- Number of women receiving comprehensive abortion care services
- Number of HIV-positive pregnant women who were on ART and linked to ANC
- Number of individuals who have been tested for HIV and who received their results
- Number of PLWHA newly enrolled to ART

Though simple counts are the simplest methods of measuring an event, disease or service, simple counts often do not provide all of the information needed to understand the relationship of a health event or service to the population in which the event occurred. Counts alone are also insufficient for describing the characteristics of a population and for determining risk. The key is to relate the frequency of an event to an appropriate population. For this purpose we mostly use ratios, proportions, and rates.

We cannot use simple counts to compare events or services across populations and across different geographic regions such as woredas or zones as the number lacks context. Example: If two woredas have provided HIV testing for 4,000 people, we cannot conclude that both woreda's performance is the same. If the two woredas have a huge population difference, we cannot compare their HIV testing performance. If Woreda X has 100,000 populations and Woreda Y has a total population of 200,000, this population difference can have an effect on the coverage of HIV testing. Some of the calculations discussed below (ratios, proportions, rates…) can provide more contexts to these values and standardize these values so they can be used for comparison across geographical areas and population groups.

2. Ratio

A ratio expresses a relationship between two items in the form of X: Y. Ratios are ubiquitous in epidemiology, since they enable the number of cases to be expressed relative to against target population**.** It compares the relative frequency of the occurrence of some event to the other event. It is any fraction obtained by dividing one by another, where the numerator and denominator are not related. Example: you can say ratio of male to female population in woreda X is 1:1.

In the Ethiopian HMIS, there are some indicators that are computed in a ratio way. We calculate ratio to determine the health staff to population ratio. Example: To determine the number of available doctors or midwives to the population of a given area, we use "doctors to population ratio" and "Midwives to population ratio" respectively. The same applies for other professional categories as well. In this case, the numerators (number of health professionals) and the denominator (total population) are not related. In such cases, we use a ratio.

Practical example: Let's say zone X has a population of 1,345,234 people and there are 123 doctors and 576 health officers. From this example, you can say that "there are 123 doctors per 1,345,234 people" or "there are 576 health officers per 1,345,234 people in zone X". However, in order for the ratio make sense, we should convert to "the number of people being served by 1 doctor or 1 health officer (1 doctor per X number of people or 1 health officer per X number of people). Accordingly, it is calculated by dividing the total population by the number of health workers:

$\frac{\text{Total population}}{\text{No. of health workers}} = \frac{1{,}345{,}234}{123} = \frac{10{,}937}{1}$, so 1 doctor is available per 10,937 people

$\frac{1{,}345{,}234}{576} = 2{,}335$, so 1 health officer is available per 2,335 people

3. Proportion

One of the central concerns of epidemiology is to find and enumerate appropriate denominators in order to describe and to compare groups in a meaningful and useful way. Proportion is one of the basic ways to describe a group. A proportion is a type of ratio in which the numerator is included in the denominator and the result is expressed as percentages, per 1000, per 100,000 etc. In order for a count to be descriptive of a group, it must be seen in proportion to it i.e. it must be divided by the total number in the group.

Example:

- Out of the 1000 cases of malaria seen at Hospital X last year, 100 were children. The proportion of children will be (100/1000) x 100 = 10%. It means that 10% of malaria cases last year in hospital X were children.
- Ten hepatitis cases would have quite a different significance for the dormitory if the dormitory housed 500 students than if it housed 20. In the 1st case the proportion would be 10/500 or 0.02 or 2% - in the second case proportion would be 10/20 or 50%.

The majority of HMIS indicators are expressed in a proportion form. Examples:

⇒ Proportion of births attended by skilled health personnel

⇒ Proportion of newborns treated for sepsis

⇒ Proportion of children aged 2-5 years de-wormed

⇒ Proportion of TB cases (all forms) provided treatment observation (DOT) by the community among all TB cases

⇒ And many other HMIS indicators (Refer to the HMIS Indicators Reference Guide)

So, for the first example, the proportion of births attended by skilled health personnel is calculated as:

$$\frac{\text{Number of births attended by skilled health personnel}}{\text{Total number of expected deliveries}}$$

So, to calculate the proportion of skilled births in one woreda that have 2,902 skilled deliveries and 15,003 expected deliveries, the proportion would be calculated as:

$$\frac{2{,}902}{15{,}003} = 0.19 = 19\%$$

From this example, you can see that the numerator is included in the denominator. In this case, the denominator is computed from population data.

Example: Woreda X has a total population of 150,000. What is the total number of expected deliveries? In such cases, you should know the conversion factor for expected deliveries. If, for example, the conversion factor is 3.5 (i.e, 3.5 percent of the population are expected to be pregnant. Therefore, 150,000 X 3.5%= 5,250. The expected deliveries will be 5,250. This is just a population estimate.

Ratios and Proportions

- Ratio: Any fraction obtained by dividing one quantity by another, such as X, the numerator, divided by Y, the denominator, OR (X/Y). X may not be included in Y.
- Proportion: A ratio in which X is included in Y. Proportions are often multiplieed by 100 to be reported as percent. But it can be reported as per 1,000; per 10,000; per 100,000 etc..

4. Percentage (Number per 100)

Percentage (number per 100), is one of the most common ways of expressing proportions. Number per 1000 or per 100,000 and per 1 million or any other convenient base may also be used. A percentage is just a proportion multiplied by 100 and they are often used instead of proportions because most people are more familiar with percentages. As described in the above example, the proportion of skilled deliveries multiplies by 100 will give us the percentage. Several of the indicators in the HMIS are called “proportions” but the formulas require that you multiply the proportion by 100 which mean we are really presenting percentages. Please refer to your HMIS Indicator Reference Guide to calculate some percentages. Some indicators may be expressed as number per 1,000 or per 100,000 because the events are rare to express them as number per 100.

Example: Infant mortality rate: This indicator has a base of 1000 and will be expressed as number of infant deaths per 1000 infants. Maternal mortality ratio is another indicator which is expressed as per 100,000.

Types of calculations

Type of calculation	Characteristics
Ratio	Division of two unrelated numbers
Proportion	Division of two related numbers, numerator is a subset of denominator
Rate	Division of two numbers; time is always in denominator

5. Rate

Rate measures the relative frequency of cases per unit of population per unit of time. It can be seen as a proportion with a time dimension. It measures the occurrence of deaths (mortality), births (natality) and disease (morbidity). Due to the variation in population of different woredas and zones, it can be more helpful to calculate rates per population.

Example: Let us see the following example for Woreda X and Y. Woreda X has a population of 200,000 and reported 500 cases of malaria in 2007 EFY. Woreda Y has a population of 100,000 and reported 400 cases of malaria in 2007 EFY. Measures of malaria disease occurrence can be calculated for Woreda X and Y (500 cases/200,000 population/ one year and 400 cases / 100,000 population/one year, respectively). These are rates for Woreda X and Y. During comparison, it is important to use the same time period. If you want to calculate the rates for EFY 2007, you would use the expected population for EFY 2007. If you want to calculate the rates for EFY 2008, you would use the population estimates for EFY 2008 and so on.

Rates measure the frequency at which a health event occurs over a period of time. A rate is also one number divided by another, but time is an integral part of the denominator. A rate represents the burden of disease or other health related outcome during a specific time period. Proportions and rates are used in public health for quantifying morbidity and mortality

- Some measures of morbidity, or illness, include prevalence and incidence rate
- Measures of mortality include mortality rates, and
- Measures of disease severity include case-fatality

Why we use rates?

- Describe the frequency of a health event or health status relative to the size of a population
- Facilitate comparison of disease frequency across different:
    - Groups of people –account for change in size of community
    - Places – allow for comparison of communities of different sizes
    - Time periods – account for observations over different periods of time

Proportion and Rates

- Rate: Often a proportion, with an added dimension of time. It measures the frequency at which a health event occurs over a period of time

  X, number of events * unit of population

  Y, Population at risk (Eg. 100; 1,000; 100,000)

- Proportions and rates are used for quantifying morbidity and mortality
  - Measures of morbidity: Prevalence; incidence rate
  - Measures of mortality: mortality rate
  - Measures of disease severity: case fatality

6. **Index/composite measures)**: *Composite indices are constructed from individual base indicators based on equal or unequal weights depending their relative importance.*
   - Universal Health Coverage (UHC index) based on 17 'tracer'/base indicators
   - Information use index
   - Customer satisfaction index
7. **Thresholds:** Is presence or absence of an attribute, pre-determined level or standard
   a. Essential drug availability (Yes/NO)
   b. Health facility conducting LQAS (Yes/NO)

Exercise: Libo Kemkem woreda has a population of 250,000. In the woreda, there are 8 health centers, 10 health officers, 20 midwives and 80 HEWs. In the first quarter of 2010 EFY, a total of 960 mothers have delivered in health facilities with the assistance of skilled birth attendants, 1170 women had PNC in the first 7 days after delivery, 1782 children under 1 year of age received penta 3 immunization, 85 new cases of tuberculosis were detected and a total of 1000 cases of malaria were diagnosed and treated.

- Calculate skilled delivery coverage in the worded
- Calculate early PNC coverage
- Calculate pentavalent 3 immunization coverage
- Calculate TB case detection rate
- Calculate morbidity attributed to malaria
- Compute ratio of midwives to population, HEWs to population, health officers to population

[Hint: Use the following conversion factors during calculation of the above indicators:

- Expected number of deliveries in the woreda= 3.4%
- Expected number of surviving infants in Libokemkem woreda= 3.1%
- Expected number of TB patients in the woreda= 250 cases per 100, 000 population

3.3 DATA PRESENTATION/VISUALIZATION

In this section, we will deal about the different data presentation methods followed by examples for each data presentation method.

"A picture is worth a thousand words"

Overview

The manner in which data is translated into visual images for improved interpretation by the reader is called data visualization. Information needs to be displayed/ presented in ways that can be easily seen, understood and discussed by managers and other people. Using charts, graphs and pictures makes ideas and trends to be easily communicated to people. The human brain can more accurately interpret an image or picture rather than rows and columns of numbers, data or words.

Clearly communicating ideas and trends is necessary to guide initiatives toward achieving objectives. The use of data visualization tools is particularly important for health care executives, who often need to convey complex concepts across a wide range of stakeholders that may include representatives from finance, human resources, clinical staff, and more. The uses of visualization tools help simplify the interpretation of the data by the audience or reader.

Data presentation is the systematic process of making information available and accessible to potential users, stakeholders and/or beneficiaries.

Some information is effectively displayed as a table, while other information is more easily understood when presented in a graph or a map. It is important to select the best type of display format that best present the information. Irrespective of the method used for displaying data/information, the following basic principles should be adhered to:

- **Titles / labels** should clearly indicate the contents/data displayed in terms of person, place and time (what, who, where, when). The axes of graphs should be well labeled. Example (title): Measles immunization coverage in Bugna woreda from 2002 EFY to 2007 EFY.
- **Indicate the *source of the data*:** When data from DHIS2 report is used, indicate the date when the data was extracted.

- **Amount of information**: Do not put too much information in one table, graph or map. Keep them simple to convey clear messages that enable users to draw the necessary conclusions from what is presented.

3.3.1. Data presentation techniques

Data reporting should be presented in both textual and visual formats. There are a number of visual data presentation formats such as tables, graphs, maps and diagrams. In this section, we will learn about the details of each presentation format with examples from DHIS2 reports.

1. Tables

A table is the simplest means of summarizing a set of observations and can be used for all types of numerical data. Tables are often used in reports. If tables are used properly, messages can more effectively be conveyed than the written text and enables the presenter to explain the data. Tables are easy to make but may be difficult to use, especially if they are big. It is critical that rows and columns be clearly labeled and, where appropriate, all the categories should be clearly shown.

A table is a method of numerical data organization/presentation in rows and columns. Rows are horizontal and columns are vertical arrangements. The use of tables for organizing data involves grouping the data into mutually exclusive categories of the variables and counting the number of observations (frequency) to each category.

Qualitative variable: Count the number of cases in each category. A simple and effective way of summarizing categorical data is to construct a frequency distribution table.

Quantitative variable: Select a set of continuous, non-overlapping intervals such that each value in the set of observations can be placed in one, and only one of the intervals

The following general principles should be addressed in constructing tables.

- Tables should be as simple as possible.
- If data are not original, their source should be given in a footnote.
- Tables should be self-explanatory. For that purpose
    - Title should be clear and to the point (a good title answers: what? when? where?) and it should be placed above the table.
    - Each row and column should be labeled.
    - Numerical entities of zero should be explicitly written rather than indicated by a dash.
    - Totals should be shown both in row and column wise.

Based on the purpose for which the table is designed and the complexity of the relationship, a table could be either of simple frequency table or cross tabulation. The **simple frequency** table is used when the individual observations involve only to a single variable whereas the **cross tabulation** is used to obtain the frequency distribution of one variable by the subset of another variable. In cross tabulation we can present two variables (two-way table, and more than two variables (**high order table**).

Example: See the following example to understand what a good table should have

Table 2. Antenatal Care coverage (first visit) of Zone X by Woreda, 2007 EFY

Districts	Period				
	Q1	Q2	Q3	Q4	Annual
Woreda 1	66	80	83	94	81
Woreda 2	70	77	96	95	84
Woreda 3	78	86	82	92	85
Woreda 4	59	93	78	90	80
Woreda 5	97	92	98	99	97
Woreda 6	79	84	99	95	89
Zone X (Total)	73	85	89	94	85

Note on Tables

1. Make sure the title is written clearly. It should include
    - The content/data displayed: In the above example, the title described that the data is about "ANC first visit coverage"
    - The data in terms of place and time: In the above example, the content describes the place (Zone X and disaggregated by Woreda), the time (the data is from 2007 EFY)
2. Column and row labels should clearly be written: In the above example, the columns and rows are labeled clearly showing the districts (and zonal total) and period.
3. It is good if the formatting of your table in a document is kept consistent throughout one document. This includes the font type, font size, use borders, and any other details.

One-way (Simple) table

If we assume 40 women gave birth in a given area in a month and if we want to present this data in the form of a simple table, we use a simple (one-way table).

Table 3. Number of deliveries by place of delivery of woreda X, 2009 EFY

Place of delivery	Number of women
Home	40
Health facility	60
Total	100

Relative frequency: Sometimes it is useful to compute the proportion, or percentages of observations in each category. The distribution of proportions is called the *relative frequency* distribution of the variable. It express the frequency of each value or class as a percentage to the total frequency. A relative frequency can be easily computed by dividing each class/category frequency by the total of all frequencies. When the relative frequency is multiplied by 100, it is said to be percentage.

Table 4. Number of deliveries by place of delivery of woreda X, 2009 EFY

Place of delivery	Count (frequencies)	Relative frequency	Percentage (%)
Home	40	0.40	40%
Health facility	60	0.60	60%
Total	100	1	100%

Cumulative frequency: The cumulative frequency of a category is the number of observations in the category plus observations in all categories smaller than it. Likewise, cumulative relative frequency is the proportion of observations in the category plus observations in all categories smaller than it, and is obtained by dividing the cumulative frequency by the total number of observations.

Table 5. Number of deliveries by place of delivery of woreda X, 2009 EFY

Place of delivery	Count (frequency)	Relative frequency	Cumulative frequency	Relative cumulative frequency
Home	10	0.1	10	0.1
Health post	20	0.2	30	0.3
Health centre	30	0.3	60	0.6
Hospital	40	0.4	100	1
Total	100	1	100	1

Two-way table

Table 6. Cross tabulation of ANC follow-up and place of delivery

	Place of delivery	
	Home	Health Facility
Had ANC follow-up	4	25
Had no ANC follow-up	6	5
Total	10	30

High order table

Table 7. Distribution of neonatal mortality by ANC follow-up and Place of delivery

Place of delivery by ANC follow up Yes		Neonatal Mortality		
		No	Total	
Home	Had ANC follow-up	1	3	4
	Had no ANC follow up	2	4	6
Health Facility	Had ANC follow-up	0	25	25
	Had no ANC follow up	1	4	5
Total		4	36	40

2. Graphs

Graphs are very important for making sure that information is fully understood. Graphs should be designed so that they convey the general patterns in a set of observations at a single glance. Although they are easier to read than tables, graphs often supply a lesser degree of detail. However, the loss of detail may be accompanied by a gain in understanding of the data. The most informative graphs are relatively simple and self-explanatory. Like tables, they should be clearly labeled, and units of measurement should be indicated. Graphs should tell a 'story' by themselves and are best used to detect trends over time, search for patterns among large amounts of data and display the relationships between variables.

When using graphs to present data/information:

- Every graph should be self-explanatory and as simple as possible.
- Title should be written clearly, and usually placed below the graph
- Label axes should clearly be stated
- Provide a legend which explains each of the lines or bars
- Select scales that fill the entire graph on both axes. Use scales that best illustrate what is being shown, e.g. percentages may work better than raw numbers.
- Use same scale consistently in graphs
- Where possible, show a target line or reference point
- The numerical scale representing frequency must start at zero or a break in the line should be shown.

Types of graphs

Different types of graphs are used for different purposes. It is important to think which kind of graph will work best to show the information. Example: If you want to see trend over time, a line graph is the best method to visualize your data.

Bar graphs: Bar charts are a popular type of graph used to display a frequency distribution for categorical and discrete nominal variables. Bar charts are used to plot individual data values next to each other, for example to compare different facilities, activities or indicator values. In a bar chart, the various categories into which the observations fall are presented along a horizontal axis. A vertical bar is drawn above each category such that the height of the bar represents either the frequency or the relative frequency of observations within that class. The bars should be of equal width and separated from one another so as not to imply continuity.

- Bars should be considerably wider than the space between them; a principle of allowing the data to dominate the chart.
- Grid lines help to make comparisons
- Avoid choosing very close grid lines
- A well-chosen order for the variable values gives a better chart
- Horizontal bar graphs are used when the variable values have long names or when three are too many variables

There are different types of bar graphs; the most important ones are simple bar graph, multiple / grouped bar graphs, and stacked bar graph.

Simple bar graph: It is a one-dimensional diagram in which the height or length of each bar indicates the size (frequency) of the figure represented.

In the above table which displays the ANC coverage of Zone X by district for 2007 EFY, it can be displayed in a bar graph form as follows. The data can be easily understandable when displayed in graph than in table form.

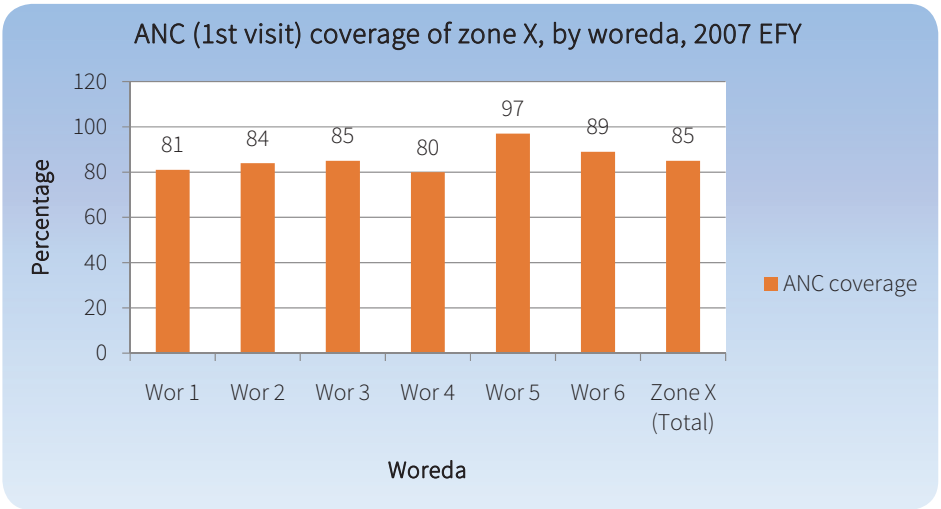


Figure 6. Antenatal Care coverage (first visit) of Zone X by Woreda, 2007 EFY

Using the above bar graph can allow us to easily compare each Woreda than when it is displayed in table or word. In this case, you can easily see that Woreda 4 has the lowest ANC coverage in the Zone (80%) and Woreda 5 has the highest ANC coverage (97%). You can also easily identify that Woreda 1 and Woreda 4 has ANC coverage below the Zonal average.

Multiple/Grouped bar graph: In this type of graph, the component figures are shown as separate bars adjoining each other. It is used when two or more categories of qualitative data put alongside each other. The height of each bar represents the actual value of the component figure. It depicts distribution pattern of more than one variable. The limitation is that it doesn't show the total within a given category. If we also try to cram in too many categories, the chart becomes difficult to understand; hence better to draw several ordinary/normal charts instead.

Example X: The zonal manager may want to see how mothers are utilizing ANC by comparing ANC (first visit) with ANC coverage (4th visit). In this case, the ANC 1st visit coverage and ANC 4th visit coverage should be calculated for each Woreda and for the total (zone) and it can be put side by side so that the difference can be seen easily.

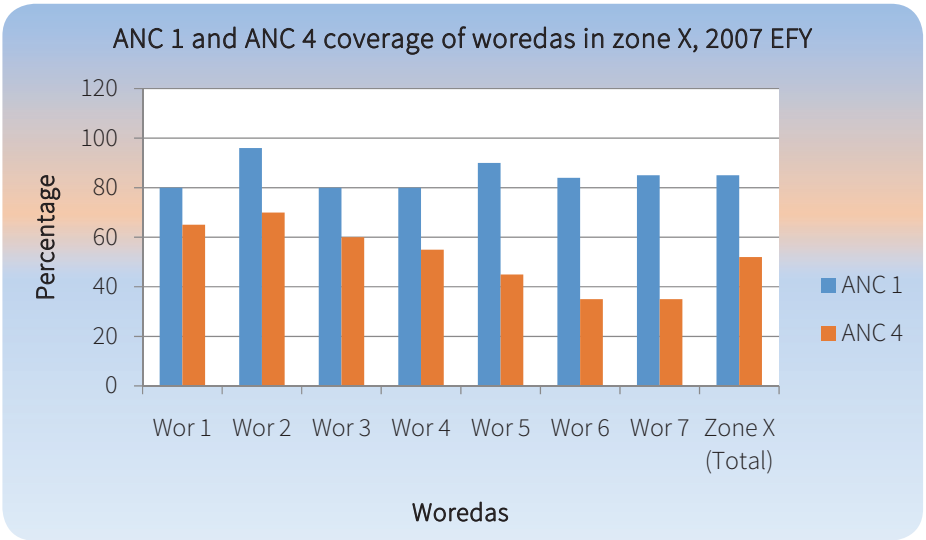


Figure 7. ANC 1 versus ANC 4 in Zone X, disaggregated by Woreda, EFY 2007

In the above example, it can be easily seen that there is a gap between ANC 1 and ANC 4 in all the woredas. The difference is mainly high for Woreda 5, 6 and 7.

Stacked bar chart: A stacked bar chart can be used to convey a greater amount of information in a single picture. In this type of graph, bars that represent the frequency of observations in two or more different subgroups are placed on top of one another. Example: Let us see Early Postnatal Care in different woredas of Zone X for the year 2007.

Bars are sub-divided into component parts of the bar. This type of graph is constructed when each total is built up from two or more components. It gives a picture of how a total is broken into its parts. Total is clearly visible, but the size of each categories of the variable takes second place. Only the size of the bottom category is easy to read precisely and it might be difficult to underhand if lots of categories present and stacked bar graphs can be constructed using actual figures or percentages.

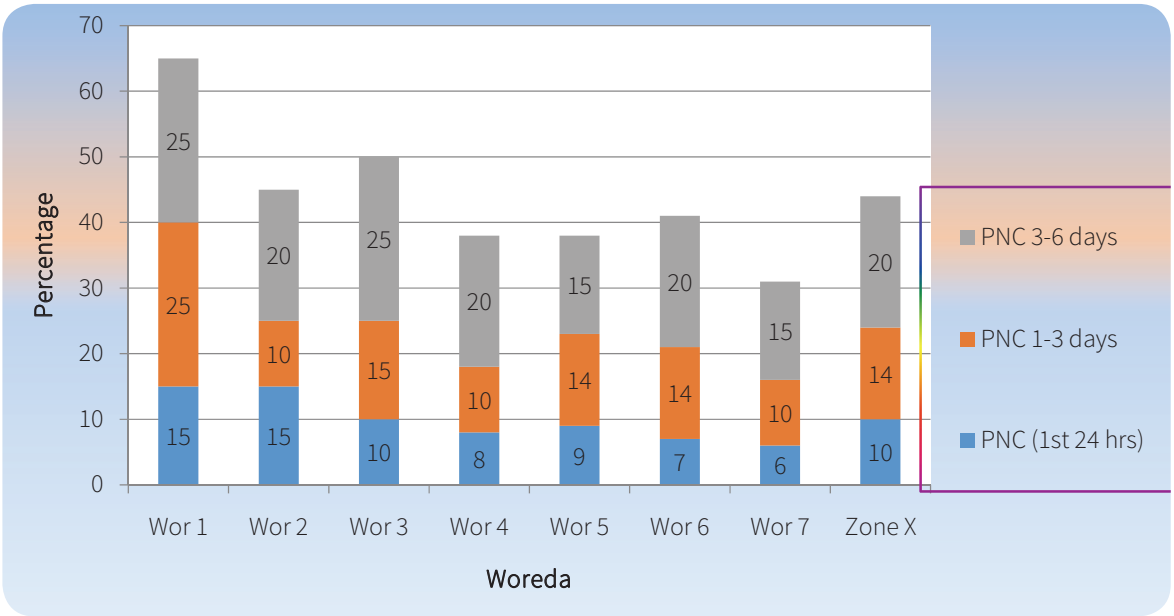


Figure 8. Early PNC coverage in zone X by Woreda, EFY 2007

From the above stacked graph, you can easily convene different information in one graph but in a simple manner. You can see the overall PNC coverage of each Woreda and the zonal average, the percentage of PNC coverage in the specified post-natal period is also displayed for each Woreda.

Histogram

A histogram is a graph of the frequency distribution of continuous measurement variables. It is constructed on the basis of the following principles:

- A histogram is constructed by choosing a set of non-overlapping intervals (class intervals) and counting the number of observations that fall in each class. The number of observations in each class is called the frequency. Hence histograms are also called frequency distributions

- The horizontal axis is a continuous scale running from one extreme end of the distribution to the other. It should be labeled with the name of the variable and the units of measurement.
- For each class in the distribution a vertical rectangle is drawn with
    - Its base on the horizontal axis extending from one class boundary of the class to the other class boundary, there will never be any gap between the histogram rectangles.
    - The bases of all rectangles will be determined by the width of the class intervals
- Class intervals are usually chosen to be of equal width. If this is not the case, the histogram could give a misleading impression of the shape of the data
- Classes of equal size
    - The base of each rectangle is the same
    - Height of the class is equal/proportional/corresponds to its frequency
- Classes of different size
    - Relatively complicated to draw and read
    - Height of the class is not equal/proportional/to its frequency
    - Only **area** is proportional to frequency
    - We therefore write nothing on the y-axis, except perhaps for ticks

Line graphs: A line graph is used to illustrate the relationship between two different continuous measurements. The line graph is especially useful for the study of some variables according to the passage of time. Each point on the graph represents a pair of values: the scale for one quantity is marked on the horizontal axis, or x-axis, and the scale for the other on the vertical axis, or y-axis. Each point on the graph represents a pair of values. Each value on the x-axis has a single corresponding measurement on the y-axis. Adjacent points are connected by straight lines. The time, in weeks, months or years is marked along the horizontal axis and the value of the quantity that is being presented is marked on the vertical axis. The distance of each plotted point above the base-line indicates its numerical value. The line graph is suitable for depicting a consecutive trend of a series over a long period.

Example X: Let us say a zonal manager wants to see the trend of malaria in the zone from 2000EFY to 2007 EFY. To easily understand whether malaria is increasing or decreasing in the zone, a line graph is an appropriate method of data presentation. See the graph below.

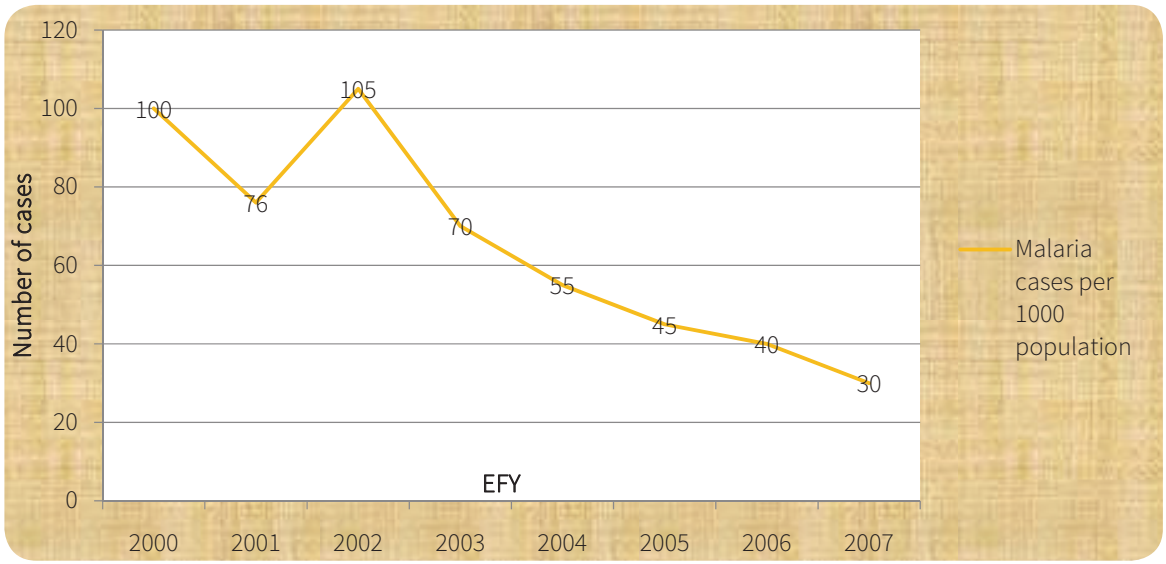


Figure 9. Malaria cases per 1000 population in zone X, EFY 2000-2007

From this graph, we can easily understand the trend of malaria cases per 1,000 populations from EFY 2001 to EFY 2007 in Zone X. We can see that malaria cases in decreasing through time in the zone.

Example 2: A line graph can also be used to compare trend of malaria in different woredas of zone X. The zonal manager can easily understand the Woreda where malaria prevalence is high and where the prevalence is decreasing or decreasing. See the graph below.

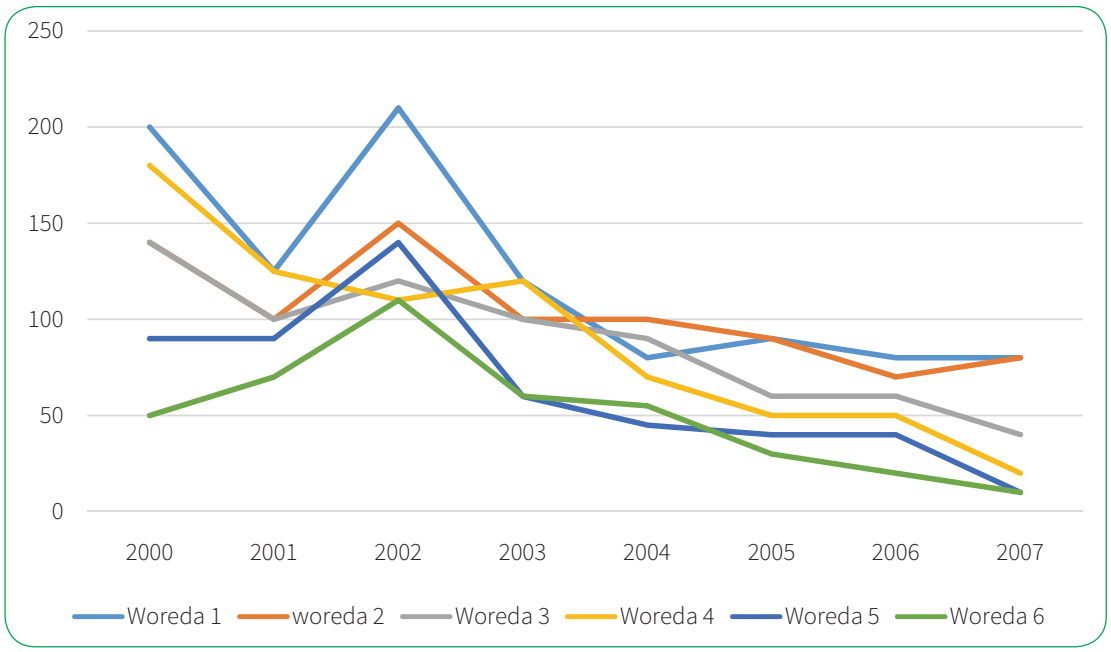
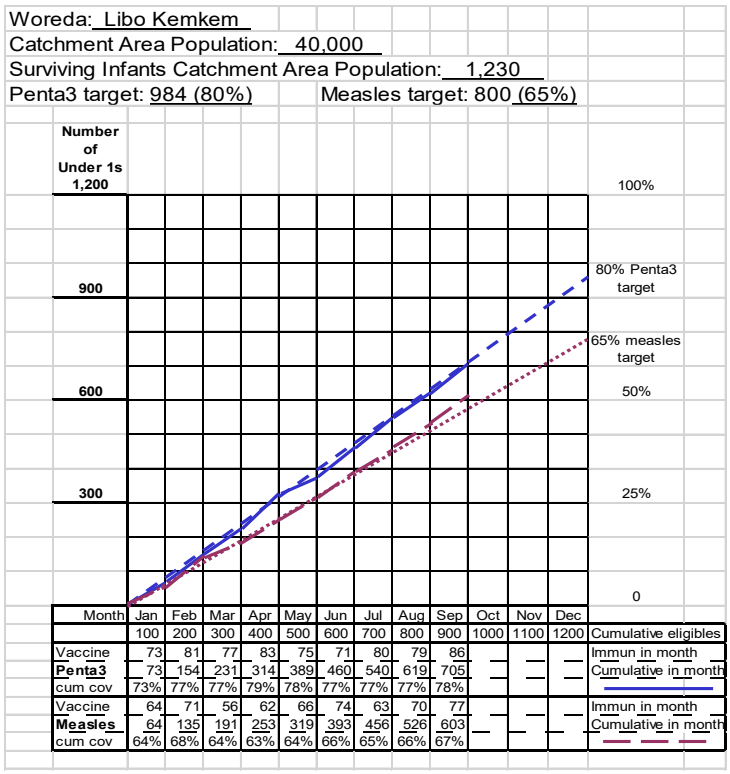


Figure 10. Malaria cases per 1000 population in Zone X, by woreda, 2000-2007

Cumulative coverage graphs: These graphs can be used to show monthly progress towards a fixed target. The activities for the month are added to the cumulative total of the preceding months and this total is compared to the target line to see whether the target is being reached. It is commonly used when targets are set for a year.

Example: A health center can use cumulative coverage graphs to monitor EPI coverage. Let us see one example.



Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	100	200	300	400	500	600	700	800	900	1000	1100	1200	Cumulative eligibles
Vaccine	73	81	77	83	75	71	80	79	86				Immun in month
Penta3	73	154	231	314	389	460	540	619	705				Cumulative in month
cum cov	73%	77%	77%	79%	78%	77%	77%	77%	78%				
Vaccine	64	71	56	62	66	74	63	70	77				Immun in month
Measles	64	135	191	253	319	393	456	526	603				Cumulative in month
cum cov	64%	68%	64%	63%	64%	66%	65%	66%	67%				

Figure 11. Cumulative frequency graph

Pie charts: These types of charts are used to show the proportion of an activity as part of the whole (like the slice of a pie) as a 'slice' in a circle. It is a circle divided into sectors so that the areas of the sectors are proportional to the frequencies. Used to represent and compare the frequency distribution of categorical variables. It is an alternative to bar charts. We should not have too many sectors in a pie chart; five or six is a reasonable upper limit for a lucid chart.

Example: Let us make a chart for the indicator "Proportion of children 6-59 months with severe acute malnutrition that exit, defaulted, died, transferred or recovered from treatment".

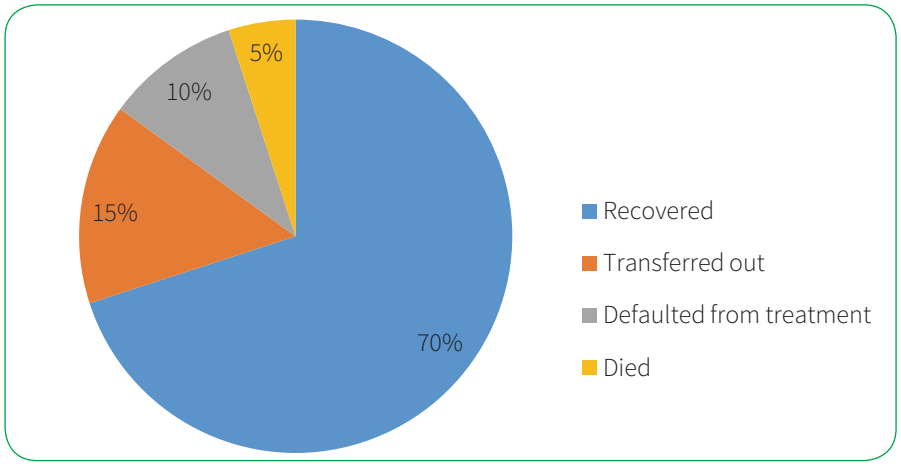


Figure 12. Proportion of children 6-59 months with severe acute malnutrition that exit, defaulted, died, transferred or recovered

Maps: Maps can be used to display several other types of health information. It can provide a global, national, zonal or woreda view of the prevalence of a disease. This can give a clear picture of best performing areas and where most support is needed. Whilst similar data can be illustrated in a graph or a map, a map provides a geographical 'picture' at one glance whilst a graph can be used to compare indicator values for different years in each province and differences between provinces over time in an understandable way. Maps are the most useful visualization methods. There are various map types you can use, such as bubble maps, spot maps to indicate different geographies or administrations.

A catchment area map is an effective tool to enable facility staff to understand the area and the population they are serving. These maps can be used to depict problems in terms of availability and accessibility to health care and distribution of population and facilities.

Spot maps show where facilities are situated and what effect location may have on health indicators and health care results.

Here is an example of a map that uses dots to represent woredas

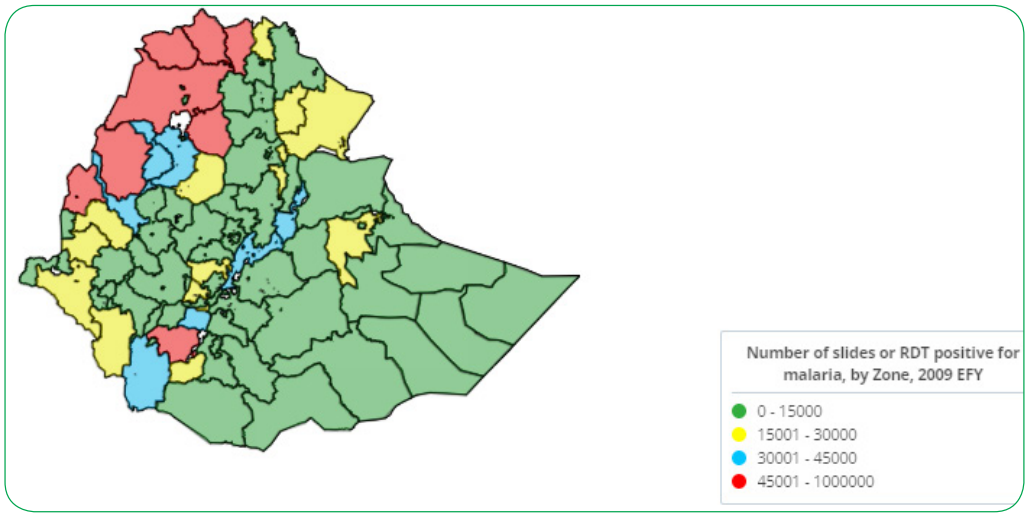


Figure 13. Number of Slides or RDT positive for malaria by Zone, 2009 EFY

3.4 E-SYSTEMS FOR DATA VISUALIZATION

High-quality data displayed in a format that facilitates decision making helps program managers and policy makers effectively allocate limited resources. Multiple software platforms, either open-source or proprietary, are available to facilitate data visualization. These software applications, many of which are interactive, provide tools to develop charts, maps, infographics, timelines, and other visual tools.

These days, measuring and sustaining outcomes improvement in healthcare is a top priority for health sector managers and workers. The common tools used for data visualization using simple electronic tools are Scorecard and Dashboard. Scorecards tell how the health systems is doing overall while dashboards tell what's happening now using interactive metrics with drill-down capabilities. Dashboard visualizations are more in-depth

National Priorities

Contraceptive Acceptance Rate	91.40	Births Attended by Skilled Health Personnel	67.04	Measles Immunization Coverage	84.89

Zones with the Region	Contraceptive Acceptance Rate	ANC - at least four visit	Births Attended by Skilled Health Personnel / Postnatal Care Coverage	PMTCT testing / # of women received ART based on option B+	Penta-3 vaccinated infants	Measles Immunization Coverage	Rotavirus vaccine first dose (Rota1) immunization coverage (< 1 year)	Infants fully immunized	Neonatal tetanus immunization - PAB
Abergele	66.42	72.38	51.92 / 91.82	102.72	132.86	127.64		120.18	
Adi Arkay	39.19	31.46	31.20 / 31.66	47.66 / 2	84.39	77.62		76.94	
Albuko	97.34	90.67	87.74 / 88.47	71.06 / 3	89.68	86.72		86.72	
Alefa	87.32	49.12	27.06 / 38.86	44.49	85.60	83.07		81.52	
Ambasel	97.68	84.76	91.96 / 93.53	85.82 / 4	99.44	97.46		97.46	
Aneded	95.00	71.52	72.58 / 81.21	66.28 / 6	98.92	91.27		91.27	
Angolala Tera	54.00	51.74	47.54 / 44.90	56.85 / 4	71.12	64.32		64.32	
Ankasha Guagusa	42.82	44.82	41.29 / 59.42	65.74 / 1	71.10	65.85		65.74	

Figure 14. RMNCH Scorecard, Amhara Region

Even the most effective tools are impractical without a solid understanding of their intended audience. Presenting a dashboard to high level leadership, for example, might result in a tactical drill-down more appropriate for program experts, health professionals responsible for program monitoring and day-to-day operations. Similarly, presenting a high-level scorecard to the Program experts or health or lower level health professionals won't provide them with the actionable data they need; nor will it enforce accountability.

eScorecard is a powerful data visualization and analysis tool that provides leaders at all levels with easy performance tracking and comparison at subsequent levels of the health system for key indicators, thus enhancing transparency and encouraging action. The scorecard colors; red, yellow and green enable managers to easily visualize and identify areas in which progress has been good or is sub-optimal.

The Ethiopian customized DHIS2 visualizer module enables to generate dynamic data analysis and visualization through charts and tables. The DHIS2 dashboard enables to produce about eight types of charts that shows series, reporting rates for each organizational units. It gives different options of displaying charts, downloading charts as images or PDF, saving charts as favorites, sharing interpretations and switching between tables, charts and map visualizations. For details of DHIS2 dashboard, refer to the data visualizer section of DHIS2 user manual.

Figure 15. Example of Dashboards prepared using charts and DHIS2

3.5. DATA INTERPRETATION

Interpretation of data is one of the most important and most difficult aspects of using data. It is an integral part of a continuum of analysis, presentation, and use. Interpretation of data is used to draw conclusions and make evidence-based decisions. The process of data interpretation helps in relating the findings with the factors that could have influenced program performance and in determining its root causes.

First it is needed to assess the progress towards the goals that has been set by applying epidemiological thinking (who, when, where, what and how) to the results. Furthermore, comparison with activities to past activities (trends) and compare to other similar institutions.

If the findings show that there is no particular problem or issue and the program is progressing well towards achieving its targets, we may simply continue with the program activities as it is. Alternately, we may still want to document and learn lessons from the success of the program.

If the findings show that the program is not progressing well, we would like to know why it is so, understand the factors influencing the performance, decide on solutions and monitor the implementation of the solutions and the progress of the program performance.

Once we have transformed data into information by summarizing them with tables, graphs, or narrative, we need to interpret the data.

Key point: Data interpretation process

- Interpreting the relevance of finding
- Justify the reasons for findings
- Consider other data
- Conduct further interpretation

The following are key steps in the process of data interpretation:

Interpretation: Relevance of finding

- Does the indicator meet the target?
- How far from the target is it?
- How does it compare (to other time periods, other facilities)?
- Are there any extreme highs and lows in the data?

Interpretation: Possible causes and other explanations for your finding?

When seeking potential reasons for the finding, we often will need additional information that will put our findings into the context of the program and its relation with related inputs or outcomes of the indicator. Supplementing the findings with expert opinion is a good way to do this, for example, talk to others with knowledge of the program or target population, who have in-depth knowledge about the subject matter, and get their opinions about possible causes.

For example, high antenatal care coverage with lower percentage of deliveries attended by Skilled Birth Attendances (SBA) will have a different meaning than if we only try to access the program using SBA coverage as the only indicator. Adding more of the key indicators in the analysis can help in appreciating the situation better.

Interpretation: Consider other data/ data source

Your interpretation should relate your findings to those of other sources of data of interest. Previous performance may have served as a baseline for the current performance. The performance findings of other sources may support or contradict your performance. In these regard, you might consider EDHS, Census Data, SARA and Surveillance Data to judge the validity and relevance of our finding.

Interpretation: Conduct further interpretation

Once you review additional data, it may become apparent that these data are not sufficient to explain the reasons for your findings – which a data gap exists. In these instances, it may be necessary to conduct further interpretation.

It is also recommended to that value of the indicator should be related to its determinants. If there is high contraceptive acceptance arte in locality where there is high cultural barriers, the data needs to be further investigated and justified

As it was mentioned, doing comparison, assessing trends and using epidemiological thinking also helps the process of interpretation.

COMPARISON

Comparison is the most important aspect of self-assessment. How the health facility is doing in relation to other similar organizations? This is the basis for competition, an annual performance review that assesses different facilities according to set criteria. As long the comparing is "apples with apples" (i.e. using the same data definitions, same indicator) it is possible to compare program targets with other facilities, or other geographic areas.

Comparison should stimulate some simple questions:

- Is the performance adequate?
- Why is the facility doing well (or badly)?
- What are others facilities doing that can be taken as lesson learnt?
- How can the health facility do better?
- Can the facility improve quality of care with existing resources?
- How can the health facility be more effective or efficient?

A facility should compare itself to:

- Targets set
    - Have the health facility met its targets? If not, why not? What should the health facility be doing better?
    - If the health facility met all the targets, is it possible to set them too low? Should it be more ambitious?

- Other facilities
    - Are achievements similar?
    - Where the health facility has done better? What doings are right? How can the lesson be shared?
    - Where has the health facility done worse? What could be doing better? How can the health facility learn from others?
- Other Woreda, Zone, Region
    - Geographic comparisons help identify what is possible and should motivate staff to achieve those levels of services.
- Norms and standards
    - Many program areas establish "norms" or expected targets that all should strive to reach. EPI coverage of 90% of infants, TB cure rates of 85%, ANC cases of 4 visits or more per pregnancy are "normal" examples.
    - Norms are set for treatment of clients, procedures to be followed and preventive measures for quality of care.

This self-assessment introduces an element of healthy competition into your workplace and allows weaker units to learn from stronger units that are performing better.

TRANDS OVER TIME

Trends are a form of comparison over time. They show service indicators approaching or exceeding the expected norms. However, they may show changing patterns of health in the catchment population; more STIs and rising HIV and TB have been seen over the past ten years.

EPIDEMIOLOGICAL THINKING

Epidemiological thinking is the process of answering the six questions about the population.

1. **Who?** Is usually answered by age, gender or occupation. Who are sick with a particular illness or compliant? Teenage girls? Old men? Infants?
2. **What?** Are some groups always prone to certain conditions? Obese people? People with chronic cough? High blood pressure?
3. **When?** Are conditions seasonal? Diarrhea, pneumonia? Or during holidays when men return home? Or when it rains? Or drought?

4. **Where?** Use your map to spot clustering of cases around a common source, or a particular water supply, or a particular shanty or "red light" area.

5. **Why?** It requires further analysis about patient's habits, possible exposure, diet or other factors that predispose to a particular disease or conditions. Besides, socio-economic conditions also needed to be examined carefully.

6. **How?** Do health services deal with sick people? Are they caring and compassionate? Helpful? Reassuring? What treatment do they get? Is it recommended? Followed? Do some discontinue? Are all cases found? This holds for TB, malaria and HIV, but also continuity of FP, immunizations, care of diabetes or hypertension. Can you measure continuity of care? And what do you do for those who drop out?

If we consider your facility performance of SBA for the EFY 2009 was 24%. What does this mean? Hint: This only showed the annual performance where your facility is. If your previous year facility performance was 22% and you target was 30% for the current year, how do you interpret your performance (24%) in comparison with the base line and Target? Hint: Even though it is better than the baseline, it is still far behind the target. Is this a problem or is it on track? Is there any other explanation for that? What does it mean by a 6% gap between target and performance?

What if the percentage of women receiving ANC is 80%?

What if the proportion of women receiving PNC within 24 hours is 10%?

What if the household survey conducted recently indicates that SBA in the woreda was 12%?

SECTION 4

INFORMATION USE FOR ACTION

SECTION 4: INFORMATION USE FOR ACTION

Section Objectives

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

- Understand steps of information use for strategic and operational decision making
- Identify and prioritize problems and identify solutions
- Apply root-cause analysis techniques and tools
- Prepare action plans and track implementations

Time required: 12 hours

STEPS OF INFORMATION USE

Information use cycle (Steps to be used for information use)

Step 1: Problem identification- IDENTIFY performance gaps

Step 2: Prioritization of Problems – PRIORITIZE

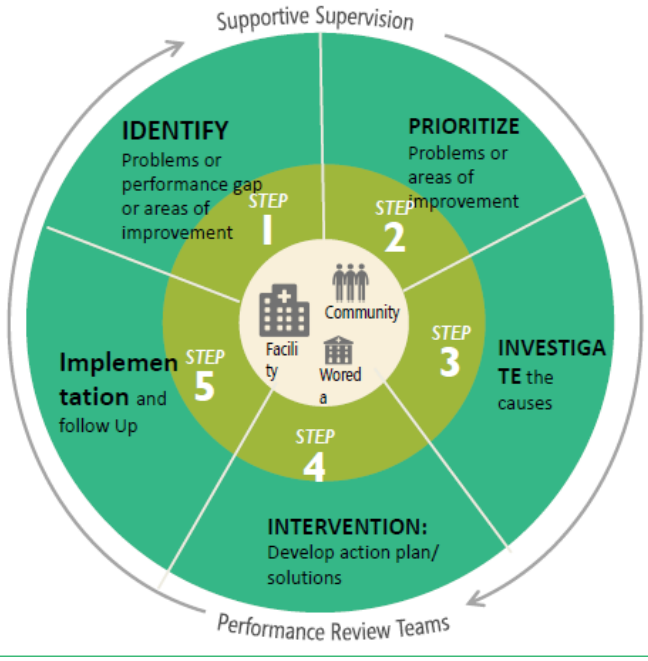
Step 3: Investigate underlying and root Causes - INVESTIGATE

Step 4: Develop action plan/ solutions - INTERVENTION

Step 5: Implementation and follow up – IMPLEMENT the action plan and follow up

A cyclic approach to information use in decision making

5- Step Approach to Improving Data Use



The five step process has been used to facilitate the use of information as a part of the decision-making processes guiding program design, management, and service provision in the Ethiopian health sector. Specifically, the steps to information use outlined in this document will help address barriers to using routinely collected data by providing guidance on:

- linking questions of interest to program managers and providers to existing data;
- analyzing, graphing, and interpreting data; and
- Continuing to monitor key indicators to inform improvements.

STEP 1: IDENTIFY PROBLEMS

The first step in information use is to see whether there is a problem in performance of the facility or institution in provision of equitable and quality of services. In order to know whether there is a problem or not, we use health and health related information that could be drawn from different data sources. The sources of information can be the routine HMIS data (in most cases), disease surveillance data, supportive supervision findings, community feedbacks, experts opinion, financial and human resource data, estimates, projections, surveys or researches. In some cases, you may need to consult multiple, existing data sources for triangulation. In others, there may be a data gap, and the data you need may not exist. In this case, you may consider using proxy indicators or collect data when it is mandatory and feasible. Analysis and interpretation of indicators is dealt in the previous sections (Section III).

Key points:

Identify barriers to equitable provision of quality service

Role of information from multiple sources to identify gaps in performance

We identify performance related problems when the indicator shows a performance gap when compared with the plan or when the existing phenomena differ from our clients' expectations. The problem need to be addressed at different levels as it could affect an individual or the general population's health and could entail multitude of challenges to livelihood of people.

We may ask the following questions to identify problems:

- Is there anything that surprises you in the data?
- Are there any highs and lows in the data?
- How does the indicator compare to other time periods, other facilities?
- How does the indicator compare to the target/ideal?
- How far from the target/ideal is the indicator?
- Are the data consistent with data from other sources?
- Does the indicator in harmony with related indicators (possible association between indicators)? (Example, skilled delivery attendance relation with ANC and PNC coverages)

Example:

Libo Kemkem woreda is found in South Gondar zone and has a projected catchment population of 250,000 in 2010 EFY. The woreda has planned the following targets for 2010 EFY, as described in the table below. During the first and second quarters of 2010 EFY, the woreda has achieved a service coverage as described in the table below. The woreda health office has received complaints from the community regarding the courtesy of health workers, cleanliness of rooms and the availability of drugs in Addis Zemen health center during the town hall meeting.

Table 8. Performance indicators of Libo Kemkem woreda, 2010 EFY

Indicator	Plan for EFY 2010	Achievement (Q1)	Achievement (Q2)
ANC 4 coverage	90%	88%	86%
Deliveries attended by skilled attendants	75%	45%	30%
Early PNC coverage	85%	55%	60%
Penta 3 coverage	95%	92%	98%
TB case detection rate	75%	50%	55%
Morbidity attributed to malaria	<2 cases per 1,000 population	4 cases per 1,000	5 cases per 1,000

Plenary Discussion

- How do you identify problems in Libo Lemkem Woreda, based on the case scenario above?
- Which indicators are on the right track?
- Which indicators have performance gap?
- Develop an appropriate visualization method for the above indicators
- How do see the relationship between indicators?

Exercise: IDENTIFY program and interventions.

In small groups ask participants to list:

1. Major program or health services that are being delivered at their health facility
2. Identify one intervention that reduces mortality, morbidity or improves quality and equity for each program or health services

Major program or health services	One key intervention	Category a. Reduces mortality b. Reduces morbidity c. Improves quality d. Improves service coverage/ equity

STEP 2: PRIORITIZE PROBLEMS

Why do we need prioritization?

Due to shortages of resources, all identified problems may not be tackled at once. As a result, prioritizing the problems helps to identify which health problems/issues has to be dealt first.

Prioritization Criteria

The facilitator should explain that to build a consensus in establishing priorities, standard criteria need to be identified. For this purpose, we use a prioritization matrix to select the priority problems that need to be addressed first. In a priority matrix, priority problem will be selected based on total score. The most priority problem is the one that scored higher and lowest priority problem is that scored lowest. The most common prioritization criteria are: magnitude of the problem, severity of the problem, feasibility and community concern.

Key points

Prioritization - is making decisions on how limited resources could be best allocated to priority health problems or needs.

Criteria for prioritization health problems

Magnitude: How much of a burden is placed on the community, in terms of financial losses, years of potential life lost or in terms of the proportion of the population affected such as pregnant women, neonate, pre-school children, school children, the elderly, etc. This basically describes how big the problem is.

Severity/danger: How serious is the condition to individuals and the community? Does it threaten life, cause major suffering, decrease the ability to lead a normal life, reduce productivity, example outbreak, etc.? What benefits would accrue from correcting the problem? Would other problems be reduced in magnitude if the problem were corrected?

Feasibility: is it possible or easy to implement interventions to reverse the problem? Feasibility of correcting the problem: Can the problem be addressed with existing technology, knowledge, and resources? How resource-intensive are the interventions?

Community concern: Is the problem a pressing issue of the community? Is it essential to include concern/ needs expressed by the community?

Scoring system: First, each member of the performance monitoring team rates each indicator/ health problem by giving a point corresponding to the criteria for priority setting on a scoring sheet. Then, the points given by all reviewers to each criteria will be summed up, and finally, the total score of an indicator will be obtained by adding up the points given by all reviewers. Those at the top of the list, with higher total scores, are priorities for additional financial resources and staff attention for performance improvement during subsequent period.

Table 9. Priority setting matrix table

Type of problem	Magnitude of the problem	Seriousness/ Severity of the problem	Feasibility & cost effectiveness	Community concern	Total

Score: 1-Low, 2-midium, 3-high

Exercise:

- Take four or five health and/or health service related problems in your area that you identified in the previous exercise and prioritize the problems using the priority setting matrix.

STEP 3: INVESTIGATE THE CAUSES

Once the problem is identified, the performance monitoring team has the responsibility to determine the root cause of the prioritized problem and correct it. Explain that several methods exist for analyzing root causes. Some of these employ formal techniques and tools such as Pareto diagrams, "fishbone" (or Ishikawa) diagrams, the logic tree and others. These formal tools can be used to group causes into categories. They can help to dissect an occurrence into its contributing factors and component parts and pinpoint where an error or failure occurred.

Root-cause analysis

Root cause analysis (RCA) is a systematic process for identifying "root causes" of problems or events and an approach for responding to them. RCA is based on the basic idea that effective management requires more than merely "putting out fires" for problems that develop, but finding a way to prevent them. Following the root cause analysis, the organization can develop and implement an action plan consisting of improvements designed to reduce future risk of events and to monitor the effectiveness of those improvements.

Among the simple yet effective tools that all health care provider & manager can adapt and employ are: flowcharts, bar chart, pareto diagram, fishbone diagram. There are other more sophisticated statistical tools like multivariate analysis that can be used to analyze for more complex problems. The tools can be applied in almost any medical and non-medical operation, processes as well as at all level.

A. Fishbone diagram

A **fishbone diagram** is a tool that helps to perform a *cause and effect analysis* for a problem. This type of analysis enables you to discover the root cause of a problem. This tool is also called a **cause and effect diagram** or an **Ishikawa diagram**.

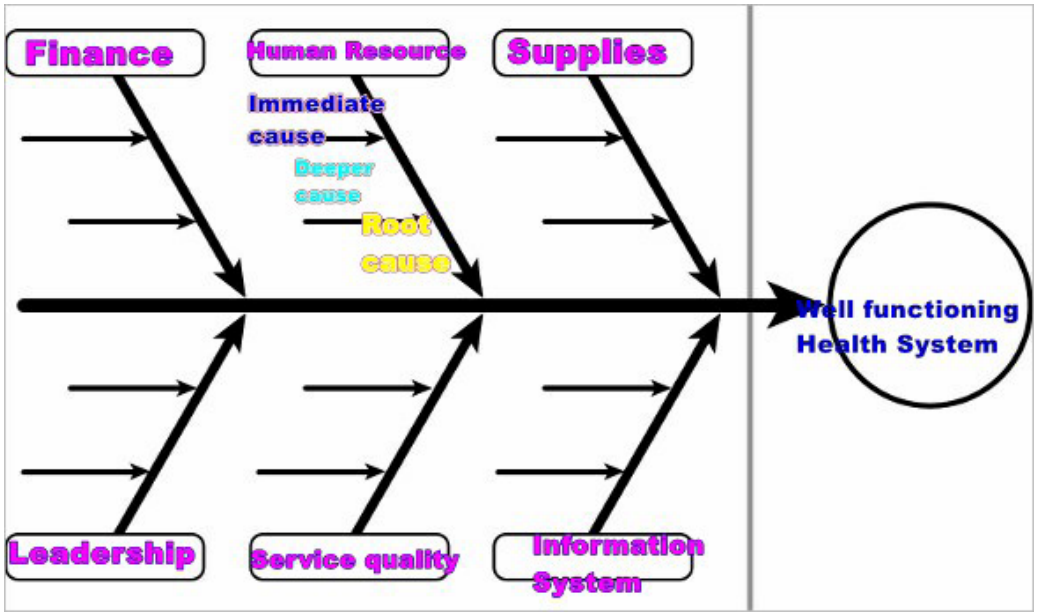
How to create a fish bone diagram

A fish bone diagram can be created in six steps...

1. Draw Problem Statement
2. Draw Major Cause Categories
3. Brainstorm immediate Causes
4. Categorize immediate Causes
5. Determine Deeper Causes
6. Identify Root Causes

Once the problem is identified, the major causes should be categorized. In the health system, the major cause categories can be categorized based on the six building blocks of a health system: leadership/governance, service delivery related, human resource, supplies/drug related, health information, and finance. Then, for each major category, the causes should be brain stormed and similar causes should be categorized. Deeper and root causes should then be identified.

Example:

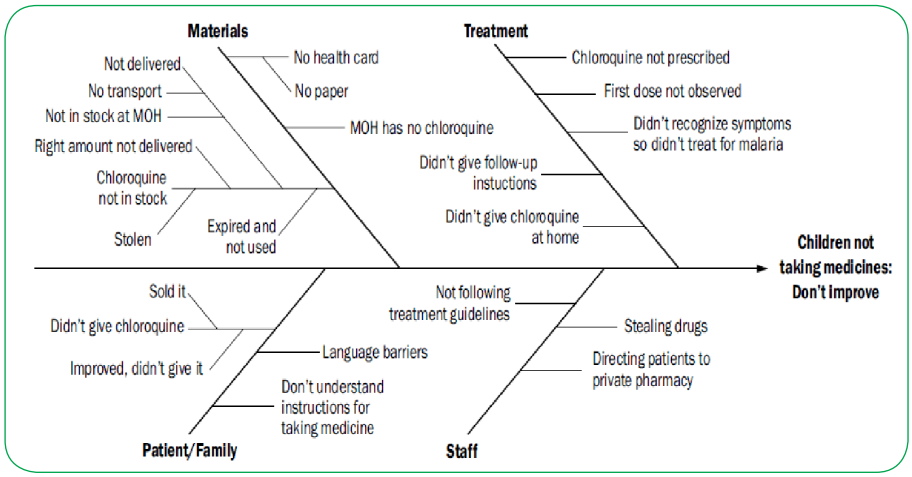


Emphasize that selection of the categories should be done in a participatory manner through consensus using prior knowledge and understanding of the program. The type of categories chosen depends on the context.

- Environmental - those factors outside the influence of the organization, such as governmental regulations, the economic cycle, local, national and global politics, etc.
- Organizational - systems inside the organization such as organizational strategy, human resources, resources, policies, procedures, organizational structure, pay, etc.
- Group or departmental - work processes, group relationships, work responsibilities, work assignments
- Individual attribute - personality, management style, skills, and behaviors.

Tell the participants that in this context where treatment of malaria was a concern, the categories used for cause-and-effect analysis were materials, treatment procedure, staff skills and behavior and patient/family.

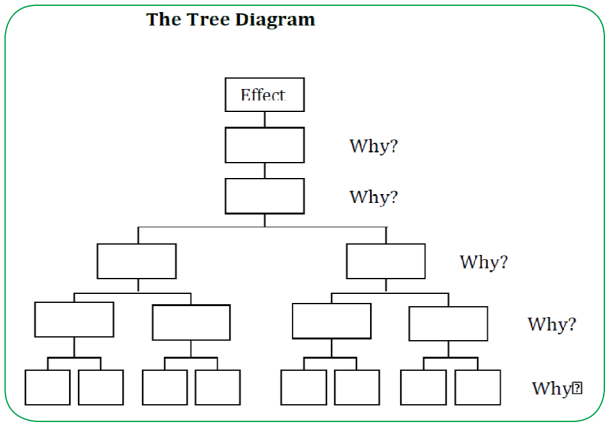
Example of a fishbone diagram used to find the causes of children not improving following malaria treatment. (*Taken from: QA Monograph – A Modern Paradigm for Improving Healthcare Quality: USAID Quality Assurance Project).*



B. The Tree Diagram– 5 WHYs (Problem tree/ Logic trees)

The analysis is done by constructing a problem tree. A problem tree is a set of assumptions on causes associated with the problem and its consequences.

The Tree Diagram (Chain of causes) starts with laying down the immediate or major causes of the effect/ problem. Each major cause is then further explored by asking "Why did this happen?" The second layer of causes is further explained by repeating the question "Why did this happen?" Such questioning continues for looking in-depth to find the root cause.



The root cause is the one that is convincing and can explain the effect directly or through a series of events initiated by it, is agreeable to action and addressing it will solve or reduce the problem.

Steps in problem tree construction

- Start by writing the problem statement on a large single sheet of paper that is pinned to the wall. Each member of the group will be given cards and pens.
- The facilitators will ask participants to write down what you think are the main causes of the stated priority health problem. Write only one cause on each card and in as few words as possible.

- For each cause, continue to ask yourself the question "BUT WHY?" and write down one answer per card.
- The facilitators will then arrange the cards under the problem statement on the wall, thus creating a problem tree.
- As you analyze problems and look at their causes you may realize that you wish to formulate the problem in a different way.
- After describing the immediate and associated causes of a problem you then describe the possible consequences of not addressing the problem. These are put above the problem and this completes the problem tree. You will realize that all the causes and consequences are described negatively.
- The last step is to review the problem tree you have just constructed. Going through each of the causes you have identified, ask yourself "Is this something we can change in the district?" We would like to focus on what is within our control to improve, even if only in a small way.

Example: Applying why 5 times

Let's say the skilled delivery coverage in Libo kemkem woreda in the two quarters of the current year has declined from the previous year performance by 30%, and the woreda health office PMT has identified this decline in performance as a priority problem during the review of the second quarter performance of the woreda.

Let's try to apply the why five times approach to identify the root causes

1. Why skilled delivery service has decreased/declined in this quarter in Libo kemkem woreda?
    a. Because women are not coming to facilities for delivery service, demand for service has declined
2. Why does demand for delivery service has decreased?
    a. Because women perceived the quality of service has deteriorated
3. Why do women perceive that service quality has declined?
    a. Because respectfulness and caring of professionals has decreased
    b. Because care in the maternity waiting homes has declined
4. Why respectfulness of clinicians and quality of service at the maternity waiting homes has declined?
    a. Because staff are demotivated/dissatisfied
    b. Because there is lack of cook to prepare foods and clean maternity waiting homes

5. Why staff are demotivated/dissatisfied and there is lack of cook to prepare food and clean maternity waiting homes
    a. Because there is no recognition of staff
    b. Because cook is not employed due to delayed in decision of the health facilities governing boards to commission budget from the revenue the health facilities generate

Exercise on root cause analysis

Based on the exercise that you did in the previous sessions, select the first two prioritized performance gaps/problems and do root cause analysis:

1. Use fish bone diagram for the first prioritized performance gap
2. Use "The Tree Diagram– 5 WHYs (Problem tree/ Logic trees" for the second

STEP 4: INTERVENTION- DEVELOP AN ACTION PLAN/ DEVELOP SOLUTIONS

Once a root cause is identified, we have to develop an intervention to tackle the problem. This should be done in a collaborative approach with relevant stakeholders.

Developing interventions is the process of identifying, short-listing and deciding between alternative approaches and measures to address identified and prioritized health problems and needs. At this stage the key question to be addressed is "how might we...?"

"How might we… questions" help to reframe your learnings or challenges into opportunities and often are used to launch a brainstorming session. Many potential solutions and ideas can be generated through this process, which allows for open discussion and dialogue.

Sometimes the cause of the problem is straightforward and deciding on a solution does not need much discussion or intervention design. However, in many occasions the issue is complex and various alternative solutions/intervention may be put forward to address the problem. In such a situation prioritizing the intervention, selecting a technique or approach to design the intervention and selecting the most appropriate intervention is necessary.

Steps of formulation of interventions

The following steps are needed in developing interventions:

- Identifying and short-listing gaps and weaknesses, threat and opportunity.
- Identifying additional components and activities that are required to bring about the desired changes.

- Modifying proposed interventions in line with geographical, political, climatic and socio cultural conditions.
- Consider the following criteria for modifying the interventions:
  - Any intervention which has very strong political support, should be included
  - Any intervention that has a binding constraint/ infeasible should be dropped
- Addressing constraints by using community resources, modifying job responsibilities and tasks, shifting available resources from one activity to another and obtaining additional resources;
- Improving management and administration in line with identified interventions.

Deciding solutions/interventions

Ask the participants what is the next logical step once a root cause has been identified. Appreciate that the next step is to decide on solution(s) or intervention(s) to resolve the problem.

Inform that formulating solutions and deciding which one to choose is also a participatory process and involves engaging the stakeholders. Sometimes the cause of the problem is straightforward and deciding on a solution does not need much discussion. However, in many occasions the issue is complex and various alternative solutions may be put forward to address the problem. In such a situation prioritizing the solutions and selecting the most appropriate one or ones is necessary.

Inform that there are many ways to prioritize the solutions. Decision makers use various criteria to prioritize and select the solutions.

Show the following table and explain that in this the criteria used for prioritization of interventions are:

- Time required to implement the solution
- Cost of implementation
- Potential for improving the situation
- Availability of resources

The high scoring intervention is selected for implementation

Table 10. Prioritization matrix for intervention selection

Potential Solutions	Magnitude Large scale = 4 Medium scale = 3 Low Scale = 2 Very Low Scale = 1	Feasibility Highly feasible = 4 Good feasibility = 3 Low feasibility = 2 Not at all feasible = 1	Cost Low Cost = 4 Medium Cost = 3 High Cost = 2 Very High = 1	Other Resources Needed Minimal = 4 Few = 3 Several = 2 Significant = 1	Capacity Excellent Capacity Exists = 4 Good Capacity Exists = 3 Fair Capacity Exists = 2 Little Capacity Exists = 1	Total

Preparing Action Plan

A plan of action- is usually prepared in a matrix format and will normally contain the following items: The identified problem, objective(s)/interventions, list of activities, inputs, responsible actor, assumptions and risks, indicator, output, cost and time frame. An example of a plan of action

Action Plan Matrix

Table 11. Action plan matrix

Performance gap to be addressed	Causes	Solutions /action points	Responsible Person	Time

STEP 5: IMPLEMENTATION AND FOLLOW UP

Once the action plan is prepared and approved by the appropriate authority, the success of the plans will depend on how well it has been implemented. There are three aspects that should be kept in mind while implementing the plan of action. These are Effectiveness, Efficiency and Timeliness. Proper implementation of activities requires prior preparation in identification of resources needed, allocation of tasks and setting deadlines. The team leader or the person responsible for the activity has to follow the implementation of the activities to ensure that the various tasks are accomplished within the set deadlines. These deadlines

and allocated tasks should be made known to all members of the team involved in the activity. This will ensure timely completion of activities.

The key question to be addressed at this stage of the information use cycle is “how will we know when we get there and what have we achieved?” It is expected that PMT members should assess the progress in the implementation of the action plan in their subsequent PMT meetings.

Table 12. Implementation follow-up Template

Intervention/Solution	Indicator	Target/Expected result	Responsible Person	Progress status*

*Progress status: This should be documented and reported during the next PMT meeting. The status includes: Completed, Partially completed, delayed, cancelled, Other (Write)

SECTION 5

PLATFORMS FOR HEALTH INFORMATION USE

SECTION 5: PLATFORMS FOR HEALTH INFORMATION USE

Time: 240 minutes

Section Objectives:

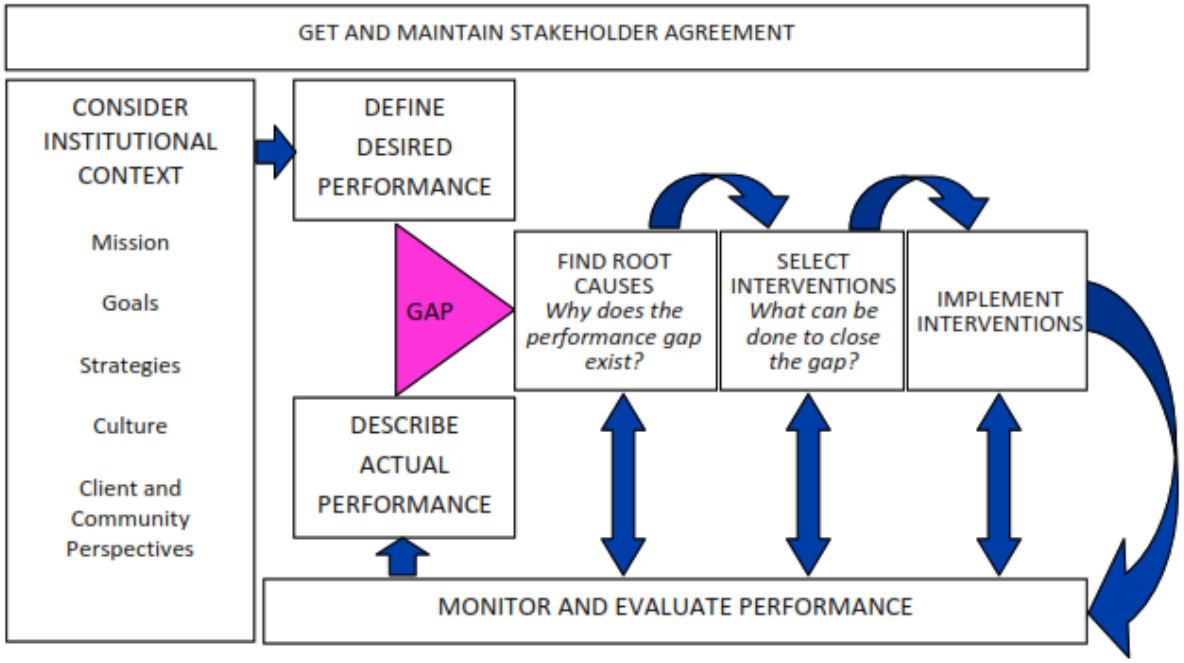
By the end of this section, participants will be able to:

- Explain the various platforms for information use
- Describe the general principles, processes, structure, role & responsibilities of Performance Monitoring teams (PMT)
- Understand the Annual Woreda-based planning and its linkage with information use
- Identify the different Review meeting forums and their linkage with information use
- Explain the health information products and dissemination channels

5.1 MAJOR PLATFORMS AND FORUMS FOR INFORMATION USE

The major platforms in the health sector for use of information are the Woreda-based annual planning, regular Performance Monitoring Meetings and participatory review meetings. These platforms use information to monitor progress vis-à-vis performance targets set at the time of strategic planning (HSTP) and the Woreda-based annual planning. Within this Performance Improvement framework, results are achieved through a process that considers the institutional context, describes desired performance, identifies gaps between desired and actual performance, identifies root causes, and selects interventions to close the gaps and measures changes in performance.

Figure 16. The Performance Improvement Framework



The desired performance is defined in terms of performance targets by quantifying changes expected in a specified timeframe. These targets specify a minimum level of performance, or define aspirations for improvement. These performance indicators and targets have been defined and quantified in the Woreda-based Annual Plan.

There are also other platforms, forums and events in the health sector which use quantitative or qualitative health information for evidence-based decision making either systematically or in a less organized and structured manner. Among these are the Strategic planning (HSTP) process, other governance and national coordination structures of HSTP such as Joint Consultative Forum (JCF), MoH-RHBs Joint Steering Committee (JSC) meetings, the Joint Core Coordinating Committee (JCCC) meetings, performance monitoring meetings, management committee meetings, review meetings….etc. and others that exist in the health sector. There are analogues structures and reviews at the regional and lower levels.

5.1.1. Performance Monitoring Team (PMT)

Key points: Who, What, When, How and Why PMT works

- **Who**: a performance monitoring team, composed of members of the management committee at health administration units and unit/case team leads and heads of health institutions at hospitals and health centers.
- **What:** Key equity and quality of service indicators of HSTP/HMIS plus indicators of local importance and findings from any data sources
- **When:** The PMT meets on monthly basis at all levels before report is submitted to the next level. The JSC, which complements the PMT at MOH level, happens every two months.
- **How:** a problem solving cycle that the team uses when an indicator signals a performance shortfall using root causes analysis and visualization/display tools
- **Where:** PMT must be established at all levels of the health system, both at health administrative units and health facilities
- **Why:** The overall objective of the monthly performance monitoring team is to assure result-based monitoring and evidence-based decision making for improving the health sector's performance.

General principles and process of Performance Monitoring Team

Performance Monitoring Team is a team of multidisciplinary health workforce that is primarily responsibility to improve data quality and use information regularly to monitor progress and improve performance at all levels. Ensuring data quality and continuous use of information will result in improvement in access, utilization, coverage and quality of health services. Therefore, adhering to and implementing the following guiding principles strengthens PMT functions and create sense of responsibility and accountability.

- PMT must be established at all levels of the health system, both at administrative health units and health facilities, from MOH to primary health care unit level.
- Clear responsibilities must be in assigned to members of PMTs through TORs and membership assignment letters.
- Heads or delegate heads of the institution are the chair persons of the PMTs at all levels; planning and M&E unit head or HMIS focal person will be a secretary; case team coordinator of health facilities & process owners of administrative health units are permanent members of the PMT.

- PMT meeting should be planned to be conducted regularly. Meeting date, venue and its members should be officially communicated/notified in advance and the meeting should be conducted at least a day ahead of submission of the monthly report to the next level.
- PMT meeting agenda should be prepared and shared with members ahead of time.
- The agenda primarily focuses on the implementation of Woreda-Based Health Sector Plan and might include other issues or priorities (e.g. HDA, any reported epidemic, etc.) set by the FMOH, RHB, ZHD or WoHO. The review will consider plan versus achievement and the extent of the coverage of health services to total population eligible for that specific service
- Discussions should focus on appreciating the progress, identifying problems or performance gaps and their root causes, decision and prioritizing solutions. Decisions on solutions should clearly state "What", "by When", "by Whom" and "with What resources/how (refer section IV).
- Discussion should also focus on the level of execution, practicality of previous decisions and the extent of mitigation of the previous problems. All decisions should be circulated to the concerned persons in a timely manner.
- If the problem is repeatedly reoccurring over time, the PMT should flag it for seeking in-depth analysis or support from higher level. This is where innovative problem solving approaches such User-Centered Design and the need for designing Quality Improvement Project (QIP) should be considered for re-designing, prototyping and scaling solutions.
- The current PMT meeting should always begin with follow up actions for gaps identified in preceding PMT meeting and evaluation of the progress on identified gaps.
- All meeting minutes must be documented based on the standard template and be signed by all members who attended the meetings.
- PMT must check the quality of the report (check for its completeness, timeliness, consistency, outliers, unusual trends … etc)
- Agenda for the next meeting will be set during each meeting. However, any issues arising later and deemed necessary for discussion will be added to the agenda by the secretary in consultation with the chair

Organization of the Performance Review Team

A. Federal Ministry of Health

At MOH level, the PMT is composed of PPD and selected MOH directorate (All program wing directorates plus operation wing directorates as needed). It is chaired by the director or delegate of PPD and the member directorates will play the secretarial role in a monthly rotation basis.

It is complemented by Joint Steering committee (JSC) where RHBs and MOH agencies are members. The JSC is a forum that brings together the Ministry of Health and the Regional Health Bureaus and agencies. The meeting is chaired by the Minister of Health, head of PPD/FMOH is the secretary and the participants include the State Ministers of Health, Regional Health Bureau Heads and heads of departments/services of the Ministry and the RHBs. The Committee should meet every two months.

B. Administrative structures

Health administrative structures include Regional Health Bureaus, Zonal Health Departments or sub-city health offices, special woreda Health Offices, Woreda Health Offices and Town Administration Health Office

1. All management members of the Health Administrative Unit are members of the PMT.
2. Heads of the health administrative structures at each level will be chairpersons for the PMT. In extraordinary circumstances, where the head cannot chair the meeting, vice head of the regional health bureau or officially delegated person can chair the team meeting.
3. Planning, Monitoring and Evaluation Process Owners will serve as the Secretary of the PMT. The secretary will be responsible for:
    i. In consultation with the Chair of PMT, call the meeting and communicate the meeting date to all the members.
    ii. Review of health system's performance vis-à-vis performance targets set in Woreda-based Health Sector Plan; done mostly using HMIS data, complemented/supplemented by data from other sources
    iii. Ensuring that HMIS reports are available timely, completely and accurately for the respective process owner to prepare their performance review findings
    iv. Supports the process owners to review and interpret the data analyzed to help them make a decision and take action
    v. Ensuring recording of the meeting minutes; archive the minutes and circulate them to all concerned

4. The Performance Review Team will meet on monthly basis and assess/evaluate the overall performance, develop improvement action plan, and track the implementation.

C. Health Facility level

1. Hospital and PHCU Director or official delegate will be the chair person for the PMT
2. All case team coordinators will be team members
3. The PMT at health center level may invite the HEWs to participate in the meeting on need basis
4. HMIS focal person will serve as secretary and responsible for:
   i. Ensuring data accuracy, timeliness and completeness of HMIS reports
   ii. Supports the case team coordinators to review and interpret the data analyzed to help them make a decision and take action.
   iii. Ensuring recording of the meeting minutes; archive the minutes and circulate them to all concerned in a timely manner.

5. The PMT will evaluate the overall performance accordingly

6. The Performance Review Team will meet on monthly basis and assess/evaluate the overall performance of the Hospital or the Primary Health Care Unit (PHCU), develop improvement action plan, and track the implementation

D. Health Post Level

1. Kebele chairperson or official delegate will be the chairperson for the PMT
2. Kebele chairperson, Kebele manager, women and children's affair representatives, agricultural development agents, teachers and Health extension worker(s) and focal person from health center will be team members
3. Health extension workers will serve as secretary and will be responsible for:
   i. Ensuring data accuracy, timeliness and completeness of HMIS reports and data from other sources
   ii. Ensuring recording of the meeting minutes; archive the minutes and circulate them to all concerned in a timely manner.
4. The HEWs will compile reports and presents the data at the kebele council meeting.

5. The PMT analyzes health data from various sources including data from HMIS, reports on the performance of health development army leaders, schools health activities, pregnancy mother conferences, community score cards, town hall meetings etc …
6. The HEW facilitate discussion for identification of barriers to quality service delivery, development and tracking of improvement action plan.
7. The implementation of improvement action plan of the previous meeting should be reviewed in the subsequent PMT meetings.

5.1.2. Annual Woreda-based plan

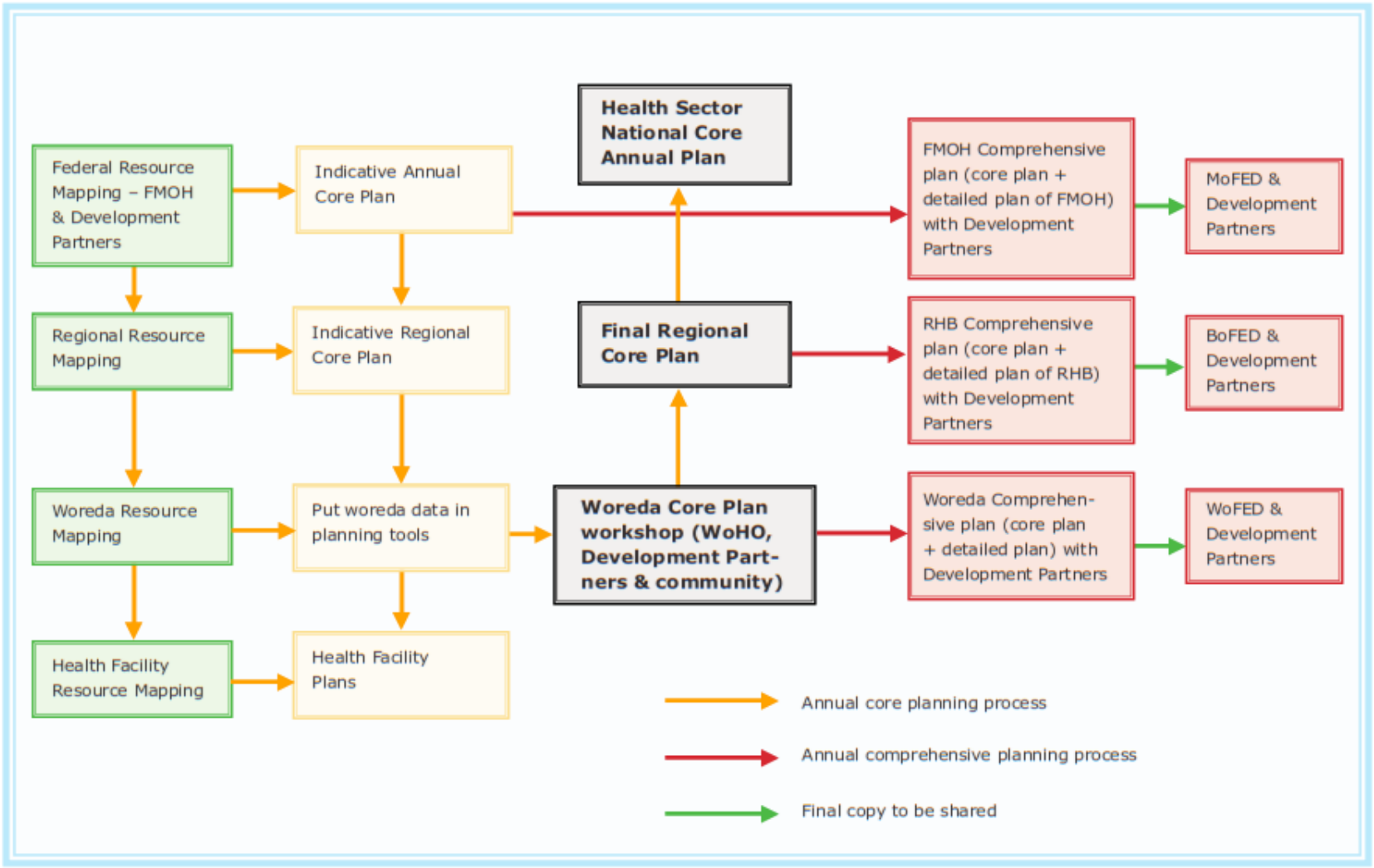
Health Sector Transformation Plan (HSTP) is the health chapter of the National Growth and Transformation Plan (GTP2). The annual woreda-based plan is a yearly operational plan of HSTP with broader objectives, priorities and targets of the strategic plan that will be translated into operational activities.

The planning process is conducted through a top-down and bottom-up approach with horizontal alignment. Through this process, the health sector aspires to develop one unified health sector plan with consultation of major stakeholders, including relevant government institutions, donors, NGOs and the community at each level.

Based on the broader objective, priorities and the targets of the five-yearly HSTP, an indicative annual plan is developed at the Federal level. The indicative plan is important to give direction and align the plans at all levels with the priorities. The Federal level indicative plan is shared with the regions based on which they prepare their own regional Indicative Plan. Then, zonal indicative plan is prepared and sent to the woredas. The Woreda Health Offices prepare comprehensive Woreda Plans using evidence-based planning approach and Balanced Scorecard planning framework. These HSTP Woreda-based Plans are aggregated to the regional and national levels. Hence, issues at grass root level are reflected at the national level.

The Woreda-based Health Sector Planning is an evidence-based result-oriented planning exercise. Most of the indicators used for the planning and monitoring the implementation of the plan come from HMIS. The Woreda-based Health Sector Plan and the performance objectives set within that plan will become the basis for the monthly, semi-annual and annual performance review meetings.

Figure 17. The annual Woreda-based planning cycle



The HSDP Harmonization Manual (HHM)

Types and source of data/information required for a decision-making during the Woreda-based annual planning process:

- Review of previous/closing year's performance against target for selected indicators of each program area/service and gap identification which serves as a baseline
- Take into account and comprehend the targets set for the particular year in the indicative plan at a national and regional level
- Data on resource available gleaned through a systematic resource mapping (Budget, grant, community mobilization, user-fee retention)
- Catchment population (By sex, age groups, residence and pregnancy)
- Number of (Actual or estimated) eligible population for a particular service which is a basis to compute coverage of the service
- Data on number of health facilities and health workforce
- Number of Kebeles in the catchment (Urban/rural)
- Number of households in the catchment area (Urban/rural) and others

The sources of data are generally from institution / HMIS/ and population-based sources (Census, EDHS, Civil Registration and Vital statistic (CRVS), other surveys and assessments ...etc.

5.1.3. Review Meetings

Types of review meetings and linkage with information use

The HSDP Harmonization Manual (HHM) calls for every two months, quarterly, biannual and annual participatory review meetings at different levels. In these meetings, local authorities and stakeholders are brought together with health institutions' staff to review performance, based on the health institution's own self- assessment, and to determine actions needed to ensure achievement of the annual plan. The health sector officials involved represent the implementing institutions for each level:

- The FMoH organizes Annual Review Meeting (ARM) that brings regional, zonal, woreda, facility mangers, experts and partners together for review of annual performance of the health sector and dissemination of best experiences
- Regional health bureaus and ZHDS organize review meetings that brings regional experts, zonal, woreda, facility mangers, health extension workers and stakeholder to review regional health sector performance and disseminate best experiences

- Woreda health offices and hospitals; conducts quarterly performance review meetings with the involvement of woreda and facility managers and experts, health extension workers, experts and relevant stakeholders
- In addition to sector-wide review meetings, programs specific review meetings such as HIV program review meetings are carried out at various levels of the health system with variable frequency from annual to quarterly.

During these meetings, strengths and challenges will be reviewed and future plans will be agreed upon. To enhance the relevance of ARM, in-depth studies will be conducted on selected key themes.

Types and source of data/information required for a decision-making during review meetings:

- Performance against target for a particular period under review (Annual, semi-annual and quarter)
- Quantitative and qualitative information shared thru lessons learnt, best practices and success stories for decision making and action
- Information presented in integrated supportive supervision report, research reports and program updates followed by a discussion and decision-making
- Surveys, operational researches, community feedbacks, expert opinions, etc …

5.1.4. Information products and dissemination

An information product can be defined as "An item that has been derived from one or more sources of information to meet a specific purpose". Information products synthesize information into easily understandable formats for different target groups. Information products is about transforming data into information that will become the basis for evidence and knowledge to shape health action. Information products are collated from a range of sources, and synthesized into usable statistics that can be analyzed and compared.

An important component of information use is strengthening processes of dissemination of **information product**s. This requires developing procedures and practices for dissemination and feedback and the development of quality information products. The value of information is enhanced by being accessible to decision makers. Through widespread dissemination and use of information products, the HIS provides direct benefit to all those who participate in it, providing an ongoing incentive for users to continue to strengthen the system.

In addition to disseminating information products during the platforms described above, common information dissemination media include:	
• Annual performance reports • Broadcast Media • Academic journals • Technical reports • Bulletins • Regular newspapers • Health and Health related indicators	• Special interest newsletters • Radio or TV interviews • Web sites • Social media • M&E digest • Community structures • Others

SECTION 6

MONITORING AND EVALUATION OF INFORMATION USE

SECTION 6: MONITORING AND EVALUATION OF INFORMATION USE

6.1 INTRODUCTION

Measuring the level of information use at different levels of the health system is essential. Health institutions should monitor the status and level of information use in their respective health institutions and take actions based on the monitoring result. It is hoped that lower levels of management, including health care providers, will use information for planning, monitoring and improving health services and it is at this level that information use can have the greatest impact on the efficiency and effectiveness of health services.

In order to use data for the different purposes, there should be reliable sources of data and a system that avails the data. In line with this, Ethiopia has recently revised the indicators, sources and associated guidelines in order to make the existing system more responsive to the program and other stakeholders need. Though there remain important challenges regarding the quality and level of detail of available information, it is generally recognized that much of the data needed for decision making are already being collected on an on-going basis by the national health information system. Moreover, the country has customized and is being implementing the DHIS2 all over the country.

However, even if the availability of data and need vary, different assessments show that the level of information use in all the facilities and administrative levels is not satisfactory. To address this, the country has developed this information use training module which is expected to be implemented at all levels of the health system assuming it will bring significant change in tackling the problem. In line with this initiative, as part of this guideline, this monitoring and evaluation tool has been developed to assist and strengthen the implementation of the guideline.

The tool is intended to assist and ensure the practice of information use in health institutions, particularly in health facilities. The dimensions and indicators included in this monitoring and evaluation tool is adopted from the Connected Woreda Assessment Checklist.

6.2 MONITORING OF INFORMATION USE

6.2.1. Indicators to monitor information use at heath institutions

The following indicators can be used to monitor health institutions on the status of information use:

- ✓ Availability of PMT as per the standard
- ✓ Number of PMT meetings held during the assessment period
- ✓ Inclusion of quality and equity indicators

- ✓ Use of multiple data sources
- ✓ Regular comparison of performance versus achievement
- ✓ Identification of Performance gaps by comparing achievement against target
- ✓ Performed root cause analysis
- ✓ Preparation of action plan
- ✓ Availability of performance display charts in each program unit
- ✓ Number of review meetings held
- ✓ Number of publications disseminated to the public

6.2.2. Recording and data Collection

PMTs at all level are expected to use the HMIS standard PMT minute book which is one of the basic tools to monitor and verify the existence of a functioning PMT as a basis for team-based information use. For additional M&E of Information use, data can be collected using semi structured questionnaire (information use checklist) and review of documents. Evaluation can be done during periodic PRISM assessment but monitoring can be done more frequently. It is recommended to conduct monitoring every quarter and discuss the findings with PMT meetings. In the connected woreda strategy, a list of questions are listed to monitor the level of information use at woreda health office and health facility level. This tool can be used by WoHOs and health facilities to monitor themselves on information use.

The checklist includes the following key points:

- **Team for Information Use:** Establishment and functionality of Performance monitoring team is a pre-requisite for information use. The following points regarding PMT need to be included in our M&E checklist regarding infrastructure for information use:
  - Establishment of PMT in the health institution: Check if PMT is established as per the standard (the standard is available in Section 5 of this manual)
  - PMT meetings: Check if the PMT is conducting regular PMT meetings and documentation is done using a minute.
- **Review of key performance indicators**
  - Check if the PMT is reviewing key performance indicators
  - Check if equity and quality indicators are included in the review
  - Plan versus achievement based on the key indicators
  - Performance gaps are identified by comparing achievement against target

- Root cause analysis is done for low performing key indicators
- Action plan is prepared &implemented for the identified priority problems/challenges
- PMT action plan/meeting minutes were circulated to case teams

- **Feedback**
  - Check if feedback is provided to monthly reports submitted from lower levels/units
- **Information Display**
  - Recent information display (Performance charts) in program units
  - Information display in the compound
  - Information display at community level
- **Information Dissemination:** Check whether the following information dissemination mechanisms are conducted
  - Regular participatory Review meetings held (Expectation: Every quarter for WoHOs and PHCUs)
  - Integrated Supportive Supervision conducted (Expectation: Every 2 months for WoHOs and every month for PHCUs)
  - Publications

6.2.3 Reporting of information use

Information use is not among the revised list of regularly reportable (monthly, quarterly, annually) HMIS indicators. However, the reports mainly from connected Woreda assessment can be monitored on a regular bases. Reports from other mechanisms such as supportive supervision, HMIS mentorship, RDQA and DQR can be considered as well although information use as an index is not being measured based on a complete list of indicators as in connected Woreda and PRISM assessments.

Health institutions will use the information use assessment checklist (that is adopted from the connected woreda strategy) to determine their level of information use and to discuss the findings during PMT meetings. Each question is scored and the total score can be used to know the status of information use in each health unit. The total score can help health institutions to be categorized as:

- ✓ Model information use status: If the total score is >=85%
- ✓ Moderate information use status: If the total score is between 70 to 85%
- ✓ Poor information use status: If the total score is less than 70%

6.2.4 .Supervision/assessments/mentorship

- Taking into account that the connected Woreda strategy is the main vehicle to operationalize Information Revolution and information use being the major area of focus of the connected Woreda and its rating criteria, regular assessment of mainly of team-based information use should be assessed using the connected Woreda assessment checklist. The assessment is done six-monthly according to the connected Woreda implementation guideline. The scoring of the adopted checklist for information use is weighted from a score of 100% (Note that the connected woreda strategy includes three main issues: Infrastructure/Digitization, Data quality and information use. The information use section of the connected woreda assessment checklist is used to monitor the status of information use in each health institution.
- Information use can also be assessed and monitored using other mechanisms such as supportive supervision, HMIS mentorship, RDQA and DQR although as mentioned above information use as an index is not being measured based on a complete list of indicators as in connected Woreda and PRISM assessments.
- Any independent regular assessment of information use might be considered if the above existing mechanism deemed to be short of capturing key information use related indicators

6.2.5. Review meetings

- Information use can be assessed during regular HMIS focused review meetings (HMIS review meetings) that is organized and conducted at different levels of the health system.
- Information use can also be assessed in other review meetings with information use as a key agenda.

6.3. EVALUATION OF INFORMATION USE

Evaluation of health information use is conducted primarily thru PRISM assessment. It can also be done as part of other HSTP evaluation mechanism such as MTR and final/end-term evaluation

REFERENCE

1. Federal Ministry of Health (2015). Health Sector Transformation Plan 2015/16-2019/20. Addis Ababa, Ethiopia
2. Federal Ministry of Health (2016). Information Revolution Roadmap, Addis Ababa, Ethiopia
3. World Health Organization (2000). The world Health report 2000. Health Systems: improving Performance, Geneva, Switzerland
4. Measure Evaluation, USAID Seven Steps to use routine information to improve HIV/AIDS Program
5. Measure Evaluation, USAID and PEPFAR (2012). Data Demand and Use: An Introduction to Concepts and Tools.
6. Federal ministry of Health (2007). The HSDP Harmonization Manual. Addis Ababa, Ethiopia
7. Federal Ministry of Health (2013). HMIS Information Use Guide. Addis Ababa, Ethiopia.
8. World Health Organization (2008). Health Metrics Network: Framework and standards for country information systems. Geneva, Switzerland
9. Anwer Aqil, Theo Lippeveld and Dairiku Hozumi (2009). Health Policy Plan. PRISM framework: a paradigm shift for designing, strengthening and evaluating routine health information systems

ANNEX 1: CHECKLIST FOR ASSESSMENT OF LEVEL OF INFORMATION USE BY WOREDA HEALTH OFFICES

SN	Indicators	Possible Points	Points Given	Remarks
1	**Performance management team(PMT) is in place and established according to national standard** • PMT is in place and the members are put together based on the national standard – 5 points • PMT is in place but the members are not put together based on the national standard – 2.5 point • PMT is not established at all – 0 points **Define the membership as per the national standards**	**5**		
2	**PMT is convening on monthly basis** • PMT has met for six or more times in the last six months - 5 points • PMT has met for five times in the last six months – 3 points • PMT has met four or less times in the last six months – 2.5 point • PMT has not met in the last six months – 0 points	**5**		
3	**PMT is chaired by the head of the Woreda Health Office as per the national standard** • All the PMT meetings in the last six months were chaired by the head of the WoHO – 2.5 point • At least three PMT meetings in the last six months were chaired by the head of the WoHO – 1.5 point • Less than three of the PMT meetings in the last six months were chaired by the head – 0 point	**2.5**		
4	**PMT is reviewing key performance indicators**	**35**		

	The health facility is tracking key quality and equity indicators from the transformation plan • Health quality and equity indicators are included in the list of indicators being tracked -5 points • Either quality or equity indicators are included in the list of indicators being tracked -2.5 points • There are no quality or equity indicators in the list of indicators being tracked – 0 points **For equity: there is documented information that shows comparison of key performance indicators on urban/rural, age and sex disaggregation** **There is documented evidence that shows tracking key quality indicators (define these indicators)**	5		
	Plan versus achievement based on the key indicators • There is documented information that shows comparison was made between what is planned and what is achieved on the key indicators six times in the last 6 months- 7.5 points • There is documented information that shows comparison was made between what is planned and what is achieved on the key indicators five times in the last 6 months- 5 points • There is documented information that shows comparison was made between what is planned and what is achieved on the key indicators four or less times in the last 6 months- 2.5 point • There is no documented information that shows comparison is made between what is planned and achieved based on the key indicators - 0 points	7.5		
	Performance gaps are identified by comparing achievement against target	2.5		
	Root cause analysis is done for low performing key indicators • Root cause is identified for all low performing key indicators – 5 points • Root cause is identified for only some low performing indicators – 2.5 points • Root cause is not identified for all the low performing indicators – 0 points	5		

	Action plan is prepared for the identified priority problems/challenges • Action plan (with roles and responsibilities, resources and timeline) is prepared for all the identified priority problems/challenges – 5 points • Action plan is prepared for some of the identified priority problems – 2.5 points • Action plan is not prepared at all – 0 points	5		
	The action plan is being implemented • There is documented evidence for actions taken – 5 points • No action is taken– 0 points	5		
	PMT action plan/meeting minutes were circulated to case teams • PMT action plan/meeting minutes were circulated to case teams six times in the last six months – 5 points • PMT action plan/meeting minutes were circulated to case teams five times in the last five months – 2.5 points • PMT action plan/meeting minutes were circulated to case teams four or less time in the last six months – 1.0 points • PMT action plan/meeting minutes were not circulated to the case teams at any point in the last three months - 0 points	5		
5	**Written feedback was given to lower level supervisory unit on strengths and weaknesses based on the analysis of information collected** • The Woreda Health Office provided written feedback to all lower level supervisory units two times in the last six months – 15 points • The Woreda Health Office provided written feedback to all lower level supervisory units once in the last six months – 12.5 points • The Woreda Health Office provided written feedback to only some lower level supervisory units two times within the last six months – 10 points • The Woreda Health Office provided written feedback to only some lower level supervisory units only once in the last six months – 7.5 points • The Woreda Health Office has not provided written feedback to lower level supervisory units- 0 points	**15**		

6	The Woreda Health Office has presented or disseminated at least one assessment findings in the last six months • The Woreda Health Office has conducted and disseminated at least one assessment findings – 7.5 points • The Woreda Health Office has conducted at least one assessment findings but unable to disseminate - 5 points • The Woreda Health Office has not presented or disseminated any assessment findings - 0 points *The assessment could include client satisfaction survey, waiting time, case studies, case report, equity survey, etc.*	7.5		
7	**Every case team has a program performance monitoring chart** • All case teams have displayed a program performance monitoring chart – 7.5 points • Only some of the case teams have displayed a program performance monitoring chart – 5 points • Only the HMIS unit/case team has displayed a performance monitoring chart – 2.5 point • None of the case teams have a program performance monitoring chart – 0 points **Provide standard list of performance monitoring chart**	**7.5**		
8	**The Woreda Health Office has displayed information in the form of table, chart, etc. based on selected indicators in the office compound and in the community** • Information is displayed in the Woreda Health Office compound and other community locations – 7.5 points • Information is displayed only in the Woreda Health Office compound or in community locations only - 5 points • No information was displayed either in the Woreda Health Office compound or other community locations – 0 points	**7.5**		

9	**Information dissemination materials such as a brochure or newsletter that shows the woreda health performance is printed and disseminated to the general public** • A brochure or newsletter or other printed materials that shows the woreda performance was printed and disseminated twice in the last 6 months - 10 points • A brochure or newsletter or other printed materials shows the woreda performance was printed and disseminated once in the last six months – 7.5 points • A brochure or newsletter or other printed materials that shows the woreda performance was printed but not disseminated in the last six months – 5 point • No brochure or newsletter is printed and disseminated in the last twelve months – 0 points	**10**		
10	**The Woreda Health Office held performance review meeting with stakeholders** • The WoHO held review meeting twice in the last six months – 5 point • The WoHO held review meeting once in the last six months – 2.5 point • The WoHO did not held performance review meeting in the last six months – 0 point	**5**		

Table 14. Checklist for assessment of level of information use by health facilities

SN	Indicators	Possible Points	Points Given	Remarks
1	**Performance management team(PMT) is in place and established according to national standard** • PMT is in place and the members are put together based on the national standard – 2.5 points • PMT is in place but the members are not put together based on the national standard – 1.5 point • PMT is not established at all – 0 points ***Define the PMT membership as per the national standards***	**2.5**		
2	**PMT is convening on monthly basis** • PMT has met for six or more times in the last six months - 3.75 points • PMT has met for five times in the last six months – 2 points • PMT has met four or less times in the last six months – 1.25 points • PMT has not met in the last three months – 0 points	3.75		
3	**PMT is chaired by the head of the health facility as per the national standard** • All the PMT meetings in the last six months were chaired by the head of the WoHO – 1.25 point • At least three PMT meetings in the last six months were chaired by the head of the WoHO – 0.75 point • Less than three of the PMT meetings in the last six months were chaired by the head – 0 point	1.25		
4	**PMT is reviewing key performance indicators**	37.5		

	The health facility is tracking key quality and equity indicators from the transformation plan • Health quality and equity indicators are included in the list of indicators being tracked -5 points • Either quality or equity indicators are included in the list of indicators being tracked -2.5 points • There are no quality or equity indicators in the list of indicators being tracked – 0 points **For equity: measure if there is documented information that shows comparison of key performance indicators disaggregated by age and sex** **There is documented evidence that shows tracking key quality indicators**	5		
	Plan versus achievement based on the key indicators • There is documented information that shows comparison was made between what is planned and what is achieved on the key indicators six times in the last 6 months- 7.5 points • There is documented information that shows comparison was made between what is planned and what is achieved on the key indicators five times in the last 6 months- 5 points • There is documented information that shows comparison was made between what is planned and what is achieved on the key indicators four or less times in the last 6 months- 2 point • There is no documented information that shows comparison is made between what is planned and achieved based on the key indicators - 0 points	7.5		
	Performance gaps are identified by comparing achievement against target	2.5		
	Root cause analysis is done for low performing key indicators • Root cause is identified for all low performing key low performing indicators – 2.5 points • Root cause is identified for only some low performing indicators – 1.5 points • Root cause is not identified for all the low performing indicators – 0 points	7.5		

	Action plan is prepared for the identified priority problems/challenges • Action plan (with roles and responsibilities, resources and timeline) is prepared for all the identified priority problems/challenges – 7.5 points • Action plan is prepared for some of the identified priority problems – 3 points • Action plan is not prepared at all – 0 points	7.5		
	The action plan is being implemented • There is documented evidence for actions taken – 5 points • No action is taken– 0 points	5		
	PMT action plan/meeting minutes were circulated to case teams • PMT action plan/meeting minutes were circulated to case teams three times in the last three months – 5 points • PMT action plan/meeting minutes were circulated to case teams two times in the last three months – 2.5 points • PMT action plan/meeting minutes were circulated to case teams one time in the last three months – 1 point • PMT action plan/meeting minutes were not circulated to the case teams at any point in the last three months - 0 points	5		

4	**Written feedback was given to lower level supervisory unit or case teams on strengths and weaknesses based on the analysis** • Written feedback was provided to all lower level supervisory units six times in the last six month – 15 points • Written feedback was provided to all lower level supervisory units less than six times in the last three month – 12.5 points • Written feedback was provided to some lower level supervisory units six times in the last six month – 10 points • Written feedback was provided to some lower level supervisory units less than six times in the last six month – 8 points • The health facility has not provided written feedback to any of the lower level supervisory units or case teams - 0 points	15		
5	**The health facility has presented or disseminated at least one assessment findings in the last six months** • The health facility has conducted and disseminated at least one assessment finding in the last six months – 10 points • The health facility has presented at least one assessment findings but unable to disseminate in the last six months – 5 points • The health facility has not conducted or disseminated any assessment finding – 0 points ***The assessment could include client satisfaction survey, waiting time, case studies, case report, etc.***	10		
6	**Every case team has a program performance monitoring chart** • All case teams have a performance monitoring chart - 12.5 points • Only some of the case teams have a performance monitoring chart – 7.5 points • Only the HMIS unit/case team has displayed a performance monitoring chart – 2.5 point • None of the case teams have a performance monitoring chart – 0 points **Provide standard list of performance monitoring charts**	12.5		

7	**The health facility has displayed information in the form of table, chart, etc. based on selected indicators in the health facility compound and in the community** • Information is displayed in the health facility compound and other community locations – 7.5 points • Information is displayed only in the health facility compound – 5 points • No information was displayed either in the health facility compound or other community locations – 0 points	7.5		
8	**Information dissemination materials such as a brochure or newsletter that shows the health facility's performance is printed and disseminated to the general public** • A brochure or newsletter that shows the health facility performance was printed and disseminated every quarter - 7.5 points • A brochure or newsletter that shows the health facility performance was printed and disseminated every six months – 5 points • A brochure or newsletter that shows the health facility performance was printed and disseminated annually – 2.5 point • No brochure or newsletter is printed and disseminated in the last twelve months - 0 point	7.5		
9	**Health facility held performance review meeting with stakeholders** • The health facility held review meeting twice in the last six months – 2.5 point • The health facility held review meeting once in the last six months – 1.5 point • The health facility did not held performance review meeting in the last six months – 0 point	2.5		

ANNEX 2: INFORMATION USE CONSTRAINT ASSESSMENT TOOLS

Key Informant Interview Questionnaire: Decision-Maker Perceptions

Version 1: National and Sub-national

This version of the information use constraint assessment tool intended to be used to routinely assess constraints to information use at the regional health bureaus, ZHDs, and woreda health offices level. The findings of the assessment should be presented during the performance monitoring meetings for designing solutions and developing improvement action plans.

Date:	
Time started/end	
Interviewer:	
Organization of the respondent:	
Position of respondent:	
Number of years in this position:	

Purpose and consent: This tool is designed to find out the barriers and constraints to information use and determine the level of data demand in the health facilities and health institutions and propose solutions to overcome the barriers.
Therefore the participation of the selected interviewees in the study is very important to provide insights about the barriers and constraints to information use in the facility or health institution. The responses of the interviewee will remain confidential through the process without alluding comments from any interviewee to any individual or organization. The findings of the assessment will be presented to respective performance review teams and will be used to inform designing of solutions to enhance data demand and thereby increase information use in the respective health institution or health facility.
Are you willing to participate?

Introductory questions	
IQ1	What was the last major decision related to policies or program that you or a team in your organization made?
IQ2	What information did you or the team use to make this decision?
IQ3	How did you or the team use information to make this decision?
IQ4	Was there any information your or the team sought but did not get to inform the decision you have made?
IQ5	What are the primary stakeholders in the use of information?
IQ6	Do you or your team get enough information to support decision you need to make about program implementation or health service provision in the health facilities?

Technical constraints: related to ability to generate high quality data and analyses	
TC1	Have you ever had any concern about the quality of information you used for decision making?
TC2	Have you ever faced differences in estimates of health system performance from different sources or statistics?
TC3	Do you think your organization have the human and other resources to produce quality data? What are the challenges to producing quality data in your organization?
TC4	How would you solve this problem in your organization? Thinking of your position, or assuming that you are head of the organization, how would you address the problem in the short term or long term?

Individual constraints: related to individuals'' capacity to collect, analyze and interpret data	
IC1	What are specific challenges you have come across among your staff to gerating and using data for decision making? Probe: are staff aware if data sources? Is there limitation in technical skill and motivation f staff to generate and use data? Do you think staff have adequate time to generate and use data? Is there incentive, knowledge and reinforcing mechanism for information use by staff?

Organizational constraints: challenges to information use due to organization's functions	
OC1	How supportive is the organization to produce quality data?
OC2	How does your organization support use of information to identify performance barriers, prioritization of problems and performance improvement?
OC3	Is there experience in you organization of building skills for use of information by staff? How do you think the organization can improve generation and use of quality data?
OC4	Describe the experience of your organization of making data available for decision makers. Describe also the challenge How do you think information can be made accessible to decision makers in your organization?
OC5	How does this process of making data available to decision makers in your organization affect your ability to use information? How do you think this can improved?
OC6	Is there any risk associated with sharing of information in your organization? How this risk can be minimized?
OC7	What other challenges do you face in using information for decision making? How do you think your or similar organization can improve information use for decision making?

Information users Interview Questionnaire

Version 2: Facility

Purpose and consent: This tool is designed to find out the barriers and constraints to Information use and determine the level of data demand in the health facilities and health institutions and propose solutions to overcome the barriers.
Therefore the participation of the selected interviewees in the study is very important to provide insights about the barriers and constraints to data use in the facility or health institution. The responses of the interviewee will remain confidential through the process without alluding comments from any interviewee to any individual or organization. The findings of the assessment will be presented to respective performance review teams and will be used to inform designing of solutions to enhance data demand and thereby increase data use in the respective health institution or health facility.
Are you willing to participate?

Note: Data users include staff who have decision-making responsibilities including managers, clinicians, laboratory and pharmacy staff, and counsellors.

Name of facility:	
Date:	
Name of Interviewer:	
Position of Interviewee:	
Years of service in the current position:	

Section 1: Information use for decision making	
1	On what areas do you influence decision? (probe: budget, staffing, supplies, planning, quality improvement …)
2	What types of information do you use to inform your decision?
3	Thinking about the two most recent decisions in which you were involved, please describe how you used data in the decision-making process. Please do not include individual patient records.

Section 2: Technical barriers to information use	
TC1	Do you face any challenge when you are trying to use information? What challenges do you face? (incomplete, poor quality, lack of data ta all, not readily available,
TC2	Have you ever provide feedback on data use in your organization? What areas did you provide feedback on?
TC3	Do you feel you have the skills necessary to use data to make the kinds of decisions in which you are involved? (areas of training you would like to receive: data collection, analysis, presentation, data using for identifying barriers, planning, quality improvement,

Section 3: Organizational barriers to data use	
OC1	Does your organization conduct regular PRT meeting?
OC2	What type of other staff meeting are held? How frequently are the meeting conduct?
OC3	Were data and information presented at the last meeting you attended?
OC4	If yes, how was it used (Probe: types of decision making)?
OC5	Does your facility receive feedback from management, MOH, or others about the facility's performance? If yes, please describe how feedback is provided?

Section 4: Other barriers to information use

I would like to know your opinion about how strongly you agree with certain statements. There are no right or wrong answers, only expressions of your opinion on a scale from 1 (strongly disagree) to 5 (strongly agree). You have to determine first whether you agree or disagree with the statement.

Second, decide about the intensity of agreement or disagreement. This information will remain confidential and will not be shared with anyone, except presented as an aggregated data report. Please be frank and choose your answer honestly.

	At this facility, decisions are based on	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree
1	Personal liking					
2	Superiors' directives					
3	Evidence/facts					
4	Political interference					
5	Cost considerations					
	In your organization, superiors					
6	Seek feedback from staff					
7	Emphasize data quality in regular reports					
8	Promote a culture of data use					
9	Explain what they expect from staff					
10	Share data with other facilities					
	In your organization, staff					
11	Are aware of their responsibilities					
12	Are appropriately trained to use data					
13	Rely on data for planning and monitoring set targets					
	Personal					
14	Collecting data makes me feel bored					
15	Collecting data is meaningful to me					
16	Collecting data gives me the feeling that it is needed for monitoring and facility performance					
17	We've discussed a variety of different barriers to data use. Are there any that I have not mentioned that you would like to discuss?					
18	Do you have any suggestions about how to improve information use at your facility?					

Data Producers Interview Questionnaire

Version 2: Facility

Purpose and consent: This tool is designed to find out the barriers and constraints to data use and determine the level of data demand in the health facilities and health institutions and propose solutions to overcome the barriers.
Therefore the participation of the selected interviewees in the study is very important to provide insights about the barriers and constraints to data use in the facility or health institution. The responses of the interviewee will remain confidential through the process without alluding comments from any interviewee to any individual or organization. The findings of the assessment will be presented to respective performance review teams and will be used to inform designing of solutions to enhance data demand and thereby increase data use in the respective health institution or health facility.
Are you willing to participate?

Note: Data producers include staff responsible for generating routine health information, such as health information officers, data analysts, clerks and managers. It is useful to interview data producers before data users, if possible, in order to understand the context in which information is produced and used at the facility.

Name f facility:	
Date:	
Name of Interview:	
Position of Interviewee:	
Years of service in the current position:	

Section 1: Data and information flow	
1	Please describe the data management team's role in the flow of information on the project? (Probe: Preparation of reports to donor/ MOH, generating HMIS reports)
2	What data do you make available to staff?
3	In what format is it reported?
4	How frequently is the data reported?

Section 2: Data utilization	
1	Are data and information used at this facility to inform managerial, administrative or clinical issues? If yes, please specify how it is used and by whom?
2	Does the data management team receive feedback from staff about data/reports (probe: requests for additional analyses, feedback about the information being helpful or not clear)? Please describe.

Section 3: Barriers to data use	
1	What types of barriers do you think exist to staff using data at this facility [read list]?
2	Staff lack of data analysis and interpretation skills
3	Perceived problems with completeness, quality, timeliness, and presentation of information
4	Data entry backlogs
5	Other

Section 4: Other barriers to information use

I would like to know your opinion about how strongly you agree with certain statements. There are no right or wrong answers, only expressions of your opinion on a scale from 1 (strongly disagree) to 5 (strongly agree). You have to determine first whether you agree or disagree with the statement.

Second, decide about the intensity of agreement or disagreement. This information will remain confidential and will not be shared with anyone, except presented as an aggregated data report. Please be frank and choose your answer honestly.

	At this facility, decisions are based on	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Some-what Agree	Strongly Agree
1	Personal liking					
2	Superiors' directives					
3	Evidence/facts					
4	Political interference					
5	Cost considerations					
	In your organization, superiors					
6	Seek feedback from staff					
7	Emphasize data quality in regular reports					
8	Promote a culture of data use					
9	Explain what they expect from staff					
10	Share data with other facilities					
	In your organization, staff					
11	Are aware of their responsibilities					
12	Are appropriately trained to use data					
13	Rely on data for planning and monitoring set targets					
14	Personal					
15	Collecting data makes me feel bored					
16	Collecting data is meaningful to me					
17	Collecting data gives me the feeling that it is needed for monitoring and facility performance					
18	We've discussed a variety of different barriers to data use. Are there any that I have not mentioned that you would like to discuss?					
19	Do you have any suggestions about how to improve information use at your facility?