Effective Data Management and Use in the Malawi Health System

Facilitator Guide

December 2018

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Foreword

Malawi's Health Information System Policy affirms the intention of the Government to improve Health worker knowledge and skills in data management and use towards improving health outcomes and the efficiency and effectiveness of the health care system overall.

The Malawi Health Sector Strategic Plan (HSSP) 2017–2022 describes the Government's priorities. These include: increasing coverage of high quality EHP services; strengthening health system performance to support delivery of EHP services; reducing risk factors to health; and improving equity and efficiency in the delivery of free, quality EHP services in Malawi, thereby contributing to poverty reduction and the socio-economic development of the nation. The Monitoring and Evaluation Strategy supports achievement of the HSSP by leveraging the use of data for decision making at all levels of the health care system. Knowledge and skills to effectively access and use data available in both paper records and electronic systems is very crucial. This curriculum will support training of all health workers to accomplish these goals.

The Central Monitoring and Evaluation Division of the Ministry of Health and Population has made tremendous efforts over the years to build capacity of health workers in data management and use. These efforts were implemented independently with technical and financial support from different partners, often using valuable resources to develop similar content. A key element affecting coordination of previous capacity-building initiatives was the absence of national materials to ensure that all trainings were aligned in delivering the same content. The team behind this curriculum made great efforts to ensure broad stakeholder involvement in its development by bringing together various departments of the MOHP, numerous partners, universities and content experts to map, develop and refine its content. A training needs assessment was conducted in August 2017, and several intensive development sessions were held over the last year to ensure that its content is complete, accurate, and relevant to the Malawi setting.

CMED will continue to coordinate and ensure that HIS: Data Management and Use trainings are delivered using this curriculum. Partners too have a role to play to ensure that they access and use the materials accordingly.

I hereby endorse this National Curriculum on Effective Data Management and Use in the Malawi Health System.

Dr Dan Namarika
Secretary for Health
November 2018

Acknowledgements

This curriculum is a result of tireless efforts by a large team led by the Ministry of Health and Population (MOHP), Central Monitoring and Evaluation Division, who coordinated the work of other departments and directorates within MOHP and partners working within the Malawi health system.

MOHP is grateful to everyone who contributed to the development of this curriculum—from conducting the needs assessment to drafting materials to piloting and finalizing.

We would like to acknowledge financial and technical support from the following:

Government of Malawi		
Isaac Dambula	Deputy Director, Central Monitoring and Evaluation Division (CMED)	Collaborator
Simeon Yosefe	Chief Statistician, CMED	Collaborator
International Training and Education Center for Health, Seattle		
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Salem Gugsa, PhC, MPH	Research and Evaluation Advisor	Co-investigator
International Training and Education Center for Health, Lilongwe		
Ireen Namakhoma, PhD	Deputy Country Director	Co-investigator
Yusuf Babaye, MBA, MSc	Country Director	Co-investigator
Abiba Ngwira, PhD	Monitoring & Evaluation Advisor	Collaborator
Martha Katete	Data Systems and Training Specialist	Developer
Martha Saidi, MPH	Public Health Specialist	Developer
Innocent Wowa	Public Health Officer	Developer
Kuunika Project Leads		
Sam Phiri, PhD	Executive Director, Lighthouse Trust	Co-investigator
Ireen Namakhoma PhD	Deputy Director for I-TECH	Capacity Building Lead
Maganizo Monawe	CMED Team Leader, Kuunika Project	Co-investigator
Implementing Partners		
Simon Ndira, PhD	Technical Advisor	GIZ
Efrida Ghobebe	Technical Advisor, CMED	CDC
Jacob Kaonga	Technical Advisor, CMED	Palladium Malawi
Thoko Sambakunsi	Technical Advisor, CMED	Vital Strategies
Ruxana Jina	Senior Technical Advisor	Vital Strategies

Section One:
About This Training

Abbreviations and Acronyms

AIDS	Acquired immunodeficiency syndrome
ANC	Antenatal care
ART	Antiretroviral therapy
ARV	Antiretroviral
ATM	Automated teller machine
BCC	Behaviour change communication
BCP	Business community plan
BHT	Baobab Health Trust
BLIS	Basic Laboratory Information System
CCTV	Closed-circuit television
CD	Compact Disc
CMED	Central monitoring and evaluation division
CPU	Central processing unit
DHA	Department of HIV and AIDS
DHIS	District health information software
DHO	District health office
DHS	Demographic and Health Survey
DoS	Denial of service
DRP	Disaster recovery plan
DQA	Data quality audit
DQR	Data quality review
DRP	Data recovery plan
DVD	Digital Versatile Disc
e-HIS	Electronic health information system
EHR	Electronic health record
EMR	Electronic medical record
FBC	Full blood count
FP	Family planning
GB	Gigabyte
GDPR	General data protection regulation
HCV	Hepatitis C virus
HCW	Health care worker
HIS	Health information system
HIV	Human immunodeficiency virus
HMIS	Health Management Information System
HRH	Human resources for health
HRIO	Health records and information officer
HSA	Health Surveillance Assistant
HSSP	Health Sector Strategic Plan
HTS	HIV testing service
ICT	Information and communications technology
ID	Identification
IHRIS	iHuman Resource Information System
IPT	Isoniazid prevention therapy

IT	Information technology
LAN	Local area network
LIMS	Laboratory information management system
LMIS	Logistical management information system
M&E	Monitoring and evaluation
MB	Megabyte
MDSR	Maternal Death Surveillance and Response
MOHP	Ministry of Health and Population (formerly Ministry of Health/MOH)
MS	Microsoft
MST	Mobile supervisory tool
NAS	Network attached storage
NGO	Non-governmental organization(s)
OLMIS	Open Logistics Management Information System
OPD	Outpatient department
OS	Operating system
PMTCT	Prevention of mother-to-child transmission of HIV
POC	Point of care
PIS	Pharmacy information system
QA	Quality assurance
RAM	Random-access memory
RDQA	Routine data quality assessment
RFID	Radio frequency identification
ROM	Read-only memory
SD	Standard deviation
SMART	Specific, Measurable, Agreed upon/Appropriate, Relevant/Realistic, Time-bound
SOCO	Single overriding communication objective
SOP	Standard operating procedure
ToT	Training of trainers
UI	User interface
UPS	Uninterrupted power supply
URL	Uniform resource locator
VCT	Voluntary counselling and testing
VF	Verification factor
WAN	Wide area network
WHO	World Health Organization

Introduction

I. Background

A functional health information system (HIS) is a crucial source of accurate and reliable health data that countries rely on when making critical decisions about patient care, policy development, programming, resource planning, and accountability. The full potential of an HIS to support improved health outcomes cannot be achieved without competent and informed human resources to collect, manage, interpret, and use health data.

Electronic solutions have been recognized as an essential component to fulfilling the outcomes outlined in the Malawi Health Sector Strategic Plan (2017–2022). In the past decade, Malawi has developed a national e-health strategy, and national information and communications technology (ICT) and HIS policies to guide the effective use of these electronic solutions. The National HIS Policy objective is as follows:

> To generate quality data (accurate, complete, timely, relevant, and reliable) and make them accessible to intended end users through standardized and harmonized tools across all programs that avoid duplication and reduce workload on already stretched human resources at the facility level.

Given the evolving nature of HIS software systems and the implementation of these systems in recent years, roles and responsibilities at different levels of the health system have been in flux. Job descriptions have not been updated quickly enough to encompass the roles that many in the health system now take on in addition to their primary duties; this has made it more difficult to ensure that health workers have the competencies necessary to fulfil their duties. The expanded use of technology makes a basic level of digital literacy, and an understanding of HIS concepts, increasingly critical for cadres at all levels of the health system in order to ensure a strong base of high-quality, routinely available data to improve decision making at each level of the system. Additionally, continuously operating electronic systems require a competent cadre of information technology (IT) or help desk providers.

Health workers now need to understand HIS organization, data flow, and their roles within the HIS at all levels. Whether working with paper or electronic systems, increasing access to and effective use of health data at all levels requires a workforce that understands, values, and effectively uses the HIS systems in their work environment. Data that enter the HIS starts with health workers on site—which means the quality of the data is in their hands. The goal for this curriculum is for all members of the health system to appreciate the value and potential of quality data, and their roles in ensuring its effective management and use towards the ultimate goal of improving the health of all Malawians.

II. Curriculum Overview

Course Goal

The goal of *HIS: Effective Management and Use of Health Data* is to establish a culture of data use in the health care system, and increase capacity to access and use health data.

Target Audience

This national training course was designed for health workers at all levels of the health system in Malawi. For the purpose of targeting the specific needs of different positions, we have divided health workers into three cadres, based on their roles in working with data. These are:

1. **Decision makers:** Health workers at the national, district, and facility levels of the health system who use data to make policy or programmatic decisions, and those who use data to make service delivery or clinical decisions.
2. **Data handlers**: Health workers at the national, district, and facility levels who collect, aggregate, and report health data using one or more paper or electronic systems (EMR, LIS, DHIS2, etc.). This cadre is primarily responsible for generating quality health data.
3. **IT support:** Personnel responsible for supporting and maintaining electronic health systems to maximize and maintain their continuous functionality. This cadre is ultimately responsible for providing support for users of those systems as well.

Course Objectives

The course provides an overview of the essential role of the HIS in carrying out the functions of the health system, and examines the key concepts and skills that Malawian health workers need to understand and refine to fulfil their duties effectively.

At the end of the course, participants will be able to:

1. Describe the overall purpose of the HIS, and how it facilitates the functions of the health system.
2. Explain the importance of data management, the flow of data, and how these become useful for decision making.
3. Describe the roles and responsibilities of health workers in the information cycle.
4. Describe the main ways in which data is used for decision making at different levels of the health system.
5. Explain the benefits of using a computer in the HIS.
6. Demonstrate the ability to use paper and electronic health information systems (e-HIS) to collect, store, and report quality health data.
7. Apply standard techniques to ensure and maintain data quality, security, and patient confidentiality at all times.
8. Describe the different roles and responsibilities of personnel in supporting and maintaining e-HIS.

III. Curriculum Organization

A variety of approaches to teaching and learning will be used during this course, with the underlying assumption being that participants are adult learners who will take considerable responsibility for their own learning. The focus will be on active learning and should emphasize the key knowledge and skills needed to effectively manage and use data within the overall HIS. The knowledge and skills that participants bring to the training are important to the learning process; participants are encouraged to share their knowledge and skills, and to raise issues that they find challenging in their practice.

The course is a blended learning programme. In its entirety, it consists of 35 sessions that are divided into eight modules, and uses the following delivery methods:

- Workshop sessions
- Self-study e-learning modules
- Mentorship sessions in the months following workshop sessions

Not all sessions are intended for each cadre. Please see the table below for the modules, sessions, and intended audience(s) for each session.

TARGET AUDIENCE BY SESSION

Module/Session	Total Time	Data Handlers	Decision Makers	IT Support
Session 0: Introduction to the Course	45 minutes	✓	✓	✓
Module 1: Introduction to HIS	**3 hours, 45 minutes**			
Session 1.1: Introduction to Health Information Systems	90 minutes	✓	✓	✓
Session 1.2: HIS Components	80 minutes	✓	✓	✓
Session 1.3: The HIS in Malawi	55 minutes	✓	✓	✓
Module 2: Data Management	**7 hours, 15 minutes**			
Session 2.1: Introduction to Data Management	60 minutes	✓	✓	✓
Session 2.2: Data Collection and Storage	120 minutes	✓	✓	✓
Session 2.3: Step 2 – Processing Data	75 minutes	✓	✓	✓
Session 2.4: Step 3 – Data Reporting Systems and Tools	60 minutes	✓	✓	✓
Session 2.5: Data for Decision Making	120 minutes	✓	✓	✓
Module 3: Digital Literacy	**4 hours**			
Session 3.1: Introduction to Computers	90 minutes	✓	✓	✓
Session 3.2: Computer Software	90 minutes	✓	✓	✓
Session 3.3: Networks	60 minutes			✓
Module 4: Electronic Systems	**13 hours**			
Session 4.1: Overview of Electronic HIS in Malawi	60 minutes	✓	✓	✓
Session 4.2: Managing Data in the EMR	330 minutes	✓	✓	✓

Module/Session	Total Time	Data Handlers	Decision Makers	IT Support
Session 4.3: Managing Data Using the Laboratory Information Management System (LIMS)	180 minutes	✓	✓	✓
Session 4.4: Managing Data Using DHIS2 Tools	150 minutes	✓	✓	✓
Session 4.5: Using the Mobile Supervisory Tool	60 minutes		✓	✓
Module 5: Data Quality	**7 hours, 15 minutes**			
Session 5.1: Introduction to Data Quality	90 minutes	✓	✓	✓
Session 5.2: Data Metrics	135 minutes		✓	
Session 5.3: Data Quality Assurance	90 minutes	✓	✓	✓
Session 5.4: Routine Data Quality Assessment	120 minutes	✓	✓	
Module 6: Data Analysis	**18 hours, 30 minutes**			
Session 6.1: Introduction to Data Analysis	150 minutes	✓	✓	
Session 6.2: Basic Statistics in Public Health	110 minutes	✓	✓	
Session 6.3: Key Concepts in Epidemiology	115 minutes	✓	✓	
Session 6.4: Indicators	150 minutes	✓	✓	
Session 6.5: Information Products, Dissemination and Use	350 minutes	✓	✓	
Session 6.6: Communicating Health Information	175 minutes	✓	✓	
Session 6.7: Monitoring and Evaluation	60 minutes	✓	✓	
Module 7: Data Security	**5 hours, 30 minutes**			
Session 7.1: HIS Security Concepts	105 minutes	✓	✓	✓
Session 7.2: Security Threats	60 minutes			✓
Session 7.3: Levels of Electronic HIS Security	75 minutes			✓
Session 7.4: Security Breaches	90 minutes			✓
Module 8: User Support	**4 hours, 30 minutes**			
Session 8.1: Importance of Support and Maintenance for e-HIS	60 minutes	✓	✓	✓
Session 8.2: Identifying e-HIS IT Issues	60 minutes			✓
Session 8.3: Troubleshooting	150 minutes			✓
TOTAL TRAINING TIME	**64 hours, 30 minutes**	**53 hrs**	**57 hrs, 15 mins**	**42 hrs, 15 mins**

Self-Study E-learning Modules

In addition to the workshop sessions noted above, you will have access to seven self-study e-learning modules to complement your trainer-led learning experience:

1. Introduction to Health Information Systems
2. Health Information Systems: Data Management Concepts
3. Using EMR for Decision Making

4. Improving and Maintaining the Quality of EMR System Data
5. Logic Models and System Classification (IT)
6. Overview of System Architecture (IT)
7. Introduction to Interoperability at the Facility Level (IT)

These modules cover similar content from a slightly different perspective—and, in some cases, content that is more specifically targeted to IT professionals. You are encouraged to go through all of them to make the most of this experience and expand your knowledge and skills. There are readings, videos, interactive learning activities, and quizzes, all meant to stimulate your interest and give you a more holistic understanding of health information systems.

Facilitators will assign e-learning modules throughout the workshop. The modules are available online at www.globalhealthworkforce.org. They are also available offline. If students do not have Internet or computer access, you may help them download the modules to a tablet, laptop, or smartphone. This will be addressed in Session 0, Introduction to the Course.

IV. Course Materials

Course materials include this Facilitator Guide, PowerPoint slide sets, the Participant Manual, self-study modules, and supporting reference materials. This guide contains instructions for conducting the course, and provides answers for all learning activities. It references handouts and activities, and includes symbols throughout to help organize the facilitator. Handouts listed are included at the end of each session.

The Participant Manual includes all handouts and copies of PowerPoint slides corresponding to the course content. Facilitators should familiarize themselves with the guides and course materials prior to the start of the course.

How to Use the Facilitator Guide

This guide provides all of the tools and instructions needed to conduct the course. Icons are used throughout the guide to prompt the facilitator to do specific things, such as prepare materials for a learning activity in advance of the session. Review the guide carefully in advance of the training. Table 1 below provides a description of the icons used throughout the guide. Look for these icons to help guide your preparation.

Table 1: Icons Used in the Facilitator Guide

Icon	Name	Description
	**Time**	At the start of the session, indicates the amount of time that trainers have for the full session. It is important to try to stay within this time frame in order to cover the full course in the allotted time. If found with other symbols in individual activities, this icon indicates a time check to remind trainers to keep activities on track.
	**Resources Needed**	Outlines the resources trainers will need for each session. Includes handouts, worksheets, and other resources such as flipcharts, markers, videos, projectors, etc.
	**Advance Preparation**	Alerts trainer to any actions they need to do in advance of starting the session, for example cutting out pieces of paper, copying certain sessions, or other preparation directly related to activities in that session.
	**Trainer Instructions**	Corresponds to the step outlined in the session overview. It is always followed by the slides, handouts, and worksheets that accompany that step.
	**Handout**	Indicates a handout. Participants will have a copy of most handouts in the Participant Manual.

The session overview table found at the start of each session in this guide provides critical information for the facilitator. Each session is divided into steps; for each step, the overview outlines the suggested time, activities, or methods; content covered in specific slides; and any resources (including handouts) needed for that step. It is important for the facilitator do their best to adhere to these time estimates. This will ensure that the class can get through the entire course content in the time allotted. Table 2 below is an excerpt from a session overview.

Table 2: Excerpt from a Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	30 minutes	Facilitator presentation/small group discussion	Health System and Malawi HSSP II (slides 4-8)	Flip chart, markers, tape, LCD

V. Evaluation

Training is conducted in order to help health professionals improve their performance. Usually, training activities are designed to target specific knowledge or skills that are being introduced, or to reinforce existing knowledge or skills. Some training activities focus on raising awareness of a new development or issue within the health care field, whereas other activities seek to take existing skills and knowledge from a basic level to a more advanced level.

Evaluation of participants is intended to show both facilitators and participants how effectively performance may improve through participation in a training activity. In other words, evaluation can tell us whether or not the health professional has obtained the training needed to do what they are tasked with.

Participants will complete a pre-test at the start of training to determine their level of existing knowledge in key areas: digital literacy, computer literacy, health information systems and technology, maintaining and improving EMR systems, data quality, data analysis, user support, and system security. The test will be repeated at the end of the training; pre- and post-test scores will be compared to assess knowledge gain.

Participants will also complete a daily evaluation during the two weeks of the training. This allows facilitators to solicit feedback about the training process, clarify participant questions in real time, and to do an overall check-in with participants. Participants will also be asked to complete an evaluation form at the end of the training; this form will also ask participants to assess their overall learning experience during the training. Time for participants to complete these forms is included in the training schedule. Once participants have completed the evaluation, facilitators should collect their forms, aggregate their responses, and review the results together during the final facilitator debriefing session.

VI. Tips for the Trainer

Imagine you are a student back in your first year of study. You are taking a course for the first time, and the subject matter is completely new. Think about how challenging it was for you as a learner. Now think about the participants who are going to attend this training. For some of them, the content may be relatively new and very challenging. For others, the content may be very familiar. Your task is to adjust your training techniques so that you reach as many participants as possible. This is no easy task! Here are four important things you can do to help connect with your participants and the content on the path to learning.

1. Establish a Rapport with Participants

Think about a good trainer you have had in the past. What made that person stand out? The qualities that made the trainer effective were not just the ability to present content, right? It was *how* they presented content and how they communicated with you. Good trainers are both knowledgeable about the content *and* create an atmosphere of trust and support in the learning process. Establishing a good rapport with learners will help you do this.

What is rapport? Rapport is a style of interpersonal communication that creates a respectful working relationship between the trainer and participant. Trainers establish good rapport with participants by acknowledging the experience that participants bring to the learning process, and by demonstrating respect for them as individuals. Rapport is maintained by using open communication that invites participants to contribute and learn from each other, and by using non-verbal communication that expresses warmth and openness. Use body posture, gestures, and facial expressions that communicate approachability. Remember, *how* you say something is as important as *what* you say!

Tips for Establishing Rapport with Learners:

- ✓ Introduce yourself thoughtfully, offering people some information about your professional and personal qualifications.
- ✓ Use people's names.
- ✓ Be friendly and helpful always, but especially during the first interactions.
- ✓ Maintain a positive attitude.
- ✓ Create opportunities for participants to feel comfortable interacting with each other.
- ✓ Make a positive first impression by arriving early and being prepared.
- ✓ Look at individuals as they are speaking.
- ✓ Use facial expressions that say 'I'm listening.'

2. Practise Good Organization

Good organization is important to the success of the course. Trainers who are organized, know their materials and prepare in advance will much more likely have a lasting impact.

The course materials are structured to help you. They include a timetable and comprehensive instructions to guide discussions and activities. Familiarize yourself with the materials prior to the start of the course. During the course, end each day by asking yourself: *What worked well today? Where did I seem to lose people?* Use this self-reflection to adjust the class structure for the next day.

Tips for Being Organized

- ✓ Familiarize yourself with course goals and learning objectives.
- ✓ Review course materials in advance.
- ✓ Review daily schedule at the start of each day with participants so they know what to expect.
- ✓ Identify ice breakers and energizers to use in advance.
- ✓ Practice good time management.
- ✓ Encourage feedback to adjust your teaching style.

3. Engage Participants in the Learning Process

Participants are the most valuable resource in an adult training course. They help each other learn by sharing relevant work experiences and providing different perspectives on the

material. Ask participants open-ended questions, engage them in conversation, and encourage them to share their own work experiences. If facilitators consider fellow trainers and participants as resources, the learning experience will be enriched for all involved.

The materials in this guide include various activities and exercises to engage participants in the content. However, this alone is not enough! You can further this process by taking time to adapt some of these materials to your participants. Think about examples that are appropriate for your audience and highlight key concepts that you want them to take away from each session. Be sure that your examples are specific to the context of the course, and are in line with course goals and objectives. Remember, the more participants identify with the content, the more they will be motivated to learn.

Tips to Engage Participants

- ✓ Adapt materials to your audience.
- ✓ Develop additional questions or activities that address the issues and challenges your participants may face at their work sites.
- ✓ Use 'real life' examples to make the content more interesting and relevant.
- ✓ Frequently ask questions to ensure understanding and to keep participants actively thinking and participating. Questions that begin with *what*, *why*, or *how* require more than just a few words to answer, and can thus help promote rich discussion. Avoid questions that can be answered with a simple 'yes' or 'no'.
    - Example: Ask: *'What questions do you have?'* instead of, *'Does anyone have any questions?'*
- ✓ After asking a question, pause. Give participants time to think and volunteer a response. A common mistake is to ask a question and then answer it yourself. Some silence is productive. If no one answers your question, rephrasing it can help to break the tension of silence, but do not do this repeatedly.
- ✓ Take advantage of more experienced participants who can help you train those with less knowledge and experience.
- ✓ Be available to talk with participants as needed.

4. Encourage Interaction with and Among Participants

Integrate participants into the learning process as much as possible by involving them with questions, handouts, and exercises.

Tips to Encourage Participant Interaction

- ✓ Ask questions that engage participants in conversation.
- ✓ Encourage participants to share relevant work experiences.
- ✓ Encourage participants to ask questions.
- ✓ Do not feel compelled to answer every question yourself. Depending on the situation, you may turn the question back to the participant or invite other participants to respond. You may need to discuss the question with another trainer before answering. Be prepared to say 'I don't know, but I'll try to find out.'
- ✓ Listen carefully to participants; respond with sincerity.
- ✓ Ask participants to lead energizers.

Good luck!

VII. Suggested Training Agendas by Cadre

The following are suggested training programme agendas that are customized for each of the three cadres: Decision Makers, Data Handlers, and IT/Support Personnel. Each agenda includes all of the sessions that are relevant to the cadre for which it is named. Training programmes may be customized according to resources and need.

Effective Data Management and Use for Decision Makers
Suggested Training Programme Agenda

Day 1	
Registration and Logistics	8:00 – 8:30
Welcome and Opening Remarks	8:30 – 9:00
Session 0: Introduction to the Course (+eLearning)	9:00 – 9:45
Pre-test	9:45 – 10:30
Tea Break	**10:30 – 10:45**
Module 1: Introduction to HIS	
Session 1.1: Introduction to Health Information Systems	10:45 – 12:15
Lunch Break	**12:15 – 13:15**
Session 1.2: HIS Components	13:15 – 14:45
Session 1.3: The HIS in Malawi	14:45 – 15:45
Tea Break	**15:45 – 16:00**
Evaluation and closure	16:00 – 16:15
Day 2	
Review of Day 1	8:00 – 8:15
Module 2: Data Management	
Session 2.1: Introduction to Data Management	8:15 – 9:15
Session 2.2: Data Collection and Storage	9:15 – 10:15
Tea break	**10:15 – 10:30**
Session 2.2: Data Collection and Storage (continued)	10:30 – 11:30
Session 2.3: Processing Data	11:30 – 12:45
Lunch	**12:45 – 13:45**
Session 2.4: Data Reporting Systems and Tools	13:45 – 14:45
Session 2.5: Data for Decision Making	14:45 – 15:45
Tea break	**15:45 – 16:00**
Session 2.5: Data for Decision Making (continued)	16:00 – 17:00
Evaluation and closure	17:00 – 17:15
Day 3	
Review of Day 2	8:00 – 8:15
Module 3: Digital Literacy	
Session 3.1: Introduction to Computers	8:15 – 9:45
Session 3.2: Computer Software	9:45 – 10:45
Tea Break	**10:45 – 11:00**
Session 3.2: Computer Software (continued)	11:00 – 11:30
Session 4.1: Overview of Electronic HIS in Malawi	11:30 – 12:30
Lunch	**12:30– 13:30**
Module 4: Electronic Systems	
Session 4.2: Managing data Using the EMR in Malawi	13:30 – 15:00
Tea Break	15:00 – 15:15

Session 4.2: Managing data Using the EMR in Malawi (continued)	15:15 – 16:15
Evaluation and closure	16:15 – 16:30
Day 4	
Review of Day 3	8:00 – 8:15
Session 4.2: Managing Data Using the EMR in Malawi (continued)	8:15 – 10:15
Tea break	**10:15 – 10:30**
Session 4.2: Managing Data Using the EMR in Malawi (continued)	10:30 – 11:30
Session 4.3: Managing Data Using the LIMS	11:30 – 12:30
Lunch	**12:30 – 13:30**
Session 4.3: Managing Data Using the LIMS (continued)	13:30 – 15:30
Tea Break	**15:30 – 15:45**
Session 4.4: Managing Data Using DHIS2 Tools	15:45 – 16:45
Evaluation and closure	16:45 – 17:00
Day 5	
Review of Day 4	8:00 – 8:15
Session 4.4: Managing Data Using DHIS2 Tools (continued)	8:15 – 10:45
Tea Break	**10:45 – 11:00**
Session 4.5: Using the Mobile Supervisory Tool	11:00 – 12:00
Lunch	**12:00 – 13:00**
Module 5: Data Quality	
Session 5.1: Introduction to Data Quality	13:00 – 14:30
Session 5.2: Data Quality Metrics	14:30 – 15:15
Tea Break	**15:15 – 15:30**
Session 5.2: Data Quality Metrics (continued)	15:30 – 17:00
Evaluation and closure	17:00 – 17:15
Day 6	
Review of Day 5	8:00 – 8:15
Session 5.3: Data Quality Assurance	8:15 – 9:45
Tea Break	**9:45 – 10:00**
Session 5.4: Routine Data Quality Assessment	10:00 – 12:00
Lunch	**12:00 – 13:00**
Module 6: Data Analysis, Interpretation, and Use	
Session 6.1: Introduction to Data Analysis	13:00 – 15:30
Tea Break	**15:30 – 15:45**
Evaluation and closure	15:45 – 16:00
Day 7	
Review of Day 6	8:00 – 8:15
Session 6.2: Basic Statistics in Public Health	8:15 – 10:00
Tea Break	**10:00 – 10:15**
Session 6.3: Key Concepts in Epidemiology	10:15 – 12:15
Lunch	**12:15 – 13:15**
Session 6.4: Indicators	13:15 – 15:00
Tea Break	**15:00 – 15:15**
Session 6.4: Indicators (continued)	15:15 – 16:00
Evaluation and closure	16:00 – 16:15
Day 8	
Review of Day 7	8:00 – 8:15
Session 6.5: Information Products, Dissemination, and Use	8:15 – 10:15
Tea Break	**10:15 – 10:30**

Session 6.5: Information Products, Dissemination, and Use (continued)	10:30 – 12:30
Lunch	**12:30 – 13:30**
Session 6.5: Information Products, Dissemination, and Use (continued)	13:30 – 15:15
Tea Break	**15:15 – 15:30**
Session 6.6: Communicating Health Information	15:30 – 16:30
Evaluation and closure	16:30 – 16:45
Day 9	
Review of Day 8	8:00 – 8:15
Session 6.6: Communicating Health Information (continued)	8:15 – 10:15
Tea Break	**10:15 – 10:30**
Session 6.7: Monitoring & Evaluation	10:30 – 11:30
Module 7: Data Security	
Session 7.1: HIS Security Concepts	11:30 – 13:15
Lunch	**13:15 – 14:15**
Module 8: User and Systems Support	
Session 8.1: Importance of Support and Maintenance for Electronic HIS	14:15 – 15:15
Tea Break	**15:15 – 15:30**
Post test	15:30 – 16:15
Closing remarks	16:15 – 16:30

Effective Data Management and Use for Data Handlers
Suggested Training Programme Agenda

Day 1	
Registration and Logistics	8:00 – 8:30
Welcome and Opening remarks	8:30 – 9:00
Session 0: Introduction to the Course (+eLearning)	9:00 – 9:45
Pre-test	9:45 – 10:30
Tea Break	**10:30 - 10:45**
Module 1: Introduction to HIS	
Session 1.1: Introduction to Health Information Systems	10:45 – 12:15
Lunch Break	**12:15 – 13:15**
Session 1.2: HIS Components	13:15 – 14:45
Session 1.3: The HIS in Malawi	14:45 – 15:45
Tea Break	**15:45 – 16:00**
Evaluation and closure	16:00 – 16:15
Day 2	
Review of Day 1	8:00 – 8:15
Module 2: Data Management	
Session 2.1: Introduction to Data Management	8:15 – 9:15
Session 2.2: Data Collection and Storage	9:15 – 10:15
Tea break	**10:15 – 10:30**
Session 2.2: Data Collection and Storage (continued)	10:30 – 11:30
Session 2.3: Processing Data	11:30 – 12:45
Lunch	**12:45 – 13:45**
Session 2.4: Data Reporting Systems and Tools	13:45 – 14:45
Session 2.5: Data for Decision Making	14:45 – 15:45
Tea break	**15:45 – 16:00**

Session 5: Data for Decision Making (continued)	16:00 – 17:00
Evaluation and closure	17:00 – 17:15
Day 3	
Review of Day 2	8:00 – 8:15
Module 3: Digital Literacy	
Session 3.1: Introduction to Computers	8:15 – 9:45
Session 3.2: Computer Software	9:45 – 10:45
Tea Break	**10:45 – 11:00**
Session 3.2: Computer Software (continued)	11:00 – 11:30
Session 4.1: Overview of Electronic HIS in Malawi	11:30 – 12:30
Lunch	**12:30– 13:30**
Module 4: Electronic Systems	
Session 4.2: Managing Data Using the EMR in Malawi	13:30 – 15:00
Tea Break	15:00 – 15:15
Session 4.2: Managing Data Using the EMR in Malawi (continued)	15:15 – 16:15
Evaluation and closure	16:15 – 16:30
Day 4	
Review of Day 3	8:00 – 8:15
Session 4.2: Managing Data Using the EMR in Malawi (continued)	8:15 – 10:15
Tea break	**10:15 – 10:30**
Session 4.2: Managing Data Using the EMR in Malawi (continued)	10:30 – 11:30
Session 4.3: Managing Data Using the LIMS	11:30 – 12:30
Lunch	**12:30 – 13:30**
Session 4.3: Managing Data Using the LIMS (continued)	13:30 – 15:30
Tea Break	**15:30 – 15:45**
Session 4.4: Managing Data Using DHIS2 Tools	15:45 – 16:45
Evaluation and closure	16:45 – 17:00
Day 5	
Review of Day 4	8:00 – 8:15
Session 4.4: Managing Data using DHIS2 Tools (continued)	8:15 – 10:45
Tea Break	**10:45 – 11:00**
Module 5: Data Quality	
Session 5.1: Introduction to Data Quality	11:00 – 12:30
Lunch	**12:30 – 13:30**
Session 5.3: Data Quality Assurance	13:30 – 15:00
Tea Break	**15:00 – 15:15**
Session 5.4: Routine Data Quality Assessments	15:15 – 17:15
Evaluation and closure	17:15– 17:30
Day 6	
Review of Day 5	8:00 – 8:15
Module 6: Data Analysis, Interpretation, and Use	
Session 6.1: Introduction to Data Analysis	8:15– 10:00
Tea Break	**10:00 – 10:15**
Session 6.1: Introduction to Data Analysis (continued)	10:15 – 11:00
Session 6.2: Basic Statistics in Public Health	11:00 – 12:45
Lunch	**12:45 – 13:45**
Session 6.3: Key Concepts in Epidemiology	13:00 – 15:00
Tea Break	**15:00 – 15:15**
Session 6.4: Indicators	15:15 – 16:15

Evaluation and closure	16:15 – 16:30
Day 7	
Review of Day 6	8:00 – 8:15
Session 6.4: Indicators	8:15 – 9:45
Tea Break	**9:45 – 10:00**
Session 6.5: Information Products, Dissemination, and Use	10:00 – 12:00
Lunch	**12:00 – 13:00**
Session 6.5: Information Products, Dissemination, and Use (continued)	13:00 – 15:00
Tea Break	**15:00 – 15:15**
Session 6.5: Information Products, Dissemination, and Use (continued)	15:15 – 17:00
Evaluation and closure	17:00 – 17:15
Day 8	
Review of Day 7	8:00 – 8:15
Session 6.6: Communicating Health Information	8:15 – 10:00
Tea Break	**10:00 -10:15**
Session 6.6: Communicating Health Information (continued)	10:15 – 11:30
Session 6.7: Monitoring & Evaluation	11:30 – 12:30
Lunch	**12:30 – 13:30**
Module 7: Data Security	
Session 7.1: HIS Security Concepts	13:30 – 15:15
Tea Break	**15:15 – 15:30**
Module 8: User and Systems Support	
Session 8.1: Importance of Support and Maintenance for Electronic HIS	15:30 – 16:30
Evaluation and closure	16:30 – 16:45

Effective Data Management and Use for IT Support Personnel Suggested Training Programme Agenda

Day 1	
Registration and Logistics	8:00 – 8:30
Welcome and Opening remarks	8:30 – 9:00
Session 0: Introduction to the Course (+eLearning)	9:00 – 9:45
Pre-test	9:45 – 10:30
Tea Break	**10:30 - 10:45**
Module 1: Introduction to HIS	
Session 1.1: Introduction to Health Information Systems	10:45 – 12:15
Lunch Break	**12:15 – 13:15**
Session 1.2: HIS Components	13:15 – 14:45
Session 1.3: The HIS in Malawi	14:45 – 15:45
Tea Break	**15:45 – 16:00**
Evaluation and closure	16:00 – 16:15
Day 2	
Review of Day 1	8:00 – 8:15
Module 2: Data Management	
Session 2.1: Introduction to Data Management	8:15 – 9:15
Session 2.2: Data Collection and Storage	9:15 – 10:15
Tea break	**10:15 – 10:30**
Session 2.2: Data Collection and Storage (continued)	10:30 – 11:30

Session 2.3: Processing Data	11:30 – 12:45
Lunch	**12:45 – 13:45**
Session 2.4: Data Reporting Systems and Tools	13:45 – 14:45
Session 2.5: Data for Decision Making	14:45 – 15:45
Tea break	**15:45 – 16:00**
Session 2.5: Data for Decision Making (continued)	16:00 – 17:00
Evaluation and closure	17:00 – 17:15
Day 3	
Review of Day 2	8:00 – 8:15
Module 3: Digital Literacy	
Session 3.1: Introduction to Computers	8:15 – 9:45
Session 3.2: Computer Software	9:45 – 10:45
Tea Break	**10:45 – 11:00**
Session 3.2: Computer Software (continued)	11:00 – 11:30
Session 3.3: Networks	11:30 – 12:30
Lunch	**12:30 – 13:30**
Module 4: Electronic Systems	
Session 4.1: Overview of Electronic HIS in Malawi	13:30 – 14:30
Session 4.2: Managing Data Using the EMR in Malawi	14:30 – 15:15
Tea Break	**15:15 – 15:30**
Session 4.2: Managing Data Using the EMR in Malawi (continued)	15:30 - 16:30
Evaluation and closure	16:30 – 16:45
Day 4	
Review of Day 3	8:00 – 8:15
Session 4.2: Managing Data Using the EMR in Malawi (continued)	8:15 – 10:00
Tea break	**10:00 – 10:15**
Session 4.2: Managing Data Using the EMR in Malawi (continued)	10:15 – 12:15
Lunch	**12:15 – 13:15**
Session 4.3: Managing Data Using the LIMS	13:15 – 15:15
Tea Break	**15:15 – 15:30**
Session 4.3: Managing Data Using the LIMS (continued)	15:30 – 16:30
Evaluation and closure	16:30 – 16:45
Day 5	
Review of Day 4	8:00 – 8:15
Session 4.4: Managing Data Using DHIS2 Tools	8:15 – 10:00
Tea Break	**10:00 – 10:15**
Session 4.4: Managing Data Using DHIS2 Tools (continued)	10:15 – 11:30
Session 4.5: Using the Mobile Supervisory Tool	11:30 – 12:30
Lunch	**12:30 – 13:30**
Module 5: Data Quality	
Session 5.1: Introduction to Data Quality	13:30 – 15:00
Tea Break	**15:00 – 15:15**
Session 5.3: Data Quality Assurance	15:15 – 16:45
Evaluation and closure	16:45 – 17:00
Day 6	
Review of Day 5	8:00 – 8:15
Module 7: Data Security	
Session 7.1: HIS Security Concepts	8:15 – 10:00
Tea Break	**10:00 – 10:15**

Session 7.2: Managing Confidentiality Within the HIS	10:15 – 11:15
Session 7.3: Levels of Electronic HIS Security	11:15 – 12:30
Lunch	**12:30 – 13:30**
Session 7.4: Security Breaches	13:30 – 15:00
Tea Break	**15:00 – 15:15**
Module 8: User and Systems Support	
Session 8.1: Importance of Support and Maintenance for Electronic HIS	15:15 -16:15
Evaluation and closure	16:15 – 16:30
Day 7	
Review of Day 6	8:00 – 8:15
Session 8.2: Identifying e-HIS IT Issues	8:15 – 9:15
Session 8.3: Troubleshooting	9:15 – 10:00
Tea Break	**10:00 – 10:15**
Session 8.3: Troubleshooting (continued)	10:15 – 12:00
Lunch	**12:00 – 13:00**
Post-test	13:00 – 13:45
Closing remarks	13:45 – 14:15

Section Two:
Training Sessions

Session 0

Session 0: Introduction to the Course

Time: 45 minutes for the session + 30 minutes for the pre-test

Learning Objectives

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

1. Introduce their fellow participants
2. Articulate the course goals and objectives
3. List the eight course modules
4. Describe the training methods
5. List the course materials
6. Discuss the role of self-study in the course
7. List the group norms for the course
8. Describe the purpose of the parking lot

Session Overview

Step	Time	Method	Content	Resources
1	20 minutes	Facilitator presentation, Paired discussion, Group introductions	Participant introductions and expectations (slides 1–2)	Flip chart, markers, tape, LCD
2	5 minutes	Facilitator presentation	Course goal and objectives (slides 6–14)	Flip chart, markers, tape, LCD
3	5 minutes	Facilitator presentation	Course content, methods and materials (slides 15–20)	Flip chart, markers, tape, LCD
4	5 minutes	Facilitator presentation	Self-study modules	Flip chart, markers, tape, LCD
5	5 minutes	Facilitator presentation	Group norms and parking lot (slides 21–22)	Flip chart, markers, tape, LCD
6	5 minutes	Q & A	Session close/Q & A	Flip chart, markers, tape, LCD
7	30 minutes	Self-study	Pre-test (slide 23)	Pre-test

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Advance Preparation

On a piece of flip chart paper, write **Group Norms** to record group norms generated during the session. On another piece of paper, write **Parking Lot** to record parking lot items during the session. After the session, tape to the wall for the remainder of the training and refer to as needed.

Trainer Instructions: Step 1 (25 minutes)

Use slides 1–5 and the facilitator notes to guide this step.

Slide 1

NOTE: these facilitation notes provide information on timing, items to emphasise and background information to help the facilitator understand and explain the slide content. These notes are not meant to be read aloud by the speaker.

EXPLAIN that this training will be a mix of both direct training with modified TOT activities during the second week using course content. In this schedule the participants will see most of the course material trained by either The Kuunika Team (for the most part) as well as their fellow participants during the Teachback sessions. There are three rounds of Teachbacks of the hardest content. This will help participants practice the most complicated technical material but still see the other sessions.

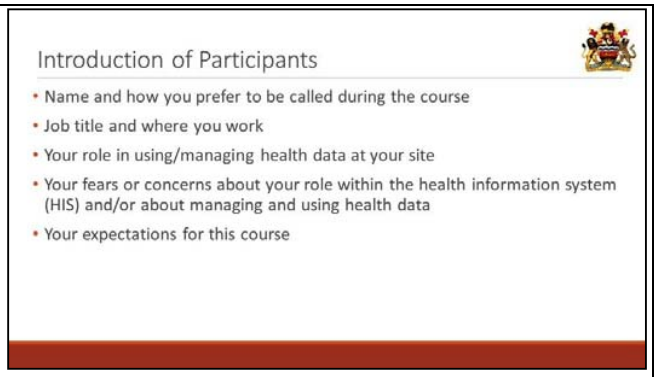
EXPLAIN that the TOT will be explained more in the second week. The first week of the training is dedicated to orienting you to Sessions 1 – 4.

Slide 2

EXPLAIN that health information systems will be referred to as HIS for the remainder of the workshop.

DIVIDE participants into pairs.

EXPLAIN that each person should introduce themselves to the other person, answering each question on the slide.



RECONVENE the group.

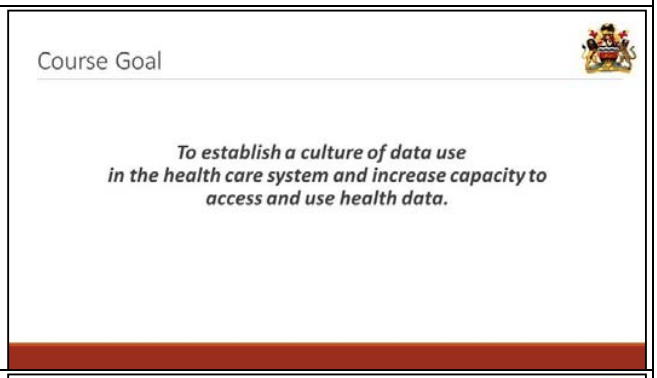
ASK each person to introduce their partner.

WRITE course expectations on a piece of flip chart paper. To save time, invite participants to add to the expectations list, adding new things rather than repeating what has already been stated.

Slide 3

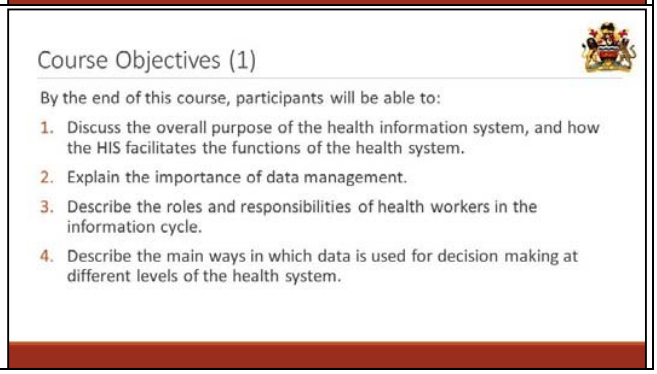
SHARE the goal of the training with participants.

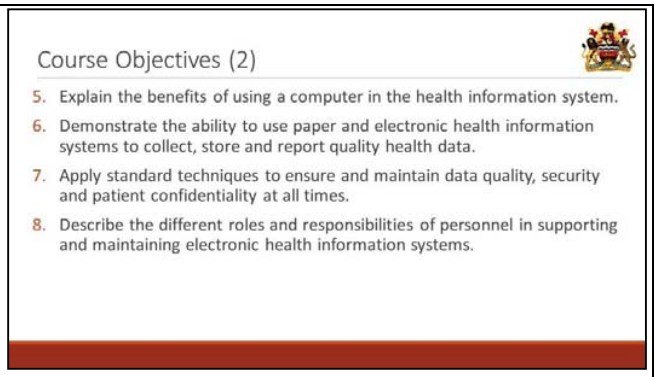
REFER participants to the Course Goals and Objectives of the Participant Manual to follow along with the next few slides.



Slide 4

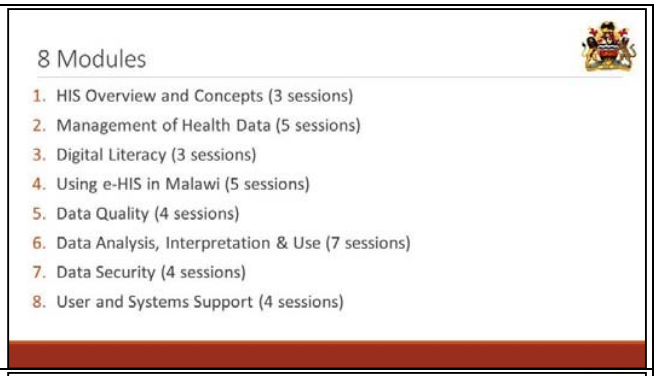
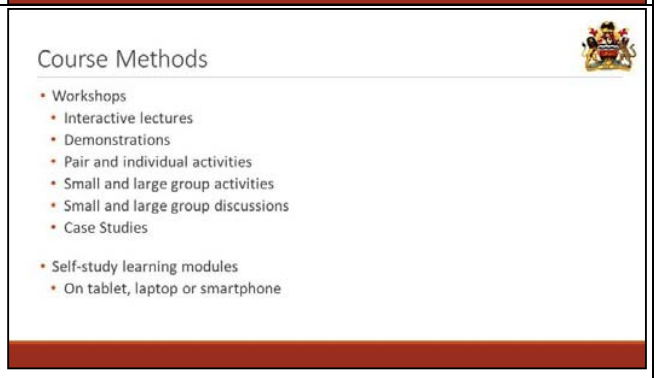
EXPLAIN that the workshop will accomplish these goals by achieving the learning objectives on this slide and the following two slides.

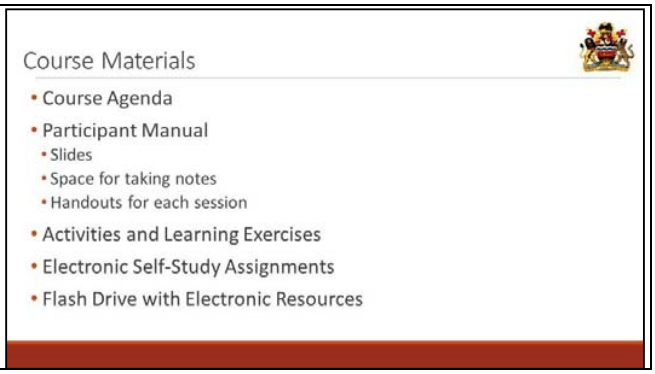


Slide 5	After presenting the goal and objectives, **INSTRUCT** participants to reflect on the expectations of the course that they shared during introductions. **ASK** participants if their expectations will be met through training goal and objectives. **ASK** participants to identify any expectations that are not reflected in the training goals and objectives. **ENSURE** that participants understand the scope and focus of this workshop: Effective management and use of health data. 

Trainer Instructions: Step 2 (5 minutes)

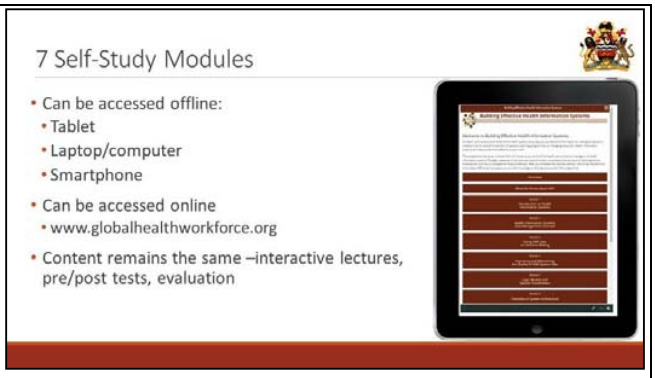
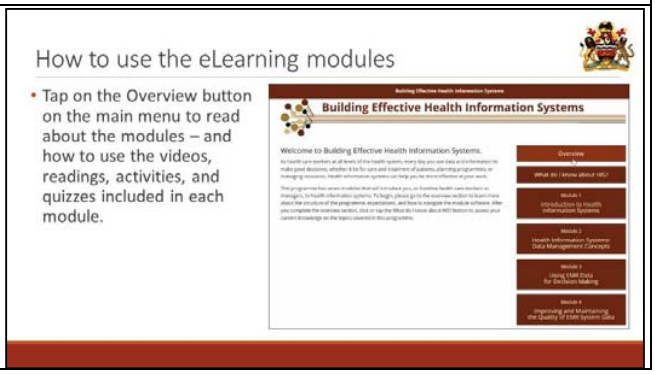
Use slides 6–8 and the facilitator notes to guide this step.

Slide 6	
Slide 7	**EXPLAIN** that everyone in the room is an adult; as such, the training course will use a variety of methods that are recognized as effective learning methods for adults. **SHARE** with participants the different training methods that will be used during the workshop to accomplish the learning objectives. 

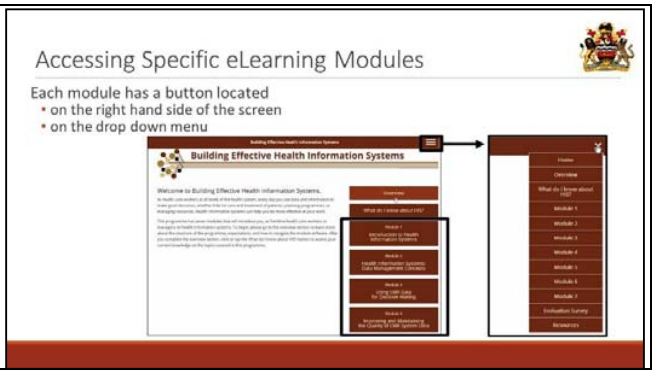
Slide 8	**REVIEW** this list of basic materials required to successfully conduct the *Effective Data Management and Use* course.	

Trainer Instructions: Step 3 (5 minutes)

Use slides 9–11 and the facilitator notes to guide this step.

Slide 9	**EXPLAIN** that there are **seven self-study e-learning modules** included in this course. Participants will have access to all of them and should be encouraged to learn from all of them. Each one can be taken offline (downloaded) using a tablet, smartphone, or computer (laptop or desktop). If you do not have a laptop or smartphone, you may borrow a tablet for the course. **EXPLAIN** that it takes approximately one (1) hour to complete each e-learning module.	
Slide 10		

Slide 11



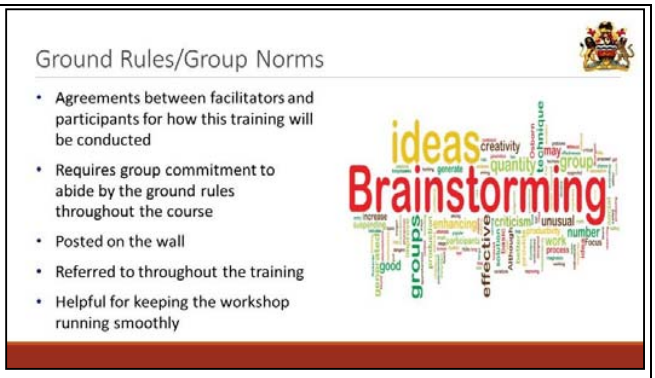
Trainer Instructions: Step 4 (5 minutes)

Use slides 12–13 and the facilitator notes to guide this step.

Slide 12

EMPHASIZE again that participants are adults, and that it is important to follow some common ground rules that also respect the fact that we are all adults.

ASK the group to brainstorm the ground rules they would like to establish for the course and write them on a piece of flip chart paper.

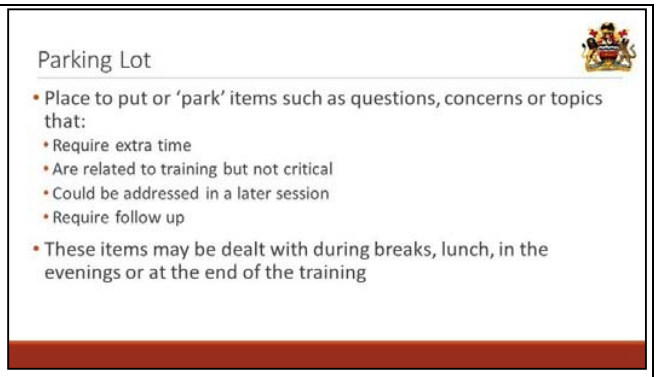


Examples may include:

- Punctuality and time management (for both facilitators and participants)
- Switch off cell phones or put them on mute/vibrate. Answer calls during breaks.
- Ask all questions
- Respect each other's opinions and contributions
- One person speaks at a time
- No interruption when others are speaking
- Patience
- No small meetings
- Group participation
- Flexibility

Slide 13

INTRODUCE the idea of a 'parking lot' after the ground rules have been established and posted.



EXPLAIN to participants that the parking lot is a way of acknowledging and recording discussions, themes, or ideas that might take too much time to fully explore, or that are related to, but not critical for the discussion. These topics are usually important to the participants.

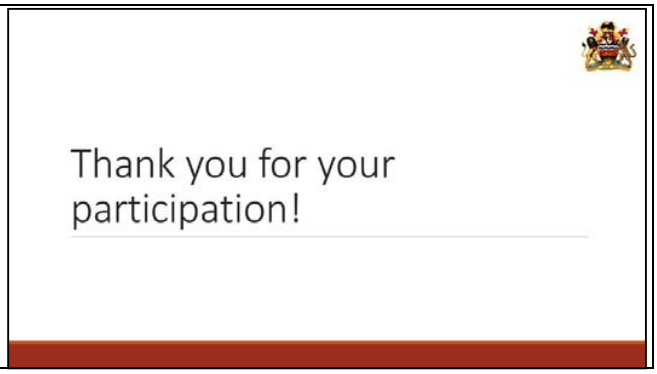
POST a piece of flip chart paper at the front of the room.

TELL participants that this is the parking lot, and that this is where the group will write down interesting topics or questions that are either taking up too much time or are not critical to the discussion. By writing these topics on this piece of paper, they are dropped in the 'parking lot' until time is available to discuss them, either at the end of the meeting or during breaks.

Trainer Instructions: Step 5 (5 minutes)

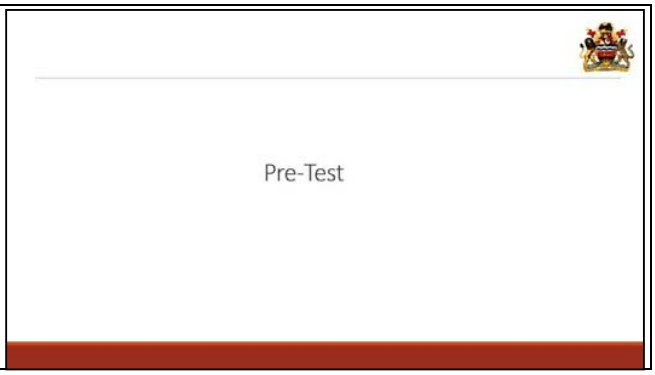
Use slide 14 and the facilitator notes to guide this step.

Slide 14



Trainer Instructions: Step 6 (30 minutes)

Use slide 15 and the facilitator notes to guide this step.

Slide 15	**DISTRIBUTE** the pre-test to participants. **EXPLAIN** that they will have about 30 minutes to complete the test. **COLLECT** the tests once the participants have finished. **THANK** the participants.	

MODULE 1: HIS OVERVIEW AND CONCEPTS
Session 1.1: Introduction to Health Information Systems

Time: 90 minutes

Learning Objectives

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

1. Define health system
2. List the primary goals of a health system
3. Discuss health system challenges
4. Define health information system (HIS)
5. Distinguish between data and information
6. Describe the essential role of an HIS in achieving the goals of the health system
7. Identify information needs at different levels of the health system

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	30 minutes	Facilitator presentation/small group discussion	Health System and Malawi HSSP II (slides 4–8)	Flip chart, markers, tape, LCD
3	20 minutes	Facilitator presentation/ interactive discussion	Health Information System, data and information (slides 9–15)	Flip chart, markers, tape, LCD
4	30 minutes	Facilitator presentation/Small group discussion	Importance of HIS and health system levels (slides 16–21)	Flip chart, markers, tape, LCD, Handout 1.1.1
5	5 minutes	Facilitator presentation	Key points (slide 22)	Flip chart, markers, tape LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

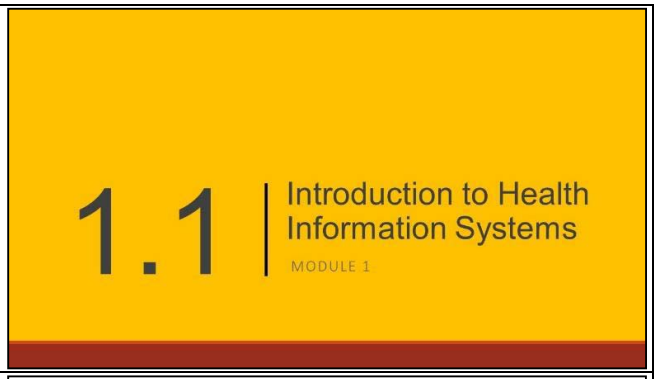
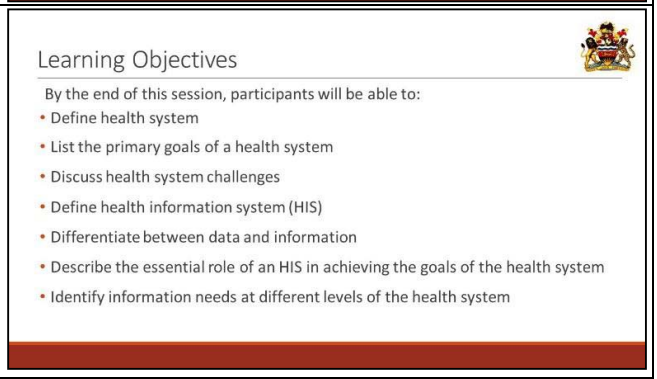
Handout 1.1.1: Management Functions and Information Support

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following e-learning Assignment:
  Module 1: Introduction to Health Information Systems

Trainer Instructions: Step 1 (5 minutes)

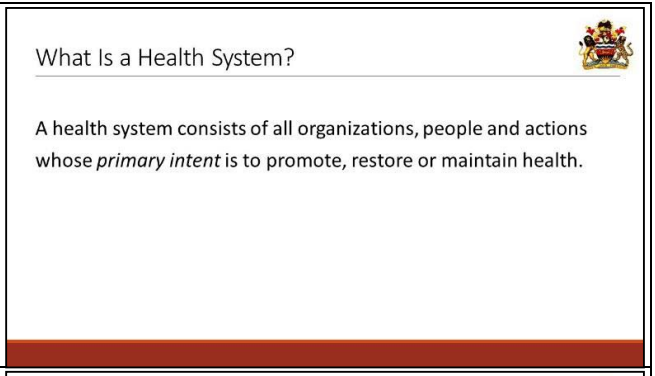
Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**INTRODUCE** the session.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (30 minutes)

Use slides 4–8 and the facilitator notes to guide this step.

Slide 4

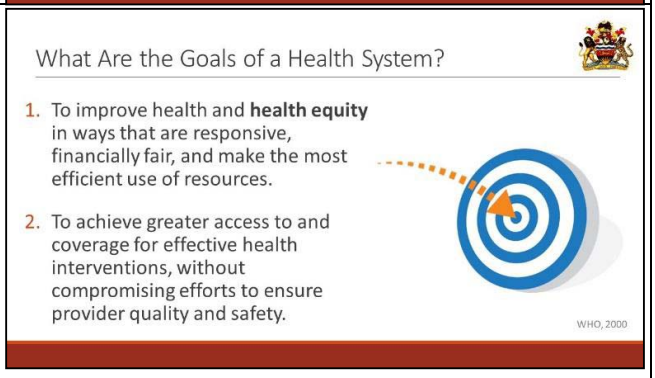


Slide 5

NOTE this slide is animated. Wait for participants to answer the question before clicking to reveal the answer.

ASK: What are the goals of a health system?

ALLOW some discussion, then **CLICK** to share the information in the slide.

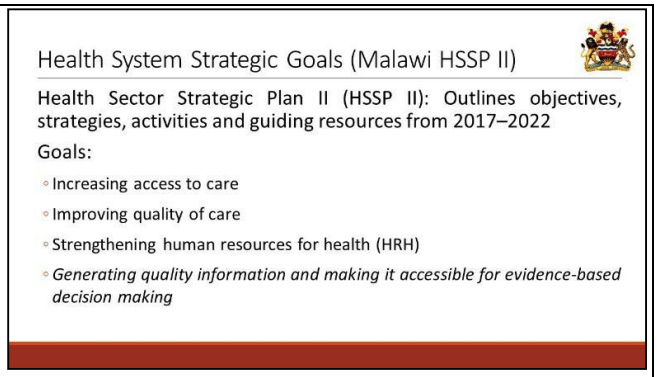


EXPLAIN: The *World Health Report 2000*, published by the World Health Organization (WHO) (http://www.who.int/whr/2000/en/), talks about overall **health system outcomes or goals** in terms of improving health and health equity in ways that are responsive, financially fair, and make the best or most efficient use of available resources.

There is also an important intermediate goal: the route from inputs to health outcomes is achieved through greater access to, and coverage for, effective health interventions without compromising efforts to ensure provider quality and safety.

Slide 6

EXPLAIN that there are many objectives the Ministry of Health and Population (MOHP) is trying to achieve through its Health System Strategic Goals (HSSP II) initiative, among them increasing access to and improving quality of care, strengthening health system infrastructure, improving leadership, and strengthening human resources for health (HRH).



Included in HSSP II is a goal related to HIS:

> *Generate quality information and make it accessible to all intended users for evidence-based decision making, through standardized and harmonized tools across all programs.*

EXPLAIN that the modules in this course will help participants to understand how they are a crucial part of achieving this goal.

Slide 7

DIVIDE participants into groups of three.

ASK them to consider which functions of a health system are needed to achieve these primary goals.

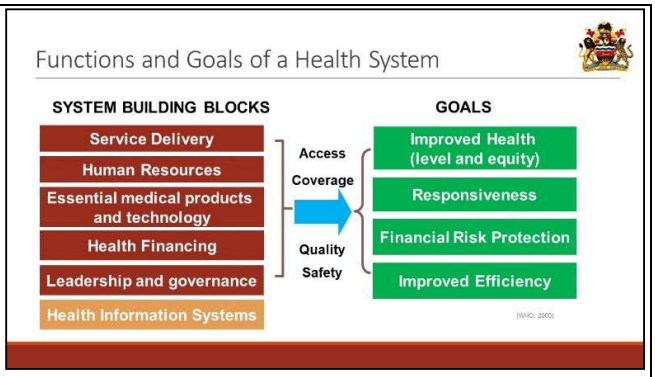
GIVE the groups 15 minutes to discuss, then bring them back together.

HAVE each group share their answers, then ask other groups to add their feedback. **RECORD** responses on a flip chart.

EXPLAIN that we will be discussing all of these issues in greater detail throughout this module.

Slide 8

EXPLAIN that in order to achieve their goals, all health systems have to carry out some basic functions, regardless of how they are organized.



The functions identified in the *World Health Report 2000* can be broken down into a set of six essential building blocks, all of which are needed to improve outcomes and strengthen health systems.

EXPLAIN each of the building blocks:

- **Service Delivery**: a health system needs to provide health services to clients.
- **Human Resources**: properly trained health workers need to be available to provide services within the health system.
- **Essential medical products and technology**: equitable access to essential medicines, medical products, vaccines, and technology is needed.
- **Health Financing**: finances need to be allocated and mobilized to support the health system.
- **Leadership and Governance**: health system leadership and governance and provide a well-functioning **HIS**.

ASK participants: Why do you think providing a well-functioning health information system is an essential building block?

ALLOW and acknowledge a few responses, then **CLICK** to the next slide.

Trainer Instructions: Step 3 (20 minutes)

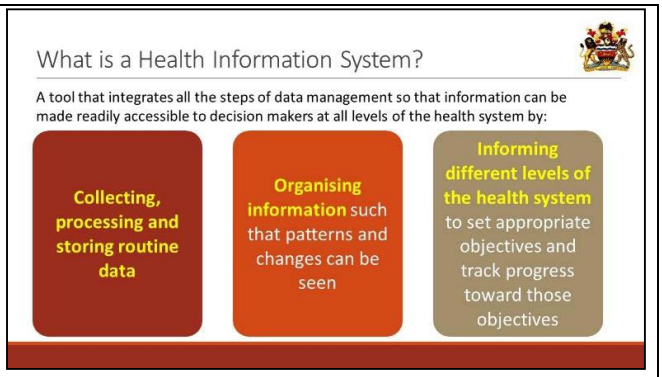
Use slides 9–15 and the facilitator notes to guide this step.

Slide 9

ASK for 1–3 examples of each challenge as you go through them to engage participants in the topic.

Slide 10

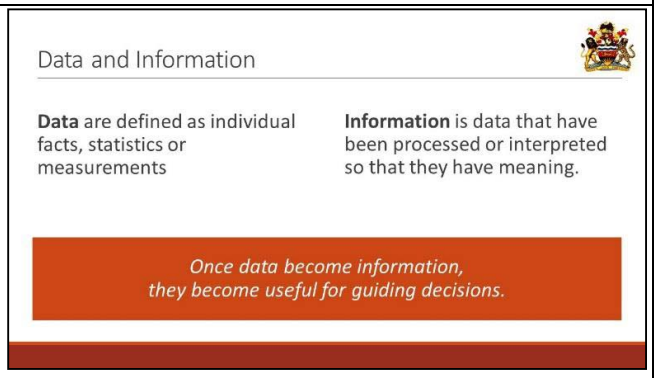
NOTE: This slide contains animation. **CLICK** to reveal each function of a HIS.



EXPLAIN that a health information system is essentially a tool to help improve population health management and achieve better health outcomes for all by capturing and using available information obtained through routine data collection. An HIS gathers information that shows changes in local health conditions, health status, health priorities, and progress towards set objectives. There are ongoing efforts to improve the availability, quality and use of health information at all levels—national, regional, and global—by using HIS.

Slide 11

NOTE: This slide is animated. Wait until participants have answered the question before clicking to reveal the answers.



EXPLAIN that so far, we've used the words data, information and evidence.

ASK: What is the difference?

ALLOW a few responses, then use the notes below to explain.

EXPLAIN that data can refer to a single piece of information, or to many pieces of information. Data are not limited to numbers; they can also be words, pictures, video, or even sound. A weight measurement or telephone number are examples of data about a person, as are such descriptions as *adult* or *adolescent*, or a *positive* or *negative* blood-test result. Think of data as raw material. Data have not been shaped, or processed, or interpreted, and do not make sense on their own. Bringing together different pieces of data can help in turning data into information.

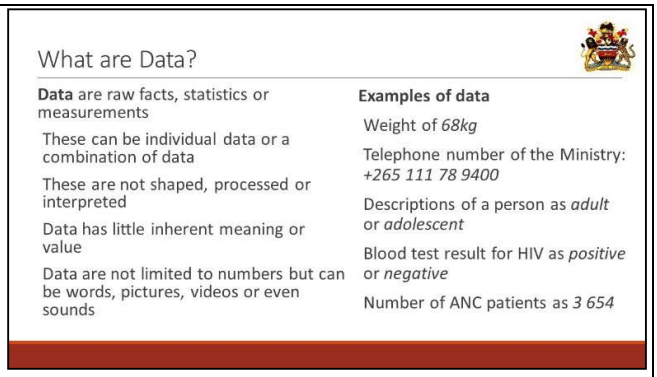
REMIND participants that later in this training we will cover skills for managing and analysing data, how to find patterns and meaning and turn them from raw data into information.

Slide 12

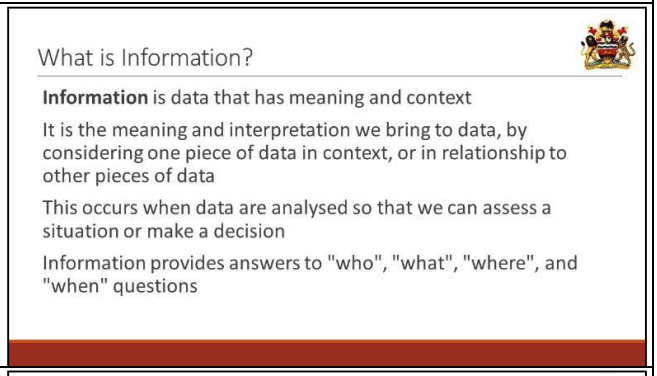
NOTE: This slide is animated. Wait for participants to answer the question below before clicking to reveal examples of data.

ASK: What are some examples of data?

ALLOW several responses, then **CLICK** to reveal the examples on the slide.



Slide 13



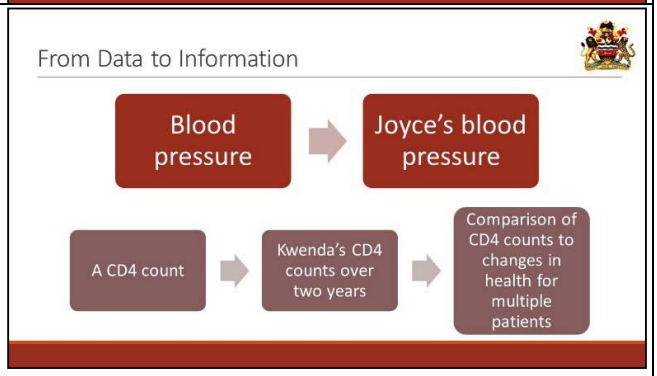
Slide 14

NOTE: This slide is animated.

EXPLAIN that you would like to first review a few practical examples of how data become information.

ASK: What are some examples of patient clinical data in the health care setting?

WRITE on the board or a flip chart: 140/90.



ASK: Is this data or information? Why?

NOTE: *This is a blood pressure recording. Later you will discuss how the recording of the measurement is improved by adding the unit of measure, i.e., mmHg.*

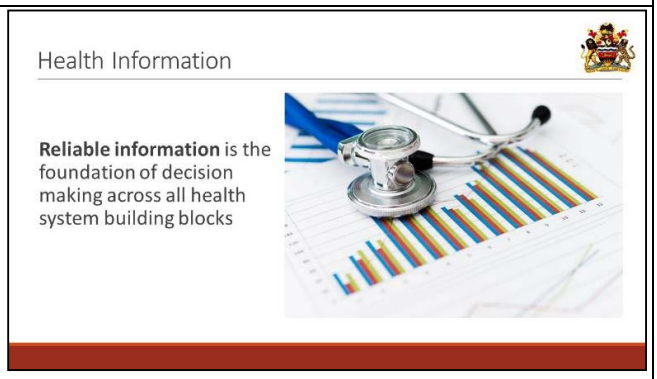
CLICK on the first item. **EXPLAIN** that to change data to information, it needs to be attached to a patient in order to be useful.

CLICK on the second item. **EXPLAIN** again that to change this data to information, it needs to be attached to a patient in order to be useful. For example, several CD4 counts tracked against a patient's health status will provide information that can be used to make decisions about clinical practice.

Data are valuable because they can be objectively measured. Data are not opinions, conjecture, feelings, or assumptions. It must depend upon verifiable, repeatable measurement. For blood pressure data, it is necessary to measure using the standard method with a blood pressure cuff. A nurse cannot determine a person's blood pressure by looking at the client's physical appearance. Data rely on objective measurement.

Slide 15

EXPLAIN that in addition to being one of the core functions of the health system, health information itself is a national asset. It is used by policy makers, planners, health care providers, development partners, and the general public to track health system performance, to support better health policies, and make effective health-related decisions for the entire population.



Sound, **reliable information** is the foundation of effective decision making across all health system building blocks. It is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education, and training service delivery and financing.

Trainer Instructions: Step 4 (30 minutes)

Use slides 16–21 and the facilitator notes to guide the presentation and group discussion.

Slide 16

EXPLAIN that HIS are a crucial part of modern health care. These systems compile a wide range of data for individual patients, including medical history, diagnoses, treatments, allergies, etc. They also provide the information needed to analyse metrics for hospitals and the population at large.

Not only do HIS improve patient outcomes, but the information gathered also provides an economic picture of health care and areas for improvement.

Slide 17

EXPLAIN that the essential role of the HIS in the health system is to provide specific information support to the decision-making process at every level.

ASK: Can you give example of some of the functions that take place at each level?

ALLOW a few responses before moving to the next slide.

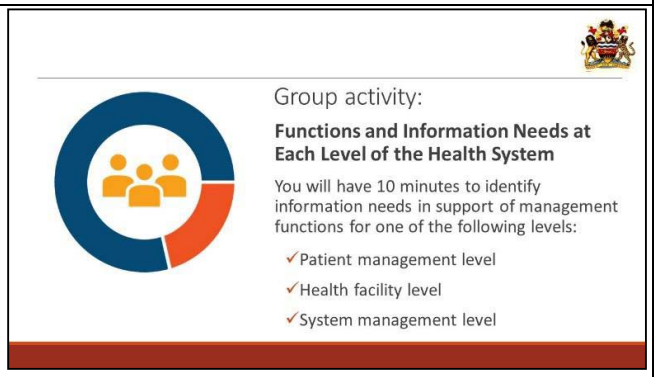
Slide 18

ASK participants to form small groups.

ASSIGN each group one level to discuss.

REFER participants to **Handout 1.1.1: Management Functions and Information Support**.

GIVE the groups 10 minutes to discuss the functions and information needs at their assigned level.



INSTRUCT the group assigned the patient management level to give their responses; **ASK** the other groups to give feedback. **RECORD** responses on a flip chart.

INSTRUCT the group assigned the health facility level to give their responses; **ASK** the other groups to give feedback. **RECORD** responses on a flip chart.

INSTRUCT the group assigned the system management level to give their responses; **ASK** the other groups to give feedback. **RECORD** responses on a flip chart.

Possible answers:

1. Patient management level

- *Taking care of patients*
- *Management of health (family and household)*

Clinical practitioners need clinical data on a daily basis for ward rounds; they use local laboratory and other diagnostic data to monitor clinical improvement in their patients. They particularly need data to follow up on patients with significant needs, such as pregnant women, children under five, and patients with chronic infectious and non-communicable diseases.

2. Health facility level

- *Monitoring and evaluation of health services and quality*
- *Management of resources*
- *Planning programme interventions*
- *Disease surveillance*

Facilities managers regularly need data to improve facility infrastructure, equipment, and human resources. They need to know norms for infrastructure, basic service packages, staffing, and equipment standards. They need to know how to calculate indicators that will give them a picture of the resources required for their service areas.

3. Health system level

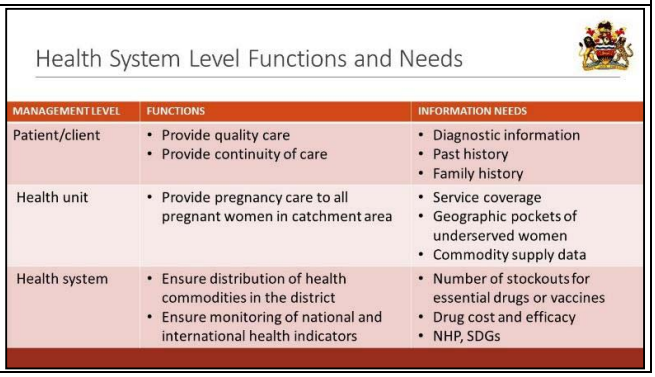
- *Policy and strategy decisions*
- *Health programmes planning and management*
- *Capacity-building*
- *Resource management*
- *Disease surveillance*
- *Research innovations*

From the district level up to the national level, system managers need data to monitor and plan for health service delivery. System managers need data on health outcomes, services provided, and management of resources. Resources include: personnel, equipment, supplies, transport, drugs and vaccines, and finances.

CLICK to the next slide to reveal an example of how the matrix might be filled out.

Slide 19

EXPLAIN that this is an example of how you might fill out the matrix.



Health System Level Functions and Needs

MANAGEMENT LEVEL	FUNCTIONS	INFORMATION NEEDS
Patient/client	• Provide quality care • Provide continuity of care	• Diagnostic information • Past history • Family history
Health unit	• Provide pregnancy care to all pregnant women in catchment area	• Service coverage • Geographic pockets of underserved women • Commodity supply data
Health system	• Ensure distribution of health commodities in the district • Ensure monitoring of national and international health indicators	• Number of stockouts for essential drugs or vaccines • Drug cost and efficacy • NHP, SDGs

Slide 20

NOTE: This slide contains animation. **CLICK** to show each way in which HIS serves a broader end.

EXPLAIN that in addition to being essential for monitoring and evaluation (M&E), the information system also serves broader ends:

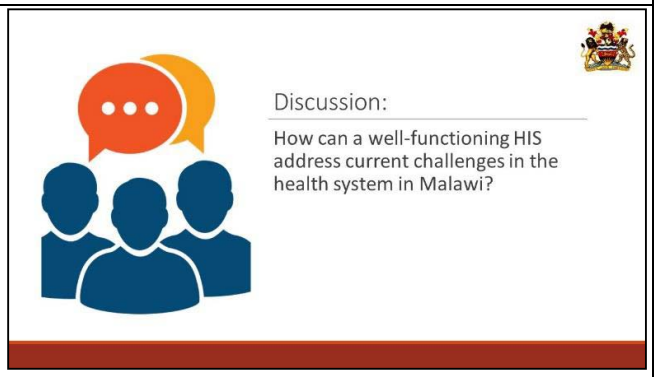
- Provides an alert and early warning capability
- Supports patient and facility management
- Enables planning
- Supports and stimulates research
- Supports reporting
- Communicates health challenges to diverse users

Slide 21

NOTE: This slide contains animation. **CLICK** to ask each discussion question.

In the same groups of three, **ASK** participants to respond to the question on the slide.

GIVE the groups 10 minutes to discuss, then bring them back together.



ENSURE that each group has an opportunity to contribute to the responses to the question.

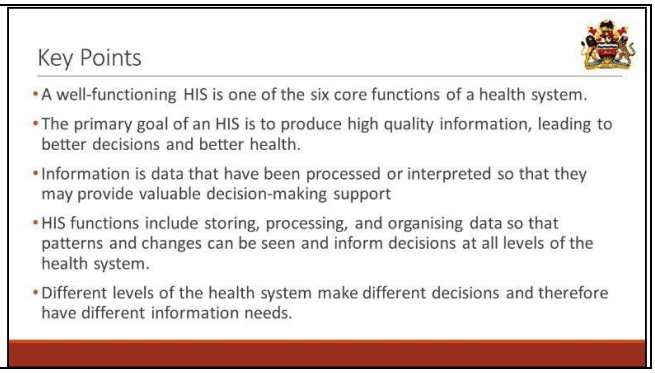
Trainer Instructions: Step 5 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22

ASK a participant to read the key points from the session.

ASK what questions do you have?



Handout 1.1.1: Management Functions and Information Support

Identify information needs in support of management functions at all levels.

MANAGEMENT LEVEL	FUNCTIONS	INFORMATION NEEDS
Patient/client		
Health unit		
Health system		

Session 1.2: HIS Components

Time: 80 minutes

Learning Objectives

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

1. Describe the basic components of an HIS and how they function together
2. Define HIS subsystems
3. Define interoperability
4. Describe the information cycle
5. Discuss how electronic subsystems support different stages of the information cycle

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	50 minutes	Facilitator presentation, Small group discussion	Functions and components of an HIS (slides 4–14)	Flip chart, markers, tape, LCD
3	20 minutes	Facilitator presentation, Group discussion	Processes and tools used in the information cycle, electronic and other sub-systems (slides 15–21)	Flip chart, markers, tape, LCD
4	5 minutes	Facilitator presentation	Key points (slide 22)	Flip chart, markers, tape, LCD

Resources Needed

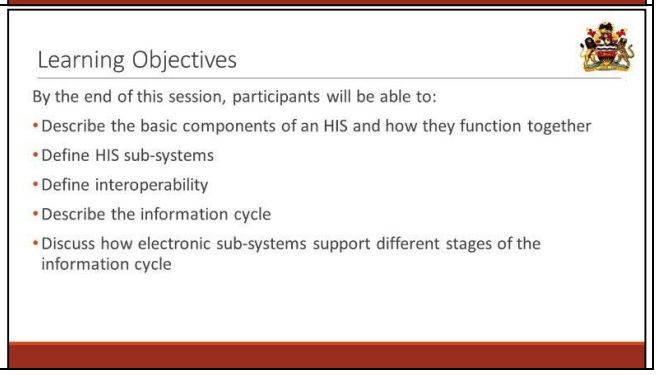
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following e-learning Assignment:
  Module 6: Overview of System Architecture

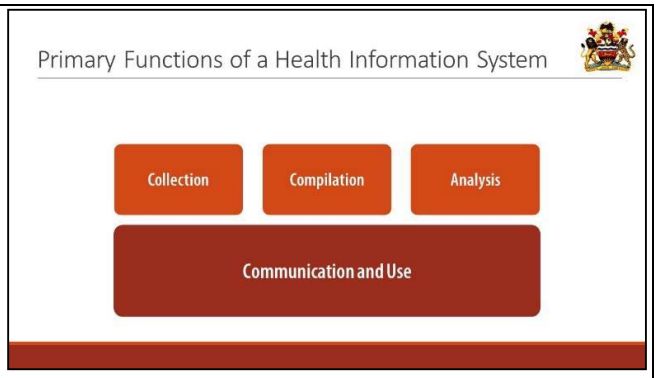
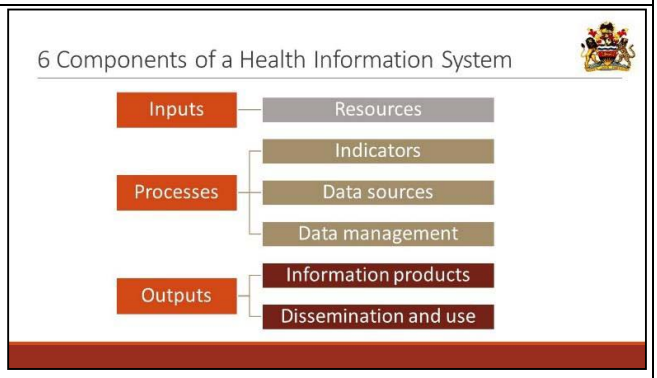
Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

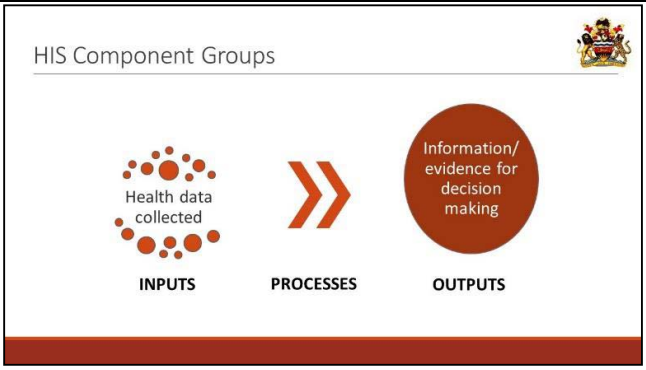
Trainer Instructions: Step 2 (50 minutes)

Use slides 4–14 and the facilitator notes to guide this step.

Slide 4	**EXPLAIN** that in session 1.1, we discussed evidence-based decision making, and the need to use quality information as the basis for those decisions.  In Session 1.2, we learnt that the HIS has a key role in the information cycle, providing specific information to support to the decision-making process at all levels of the health system. The information cycle, as we now know, is how data are transformed into information and evidence for decision making. In this session, we will look at how the components and structure of the HIS make this possible.
	REMIND participants that in the previous session, we discussed the primary functions of an HIS. Here they are simplified into the collection, compilation, and analysis of data, and the communication of those results to assist (use) in the decision-making process.
Slide 5	**EXPLAIN** that all HIS have these six key components: resources, indicators, data sources, data management, information products, and dissemination and use.  It is important to understand these six components and how they interact with each other to produce better information for better decisions and better health. **EXPLAIN** that as you can see here, another way to look at the six components is to divide them into three groups: **inputs**, **processes**, and **outputs**. These will be discussed in the following slides.

Slide 6

EXPLAIN that, as shown in the previous slide, another way to look at the six components is to divide them into three groups: **inputs**, **processes** and **outputs**.



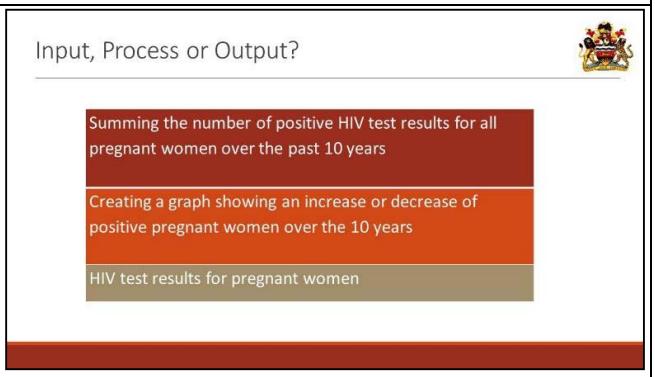
- **Inputs** refers to resources, or what goes INTO the system to make it work.
- **Processes** take place WITHIN the system—such as how indicators and data sources are selected, and how data is collected and managed.
- **Outputs** refer to the results of these processes, or what comes OUT of the system—the generation, dissemination, and use of information.

Slide 7

ASK participants to categorize each of the examples on the screen as an input, output, or process.

ENSURE they understand the question. **GIVE** them 2–3 minutes to read the examples and formulate their responses.

GUIDE participants in their reasoning, if necessary.



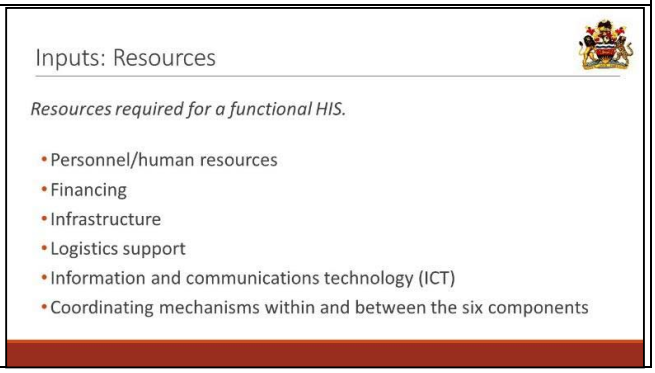
Answers:

- *HIV test results for pregnant women (**input**)*
- *Summing the number of positive HIV test results for all pregnant women over the past 10 years (**process**)*
- *Creating a graph showing an increase or decrease of positive pregnant women over the 10 years (**output**)*

ENSURE participants understand the differences among the three before moving on to the next slide.

Slide 8

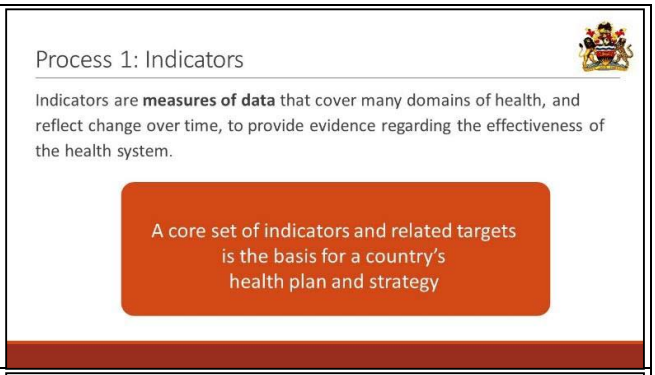
EXPLAIN that legislative, regulatory, and planning frameworks are all required to ensure a fully functioning HIS.



Slide 9

ASK participants to define **indicator** and **target setting**.

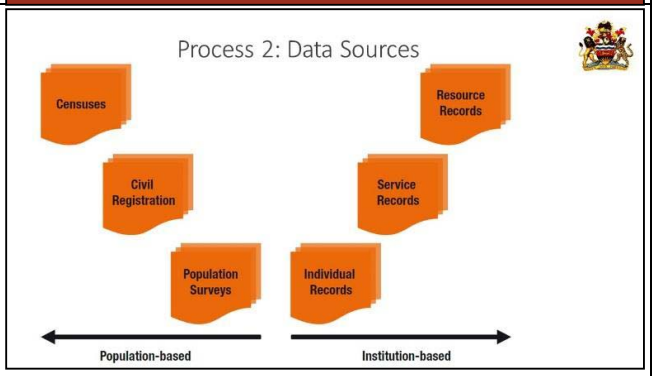
CLICK the slide to show the definitions.



Slide 10

EXPLAIN that another component is data sources, which falls under the processes category.

There are two main sources of data: **population-based** and **institution-based**.



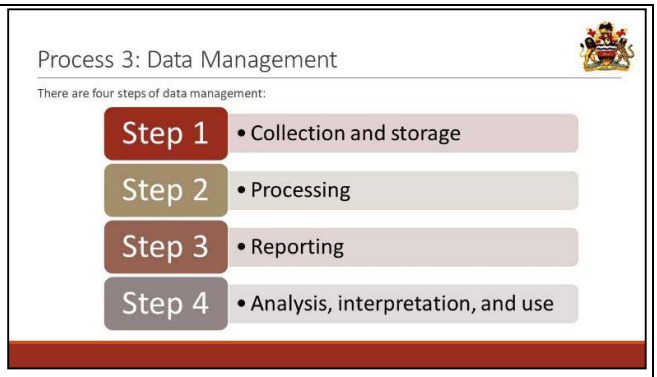
Population-based sources generate data on all individuals within defined populations; they can include total population counts (such as the census and civil registration) and data on representative populations or subpopulations (such as household and other population surveys). What these data sources have in common is that they relate to the whole population, not only to the groups using health services. The data from these sources can either be continuous (generated from civil registers and other administrative records, or periodic (such as that generated from cross-sectional household surveys).

Institution-based sources generate data as a result of administrative and operational activities. Within the health sector, the wide variety of health service data includes morbidity and mortality data among people using services; services delivered; drugs and commodities provided; information on the availability and quality of services; case reporting; and resource, human, financial, and logistics information. These activities are not confined to the health sector; they also include police records (reports of accidents or violent deaths), occupational reports (work-related injuries), and food and agricultural records (levels of production and distribution).

EMPHASIZE that using data from a combination of sources to answer a question may result in a more realistic, appropriate answer.

Slide 11

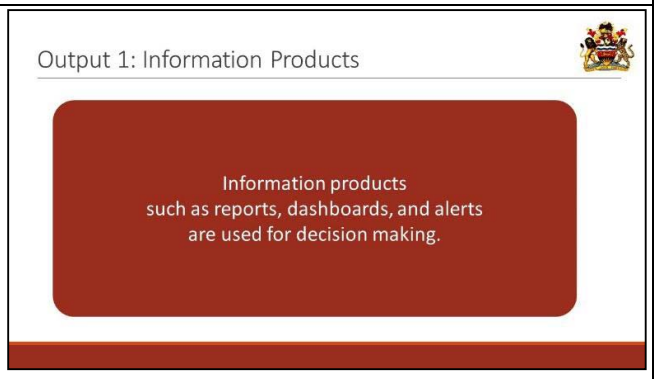
EXPLAIN that data management covers all aspects of data handling. It provides optimal processes for collection and storage; quality assurance and processing; compilation; analysis, interpretation, and use; and dissemination of data from different sources.



REMIND participants that module 2 will focus entirely on the data management process.

Slide 12

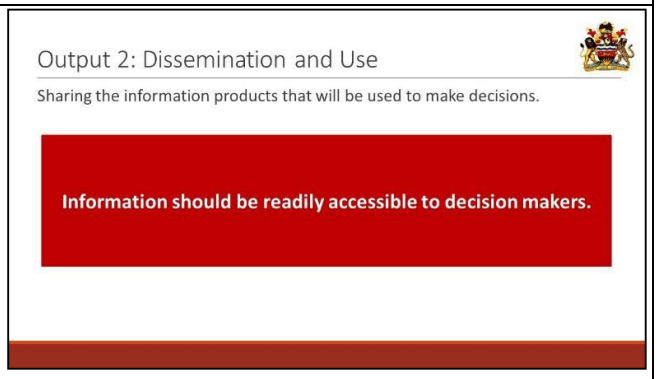
EXPLAIN that another important component is information products—the output of the HIS. As we have learnt, data must be transformed into information that will provide the basis for the evidence and knowledge to shape health action.



The results of transforming data into information are compiled into reports, dashboards, and alerts that can be used for decision making to improve health care.

Slide 13

EXPLAIN that information is of little value if it is not available to meet the needs of multiple users—policy makers, planners, managers, health care providers, communities, and individuals. Therefore, dissemination and communication are essential attributes of the HIS.



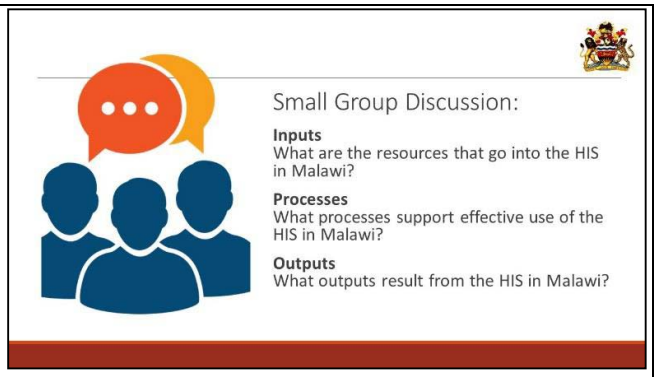
A culture of data use should be encouraged as a core part of day-to-day management of data health systems planning and delivery.

Slide 14

30 minutes total

DIVIDE participants into groups of three or four and have them discuss the questions on the slides.

EMPHASIZE that when we talk about HIS, we are referring to paper-based and electronic systems.



ENSURE they understand the questions and what we mean when we refer to inputs, processes and outputs.

ALLOW 10 minutes for this discussion.

MONITOR their progress and assist if necessary.

BRING participants back together to share their responses (10 minutes).

LISTEN for:

Inputs

- **Personnel:** Skilled and knowledgeable people who are going to use the system (collect data, manage data, use data) and those who lead/orchestrate/manage the HIS as a whole.
- **Written guidelines and policies:** Standards which will guide consistent implementation of processes.
- **Financial resources:** Funds to obtain/maintain infrastructure, support personnel, and implement the system.
- **Infrastructure:** Office space, filing systems, forms, pens, pencils, calculators, computers, etc.

What **indicators** do they commonly report on? **PROMPT** participants to think about what indicators are and what they do. Then **ASK** participants: What we mean when we refer to Indicators as a process within an HIS?

After some discussion, **EXPLAIN** that, in order to know how effective the system is, it will be important to observe change over time, using measurable data sets and indicators that will reflect such change.

Note that **data sources** provide the very data that will be transformed into the information required for strong decision making. Using a combination of sources will result in high-quality data being collected efficiently.

Data management is an essential element to have in place. Data management provides a means of processing and aggregating data from different data sources that will allow it to be easily obtained and used in conjunction with other information. Using an electronic medical record (EMR) system to manage data is a key focus of this course.

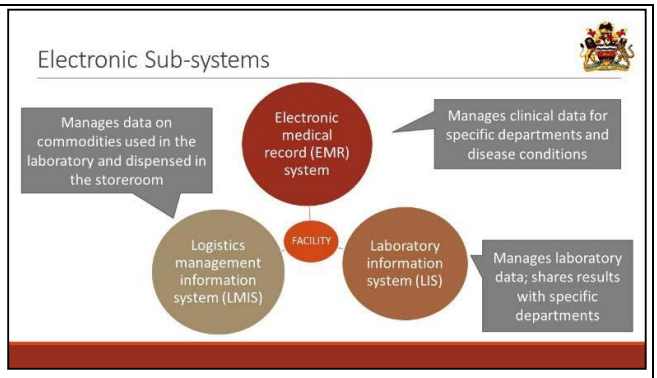
The main output of the HIS is **information** that can be analysed and used by decision makers. Simply transforming the data into information is not enough; the information must be easily and reliably accessible to enable its **dissemination and use**.

Source:
Health Metrics Network. Framework and Standards for Country Health Information Systems. World Health Organization. June 2008. http://www.who.int/healthmetrics/tools/componentsofastronghis.pdf

Trainer Instructions: Step 3 (20 minutes)

Use slides 15–21 and the facilitator notes to guide this step.

Slide 15



NOTE: This slide is animated. Wait for participants to answer questions, then click to reveal the answers one by one.

EXPLAIN that we've just discussed the HIS components used to transform data into information.

EXPLAIN that the HIS is made up of many smaller systems used at different levels of the health system. These are called **sub-systems**. Now we will look at some of the electronic subsystems used at the facility level and talk about how they work together to manage data within a facility.

ASK: What are some of the electronic systems (or sub-systems) we use in the facility? **ALLOW** and **ACKNOWLEDGE** a few responses.

CLICK to reveal the systems shown on the slide.

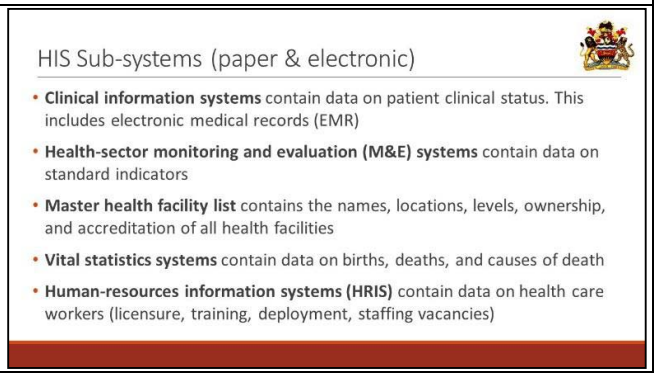
ASK participants: What does the EMR do?

ALLOW a few responses and then **CLICK** to reveal the answer.

CONTINUE with LIS and LMIS.

EMPHASIZE: All of these systems are a part of the overarching HIS.

Slide 16

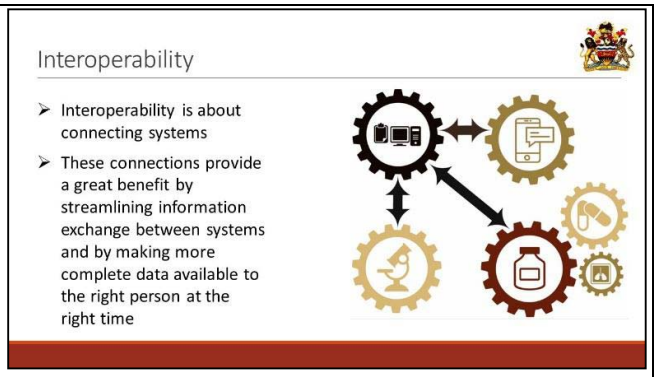


NOTE: This slide is animated. Wait for participants to answer the question before clicking to reveal the responses one by one**.**

ASK participants to brainstorm/list HIS sub-systems in Malawi.

ALLOW a few responses, then **CLICK** to reveal the sub-systems.

Slide 17

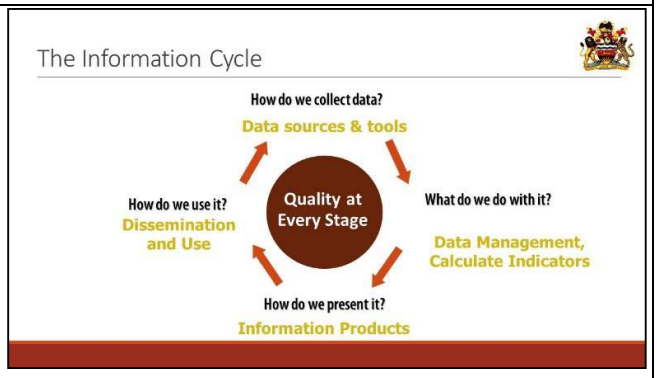


EXPLAIN that interoperability is about connecting systems, the same way that roads of differing size, importance, and materials connect to serve many locations. Interoperability allows each system to do what it does best and share its data with other systems so they can do what they do best.

These connections provide a great asset by streamlining information exchange and supporting the availability of more complete data to the right person at the right time—but they can also be a liability. A problem with one system could lead to vulnerability in any system connected to it. Overall, however, we assume that the benefits of interoperability outweigh the risks.

REFER participants to e-learning module 7, Interoperability at the Facility Level, for more information.

Slide 18



NOTE This slide is animated. Wait until the instructions have you click to reveal text.

EXPLAIN: The information cycle is an important foundation for this course—we will return to discuss different aspects of this topic in more detail as we move through the modules. The information cycle is made up of all the processes that transform data into information that can be used to make important health decisions.

EXPLAIN: Now we know that all systems require inputs, such as the data entered into a register, which is transformed (using various processes) into outputs that can be used for a specific purpose, such as decision making. This transformation takes place via the information cycle.

DIVIDE a piece of flip chart paper into four sections. Use the information cycle questions (black text) as headings: How do we collect data? What do we do with it? How do we present it? How do we use it? First answer these basic questions and **CLICK** to reveal the yellow text under each question.

ASK participants to identify the processes and tools used to achieve the outputs (objectives) at each stage. **ENCOURAGE** participants to identify any electronic tools they use.

As they share their ideas, **WRITE** the processes/tools under the appropriate stages.

ASK: What paper or electronic tools do you use to collect patient data?

LISTEN for:

- *Registers*
- *Patient passbooks*
- *EMR*
- *LIMS*

ASK: What tools do you use to aggregate data?

LISTEN for:

- *Monthly reports*
- *DHIS2*

ASK: What tools do you use to present data?

LISTEN for:

- *EMR reports*
- *DHIS2 reports*
- *Paper-based reporting tools*

Slide 19

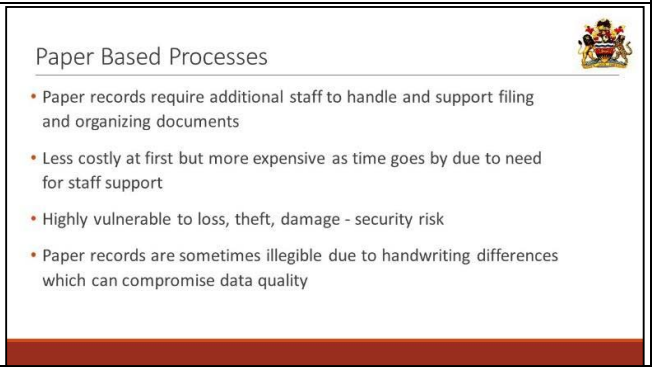
INITIATE a brief discussion (3–5 minutes) about the advantages and disadvantages of paper versus electronic tools/systems.

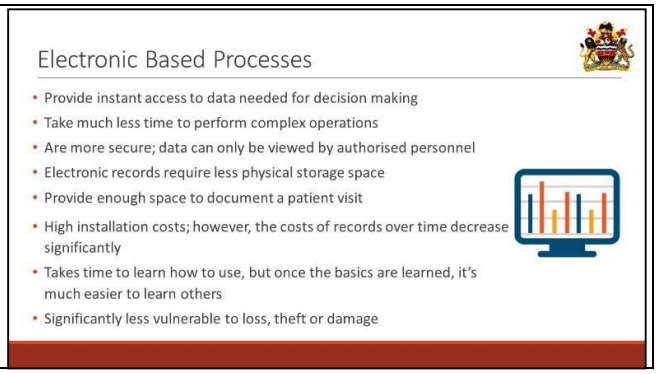
ASK participants about the challenges that they have encountered using paper tools in the information cycle.

ASK participants to share their experiences with electronic sub-systems: How have electronic tools addressed some of these challenges?

Slide 20

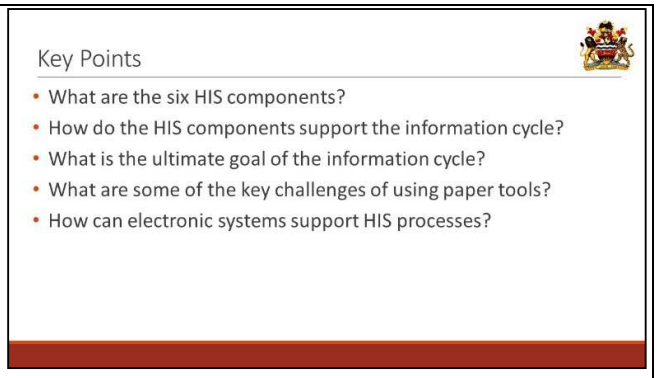
ASK: Can you think of any other advantages or disadvantages of using paper-based processes?



Slide 21	**ASK:** Can you think of any other advantages or disadvantages of using electronic processes?	

Trainer Instructions: Step 4 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22	**ASK** participants the questions on this slide in order to elicit their takeaways from this session. After participants share the key points that they identified, tell them that the next session will look more closely at how the different data collection tools they identified are organized in the Malawi HIS, and what their unique purposes are. **REFER** participants to e-learning module 6 on Overview of System Architecture for more information.	

Session 1.3

Session 1.3: The HIS in Malawi

Time: 55 minutes

Learning Objectives

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

1. Discuss the evolution of Malawi's HIS
2. Discuss the latest developments in Malawi's HIS
3. State the objective of Malawi's HIS
4. Explain the concept of HIS architecture
5. Describe how information flows across different electronic systems in Malawi's HIS
6. Describe the roles of decision makers, data handlers and IT/system support personnel in Malawi

Session Overview

Step	Time	Method	Content	Resources
1	2 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	15 minutes	Facilitator presentation	Evolution of HIS in Malawi and HIS architecture (slides 4–10)	Flip chart, markers, tape, LCD
3	25 minutes	Facilitator presentation/ individual and partner activity	Role of health workers in HIS (slides 11-15)	Flip chart, markers, tape, LCD, Handout 1.3.1
4	13 minutes	Facilitator presentation	Key points (slide 16)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

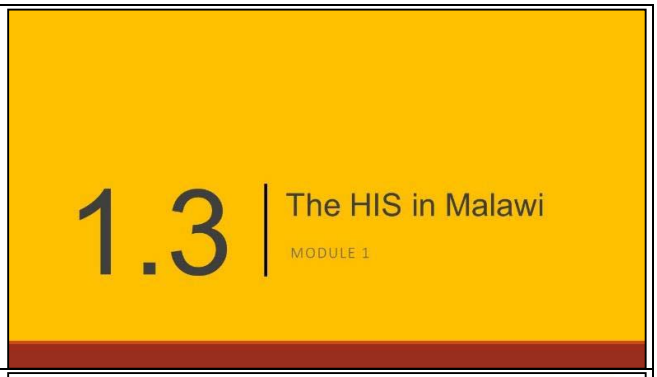
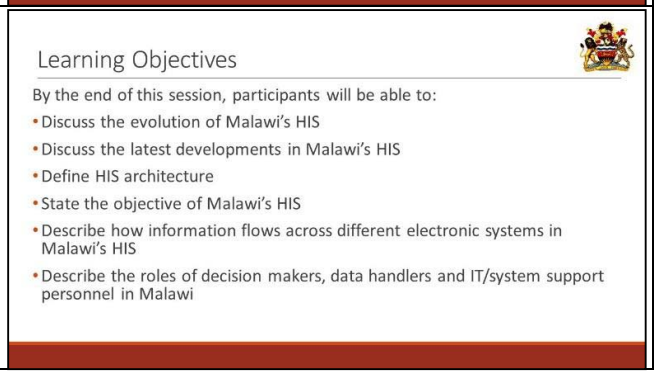
Handout 1.3.1: Matching Roles with Responsibilities

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following e-learning Assignments:
  Module 6: Overview of System Architecture
  Module 7: Introduction to Interoperability at the Facility Level

Trainer Instructions: Step 1 (2 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session	

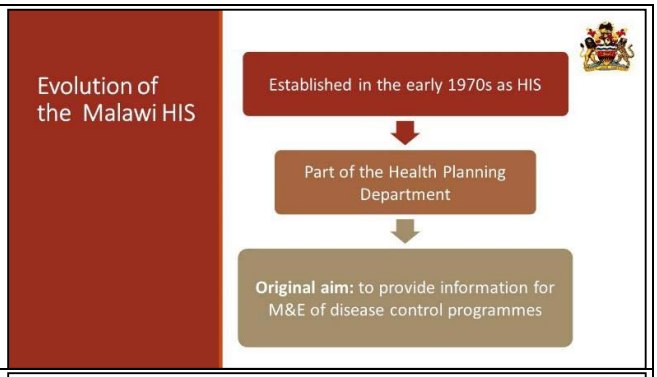
Trainer Instructions: Step 2 (15 minutes)

Use slides 4–10 and the facilitator notes to guide this step.

Slide 4

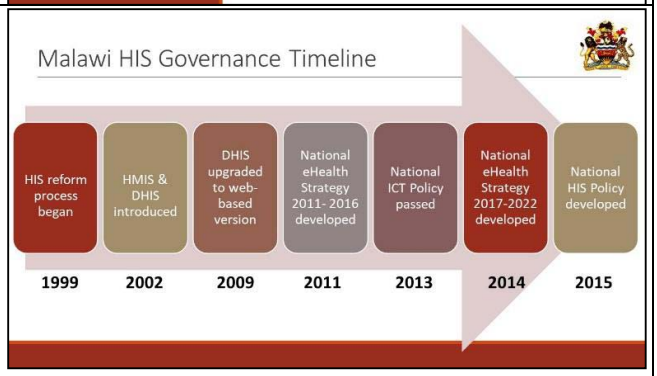
DESCRIBE the background and evolution of the HIS in Malawi.

HIGHLIGHT that Malawi's HIS has been in place for decades. For much of this time, it has used paper registers and reports to manage data and provide decision makers with information.



Slide 5

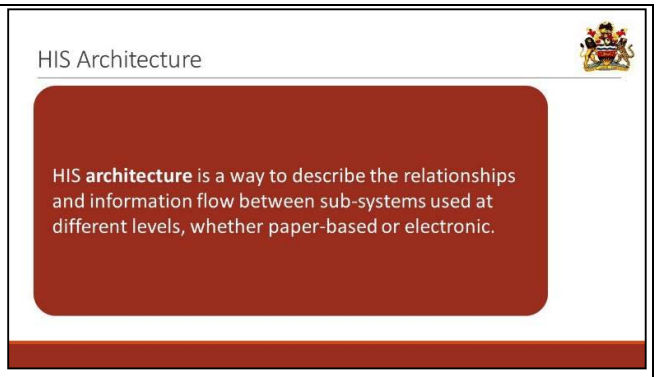
EXPLAIN that HIS governance has supported efforts to improve data management through new technology by moving to electronic registers and reports:



- The MOHP introduced the HIS reform process in 1999 to improve the health care system.
- In 2002, the Health Management Information System (HMIS) was introduced across the country. The same year, the District Health Information Software (DHIS) was also introduced to manage data.
- In 2009, DHIS was upgraded to the web-based version.
- In September 2013, the Malawi government passed its national ICT policy. One of the priority areas of this policy was to develop human capacity by using ICT to increase access to health care, education, and training facilities. The policy also focused on infrastructure development, legal and regulatory framework, access to ICT and ICT-based services in rural and underserved communities, and the promotion of national ICT security.
- In April 2014, MOHP released The Malawi National eHealth Strategy; in September 2015, this was followed by the Malawi National Health Information System Policy.

Slide 6

EXPLAIN that we use the term **HIS architecture** to describe the structure of the HIS. When we talk about HIS architecture or structure, we are referring to a sort of map that outlines each of the systems and the data they collect, and identifies how and when each system should 'speak' to each other.

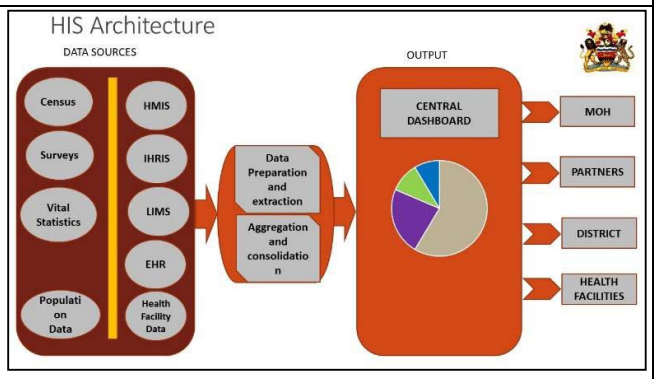


The purpose of defining the HIS structure is to clarify the important relationships between all of the subsystems. Which ones communicate with which? If one system collects a certain type of data and can communicate it to another, then only one of them needs to collect that data. This makes it possible to reduce duplicate work and other risks that come along with using different systems.

- The HIS architecture shows how the sub-systems of an HIS function together in support of the overall goal/purpose of a country's HIS.

Slide 7

EXPLAIN that this diagram shows an example of HIS architecture. You can see that it describes the different relationships and flows of information between subsystems. Subsystems may involve both paper-based and electronic elements, and may include electronic health records, laboratory information systems, HRH information systems, supply chain management systems, demographic information systems, population health information systems, and systems for aggregate reporting of health services data.



NOTE the icons for electronic and paper-based systems.

POINT OUT that any HIS structure—whether it consists of paper or electronic components—will have similar features:

- Points where data are **collected**
- Points where data are **aggregated and consolidated**
- Points where data are **transmitted**
- Places where data are **stored**

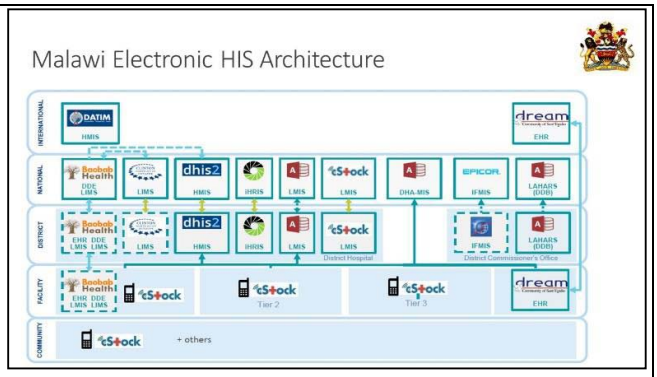
ASK participants to identify their levels (facility, regional, or national) on this diagram. Starting with participants who work at the facility level, **ASK** them to describe what happens at their level: is data collected, aggregated, transmitted, and/or stored?

Then **ASK** participants who work at the district level to describe what happens at their level; after hearing their responses, **ASK** those who work at the national level.

Slide 8

EXPLAIN that this image represents Malawi's HIS today.

The Central Monitoring and Evaluation Division (CMED) has taken great steps to improve the state of Malawi's HIS architecture in recent years. DHIS2 was piloted in 2011, and a national server established in 2012. These are the main electronic systems used in Malawi today.



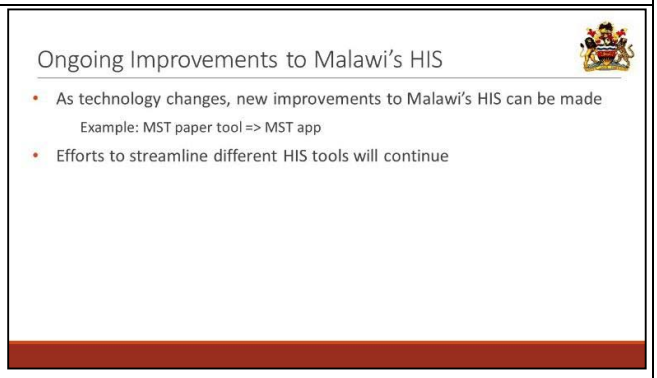
Even though the architecture looks much improved, there are still important improvements to be made. Although some of the systems connect to one another, because the different systems have not been standardized, the majority still do not.

Slide 9

USE the following points to discuss ongoing improvements to Malawi's HIS:

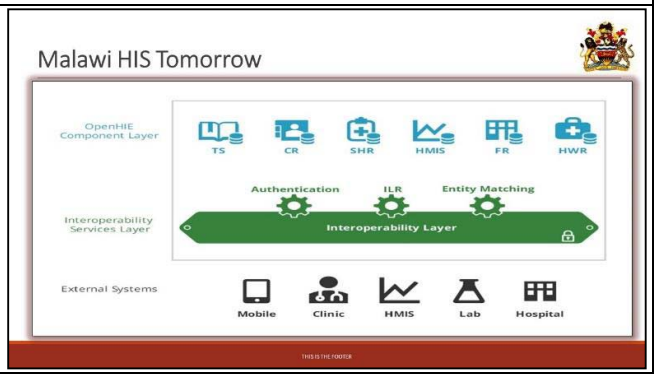
The next step is to enable these electronic systems to communicate and exchange data.

In Module 4, we will take a closer look at EMR, DHIS2, and other electronic HIS (e-HIS) subsystems.



Another improvement to Malawi's HIS was made in June 2018: the national health indicators were revised. We will look at parts of the revised handbook in Module 6.

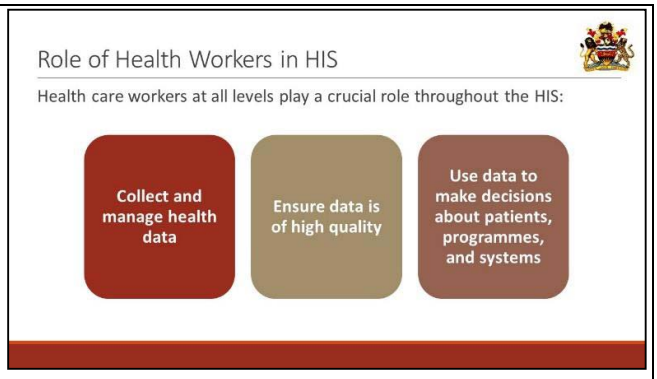
Slide 10



Trainer Instructions: Step 3 (25 minutes)

Use slides 11–15 and the facilitator notes to guide this step.

Slide 11



EXPLAIN that health workers play a variety of roles in the HIS.

INSTRUCT participants to think about some of the specific roles that health workers play in the HIS.

EXPLAIN the following:

- Let's start with data handlers—health workers at the facility and district levels whose responsibilities primarily involve *collecting, aggregating and reporting* health data.
  ASK: What roles do these staff play in the HIS?
- Now, what about decision makers (Administrators/managers at all levels of the health system who use HIS data *to make a variety of decisions)?*
  ASK: What roles do these staff play in the HIS?
- How about IT/Systems support staff (Personnel providing *technology and system support* for electronic health systems)?
  ASK: What roles do these staff play in the HIS?

Slide 12

NOTE: The facilitator should refer to the answer sheet provided in the Facilitator's Guide.

REFER participants to **Handout 1.3.1: Matching Roles with Responsibilities** in their participant manual. Explain that the different responsibilities and activities that occur in a facility that has a HIS with an EMR system implemented are listed on this sheet. Their task is to match the staff categories with the correct responsibilities and activities.

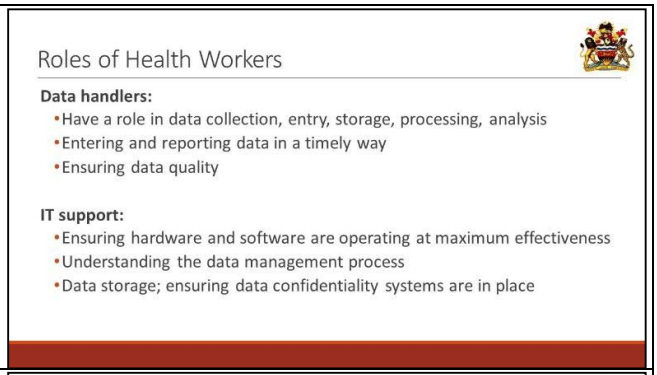
TELL participants they have 10 minutes to do the activity before they will need to find a partner.

After 10 minutes, **ASK** if everyone has a partner; **INSTRUCT** them to trade activity sheets.

REVIEW the answers with the larger group.

Slide 13

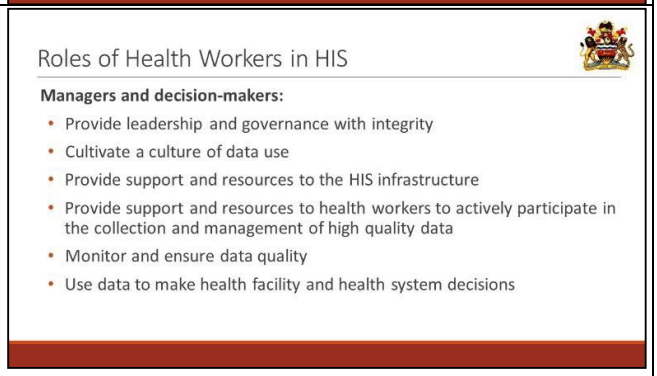
REVIEW the role of data handlers and IT support using the points on the slide.



Slide 14

EXPLAIN that in this slide we will look at managers and decision makers, these roles operate at various levels in the health system.

NOTE that in order for decision makers to carry out these functions, they need a broad understanding of the HIS. Among the things they need to know are what data are being collected, where to find data, basic system troubleshooting, and how to generate reports.

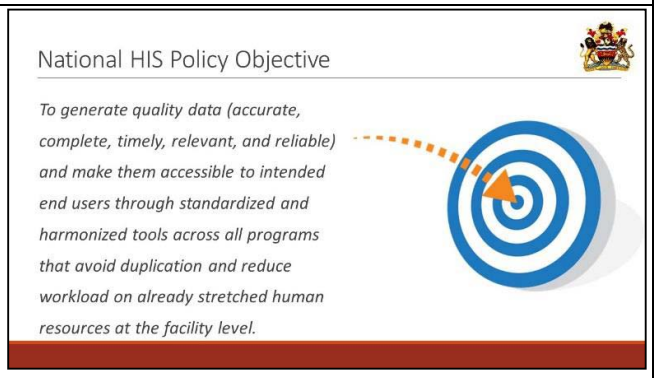


Slide 15

REMIND participants that we learnt about the HIS goals when we discussed the information cycle in session 1.2.

ASK: Does anyone remember what those goals were? They were in simple black text in the middle of the information cycle.

Answer: *better information, better decisions, better health!*



EXPLAIN that the HIS objectives outlined in Malawi's HIS Policy document are shown on this slide.

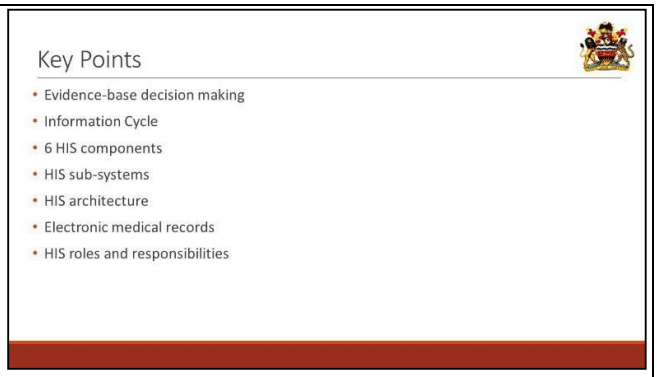
Trainer Instructions: Step 4 (13 minutes)

Use slide 16 and the facilitator notes to guide this step.

Slide 16

10–13 minutes total

DISPLAY this slide and instruct participants to take out a piece of notepaper.



EXPLAIN that these terms summarize the first four sessions of the training. Participants should take 3–5 minutes to write down one key point about each of the themes presented on this slide.

After 3–5 minutes, **ASK** two participants to share the key points they identified for evidence-based decision making.

CONTINUE by asking two more to share their points for the information cycle, HIS components, etc.

Their responses should indicate how well they have met the learning objectives for the first module.

Handout 1.3.1: Matching Roles with Responsibilities

In the right-hand column is a list of responsibilities and activities that are found in facilities that use an EMR system as a part of the overall HIS. In the left-hand column are three staff categories: IT Support Personnel, Decision Makers, and Data Handlers.

Match the staff role with the correct responsibilities by drawing a line from the staff category to the responsibility that falls to someone in that category. Some responsibilities may fall to more than one staff category; each category has multiple responsibilities.

IT Support Personnel	Partner collaboration and coordination
	Programme/intervention planning
	Data analysis and interpretation
	Advocacy at the policy level
	Resource management
	Using data for patient care and treatment
	Monitoring and evaluation
	Evidence-based decision making
Decision Makers	Data validation
	Data collection
	Data entry
	Data cleaning
	Reporting
	Data aggregation
	Backing up data
	Installing the EMR system and its updates/upgrades
Data Handlers	Tracking and resolving error messages and bugs
	Maintaining software system security
	Data storage

Module Two
Session 2.1

MODULE 2: MANAGEMENT OF HEALTH DATA
Session 2.1: Introduction to Data Management

Time: 60 minutes

Learning Objectives

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

1. Define data management
2. Explain the importance of data management
3. Discuss the importance of data management standards
4. List the domains of data management standards
5. Define SOPs
6. Describe the steps of data management

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	35 minutes	Facilitator presentation/ pair activity	Importance of data management, data management steps, data collection, data processing and storage, data analysis, interpretation, reporting and use (slides 4–14)	Flip chart, markers, tape, LCD
3	15 minutes	Facilitator presentation, group discussion, brainstorm	Data Management in the information cycle, challenges in data management, (slides 15–16)	Flip chart, markers, tape, LCD
4	5 minutes	Facilitator presentation	Key points (slides 17)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Advance Preparation

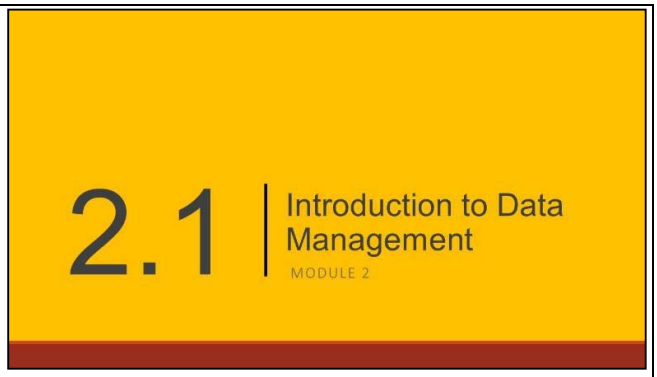
- If desired, write out the session's learning objectives on a piece of flip chart paper
- Access the WHO and MEASURE documents for reference
- Review the following e-learning Assignments:
  Module 2: Data Management Concepts

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2

EXPLAIN that this session will provide an introduction to data management and its importance in health care.

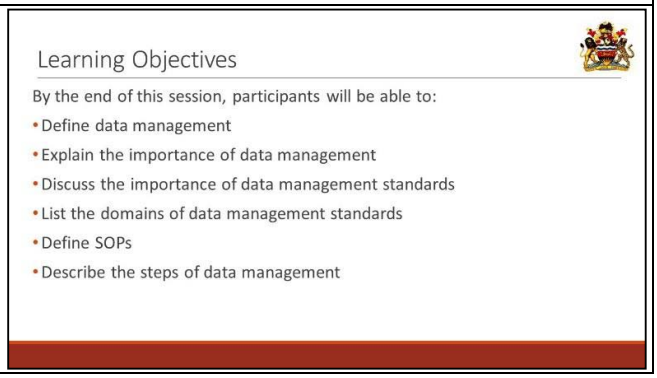


EMPHASIZE that e-learning module 2 on Data Management Concepts provides supplementary content to this session that will allow you to go a bit deeper into the subject, and also to view it from a different perspective.

In some cases, you will see different terminology used than is provided in these sessions. It is important to understand that people with different backgrounds and experience may use different terms to refer to concepts that you are already familiar with. This is OK! In fact, it is a part of the learning process. We hope that you will find that the e-learning modules both complement the training content and expand your understanding of effective data management and use.

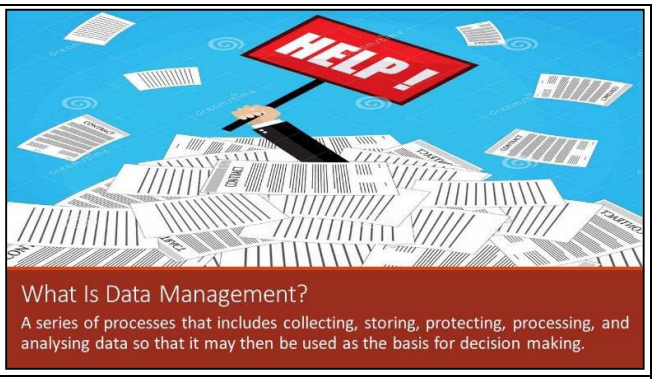
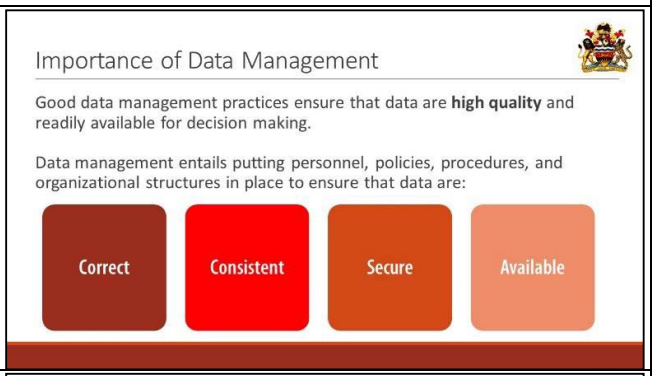
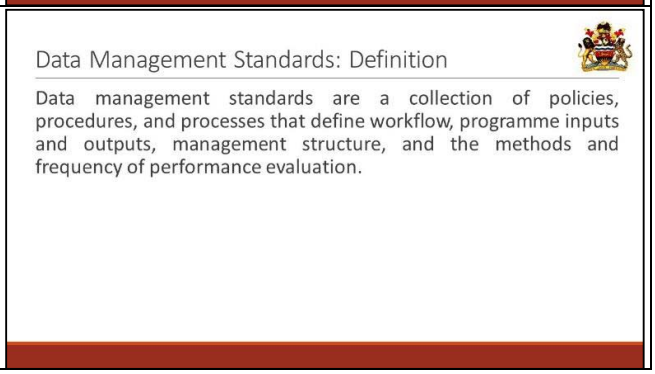
Slide 3

REVIEW the learning objectives for this session.



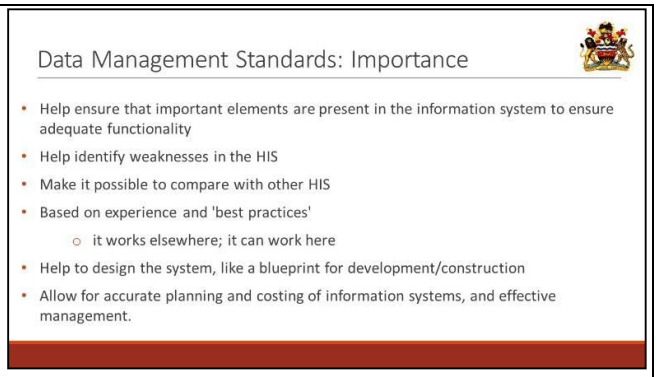
Trainer Instructions: Step 2 (35 minutes)

Use slides 4–14 and the facilitator notes to guide this step.

Slide 4	**NOTE** This slide is animated. Wait for participants to answer the question before clicking to reveal the answer. **ASK:** What is data management? **ALLOW** a few responses and then **CLICK** to reveal the answer.	
Slide 5	**EXPLAIN** the importance of data management as shown on the slide.	
Slide 6	**ASK** participants what standards are. Answer: *a level or quality of execution.*	

Slide 7

EXPLAIN that you may have seen documents on data standards in the past—they are long and detailed! For purposes of this training, we will just introduce the concept of data management standards and go briefly into the four domains of these standards.

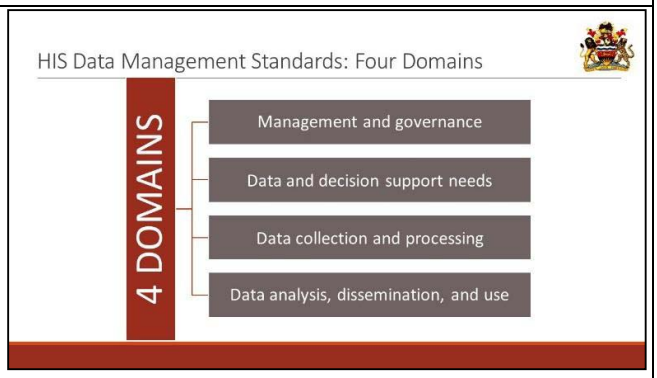


REMIND participants that the HIS objective outlined by the MOHP is:

> *To generate quality information (accurate, complete, timely, relevant, and reliable) and make them accessible to all intended users through **standardized and harmonized tools** across all programs that avoid duplication and reduce the workload on data capture by already stretched human resources at the health facility level.*

Slide 8

REVIEW the four domains of Data Management Standards.



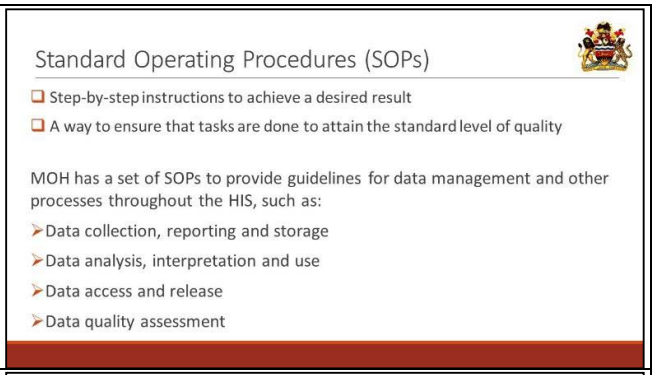
1. **Management and governance:** This refers to administrative policies, procedures, and processes that define workflow, programme inputs and outputs, management structure, and the methods and frequency of performance evaluation.
2. **Data and decision support needs:** This refers to designing the HIS with the end point in mind. That is, creating systems, tools, and processes that support the data needs of and decision making by users.
3. **Data collection and processing:** This refers to the ongoing, systematic gathering, organizing, cleaning, and aggregating of data for use.
4. **Data analysis, dissemination and use:** This refers to standard processes for turning data into information, and then using that data for decision making.

EXPLAIN that there are also standards and SOPs currently under development by CMED/MOHP. These will be disseminated when finalized.

Slide 9

SAY: Malawi has a set of standard operating procedures (SOPs) that align with the four domains.

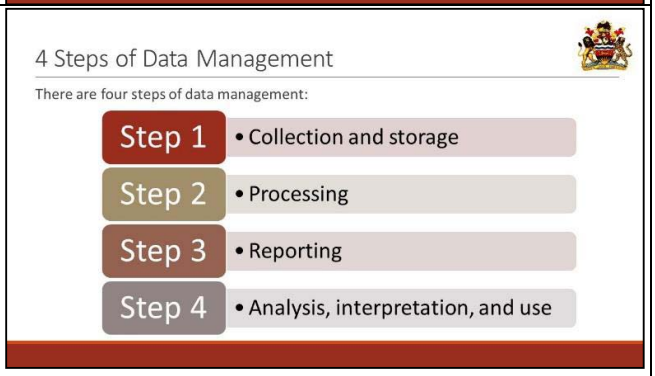
EXPLAIN that many of these have recently been finalized and should be accessible to you as you take the skills you've learnt in this training back to your worksite.



Slide 10

NOTE: This slide is animated. Wait until participants answer the question before clicking to reveal the answers.

ASK participants to pair up with the person next to them to list and order the steps of data management. **ALLOW** three (3) minutes.



ASK a few groups to share their responses.

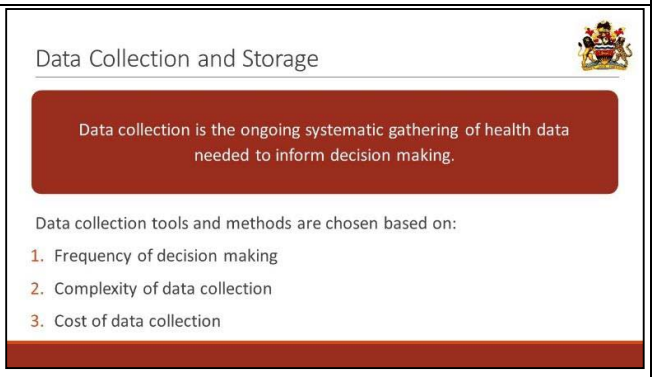
Then **EXPLAIN** that there are four steps in data management. We will be discussing each step in detail in sessions 2.2, 2.3, and 2.4.

NOTE: There is an entire module dedicated to step 4 (analysis, interpretation, and use). We will learn about this in module 6.

Slide 11

DISCUSS data collection.

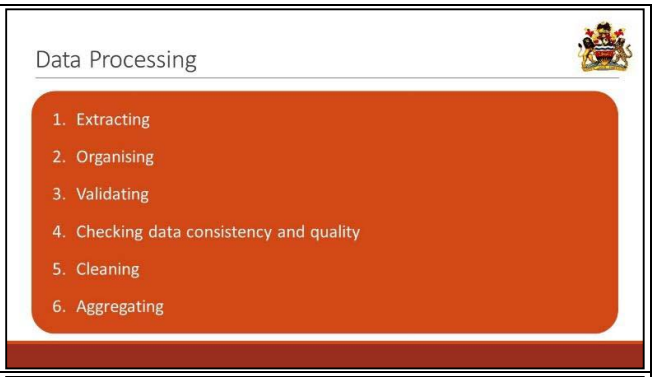
EXPLAIN that data are collected in two ways—**routinely** and **non-routinely**; all national systems use both types of collection to obtain data for planning and managing their health services. We will go further into the differences between the two in the session on data collection.



At all levels, data need to be **stored** in a way that ensures confidentiality, and that encourages regular analysis at the local level, and regular use to improve service delivery. We will also discuss storage of data in more detail during the next session.

Slide 12

EXPLAIN that after data are collected, they need to be processed, **checked for quality**, and **transmitted to higher levels** of the health system. Data processing includes many different activities, including the ones shown on this slide.

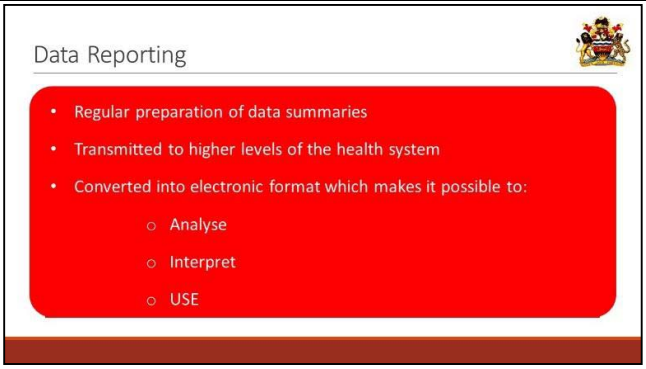


Slide 13

NOTE: This slide is animated. Wait for participants to answer question before clicking to reveal the answers.

ASK: What is the purpose of reporting?

ALLOW a few responses and then **CLICK** to reveal the answers on the slide.



EMPHASIZE that regular reporting makes it possible to see changes and patterns that may indicate an urgent need to act.

ASK: What are some examples of changes or patterns that you've experienced when creating or reading reports?

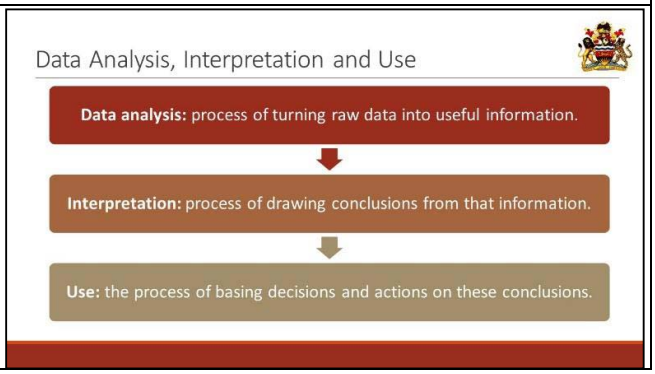
Slide 14

DEFINE the terms.

GIVE examples.

REMIND participants that all of module 6 is dedicated to data analysis, interpretation, and use.

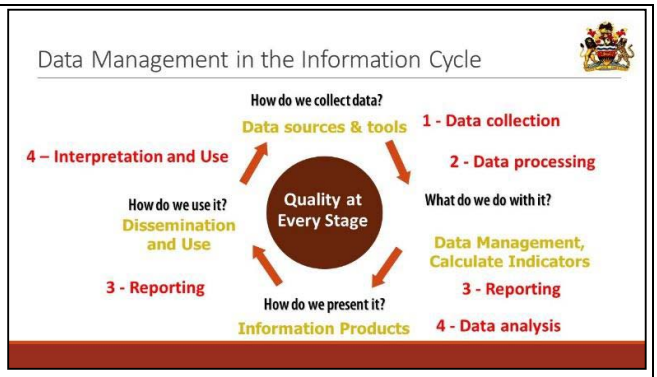
ASK what questions do you have?



Trainer Instructions: Step 3 (15 minutes)

Use slides 15–16 and the facilitator notes to guide this step.

Slide 15



NOTE This slide is animated. Wait for participants to point out the steps of data management before clicking to reveal where they come in the information cycle.

ASK participants to describe the information cycle.

LISTEN for:

- *The information cycle is an important foundation for this course.*
- *It shows us how data is transformed into information and evidence so that it can be used for decision making.*
- *The health information system is the primary tool we use to manage data through some or all of these steps, whether paper-based or electronic.*
- *We've also looked at the HIS inputs, processes and outputs associated with each phase of the cycle.*

SAY: Now that we are discussing data management, let's see if we can point out where each of the steps of data management come in the information cycle.

CLICK to reveal each step.

EMPHASIZE that reporting can take place both before and after data analysis. Regular reports are read, which may spur the need for further analysis and reporting of those results. Remember, the ultimate goal of data management is data use, specifically to inform the decision-making process for effective management of the health system.

Slide 16

SAY: Now that we know the steps of data management, let's discuss the challenges and possible solutions we encounter in carrying out these steps on a day-to-day basis.

ASK participants what regular challenges they experience in managing data.

Possible challenges may include:

- *Overlapping or inconsistent data collection tools*
- *Not enough time to collect all necessary data*
- *Not enough space on forms*

- *Forms are not completely filled out*
- *No training provided for those collecting or entering data*
- *Availability of tools*
- *Different sites are using different versions of tools; therefore getting data on different indicators is challenging*
- *Report generation is time consuming*
- *Data analysis is limited*
- *Internet access or power issues*

Having identified some of the challenges in managing data in the HIS, now **DISCUSS** some possible solutions to overcome these challenges.

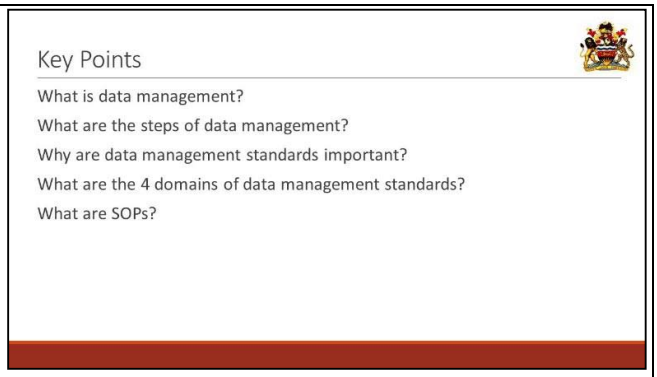
After some initial ideas have been presented, **CLICK** to reveal the ideas we will focus on in this discussion.

Trainer Instructions: Step 4 (5 minutes)

Use slide 17 and the facilitator notes to guide this step.

Slide 17

ASK participants to answer the questions on the slide for review.



SUMMARIZE with the following points:

- Data management is a series of processes that includes collecting, storing, protecting, processing, and analysing data so that they may then be put to use.
- Good data management practices ensure that data are of high quality so that they can effectively inform decision making.
- Data management steps include 1) collection and storage, 2) processing, 3) reporting, and 4) analysis, interpretation, and use.
- Data management standards are a collection of policies, procedures, and processes that define workflow, programme inputs and outputs, management structure, and the methods and frequency of performance evaluation.

The four domains of data management standards are: management and governance; data and decision support needs; data collection and processing; and data analysis, dissemination, and use.

Session 2.2

Session 2.2: Data Collection and Storage

Time: 120 minutes

Learning Objectives

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

1. Distinguish between routine and non-routine health data
2. List the types of tools used in data collection
3. Name the golden rules of data collection tools
4. Describe the flow of data within a facility and in the health system
5. Differentiate between the models for data entry
6. Discuss the rationale and best practices for confidentiality
7. Discuss the pros and cons of the different types of data storage

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	50 minutes	Facilitator presentation/ interactive discussion	What is data collection, planning for data collection, data collection tools, facility service data instruments in Malawi (slides 4–18)	Flip chart, markers, tape, LCD
3	10 minutes	Facilitator presentation	Data pathways (slides 19–20)	Flip chart, markers, tape, LCD
4	15 minutes	Facilitator presentation	Health facility workflows (slides 21–24)	Flip chart, markers, tape, LCD
5	5 minutes	Facilitator presentation	Confidentiality (slide 25–26)	Flip chart, markers, tape, LCD
6	30 minutes	Facilitator presentation, group activity	Data storage (slides 27–30)	Flip chart, markers, tape, LCD, Handout 2.2.1
7	5 minutes	Facilitator presentation	Key points (slide 31)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

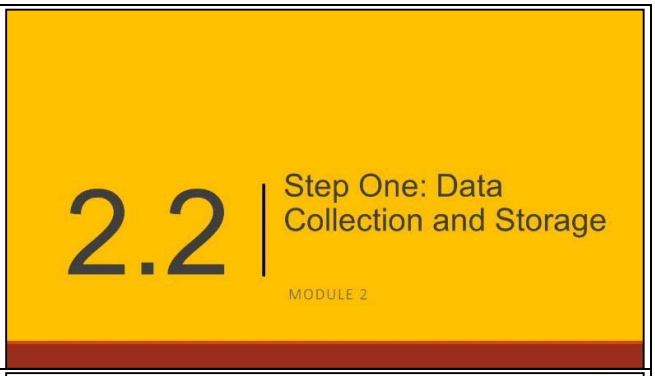
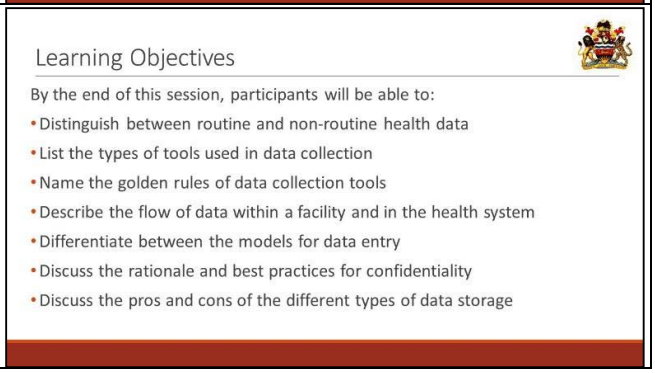
Handout 2.2.1: Pros and Cons of Data Storage Types

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following e-Learning Assignments:
  Module 2: Data Management Concepts

Trainer Instructions: Step 1 (5 minutes)

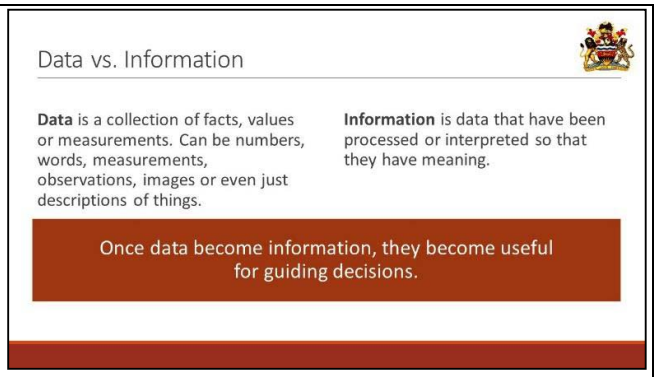
Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this session will focus on data collection storage—step one in the data management process.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (50 minutes)

Use slides 4–18 and the facilitator notes to guide this step.

Slide 4



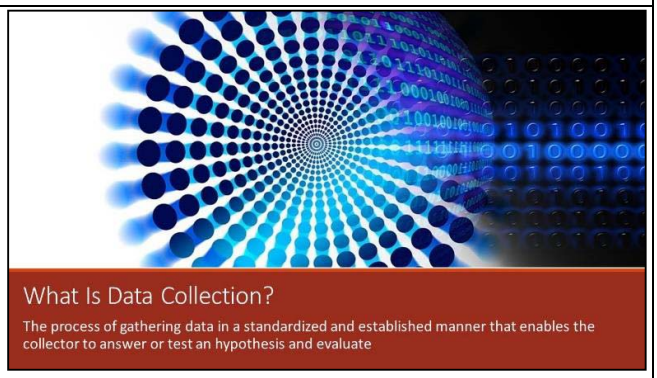
EXPLAIN: Data can refer to a single piece of information, or to many pieces of information. Data are not limited to numbers; they can also be words, pictures, video, or even sound. A weight measurement or telephone number are examples of data about a person, as are such descriptions as *adult* or *adolescent*, or a *positive* or *negative* blood-test result.

Think of data as raw material. Data have not been shaped, or processed, or interpreted, and do not make sense on their own. Bringing together different pieces of data can help to turn data into information.

When humans bring meaning and context to data, then data become information. Information is data that have been processed or interpreted so that they have meaning. Once data become information, they become useful for guiding decisions.

REMIND participants that later in this training we will cover skills for analysing data, how to find patterns and meaning and turn them from raw data into information.

Slide 5



SAY: Now that we understand the different types of data, let's discuss data collection.

EXPLAIN to participants that data collection is a crucial step in the process of measuring programme outcomes. In accordance with the National Health Information Policy 2003, each health facility in Malawi is expected to record and collect data while delivering services, and report that data to the MOHP.

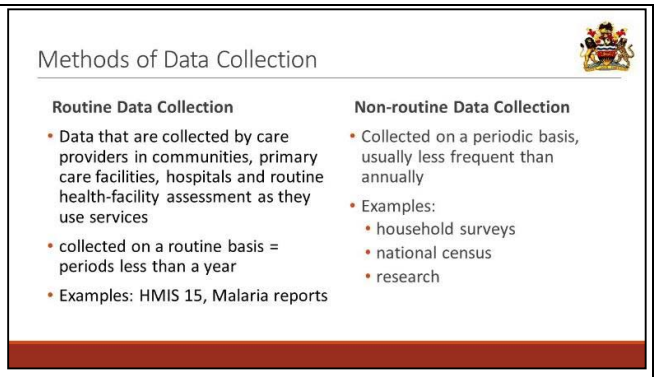
Each reporting facility is expected to compile and analyse data on a daily, monthly, quarterly, and annual basis, and take the necessary actions to improve coverage and quality of services.

Slide 6

DIFFERENTIATE between routine and non-routine data collection.

ASK: What are some examples of routine health data? What are some examples of non-routine health data?

NOTE that vital registration refers to routine data collection on vital events (births, deaths, and migration data). However, this mostly occurs outside the health system, so we will not discuss the topic further in this course.



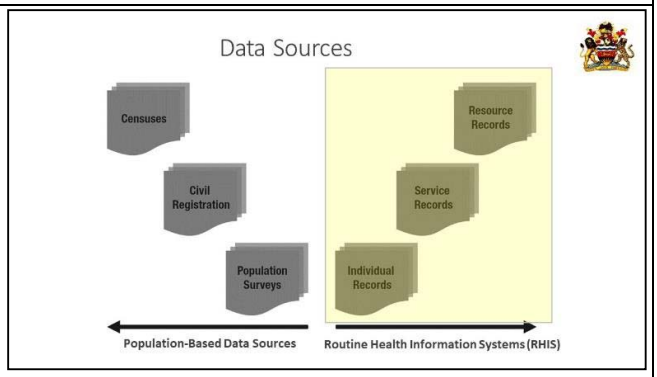
Slide 7

REMIND participants that we saw this slide when we learnt about the six HIS components.

ASK participants if they remember whether data sources are a resource, a process, or an output.

Answer: a process.

EXPLAIN that HIS data sources can be divided into population-based sources (non-routine) and institution-based (facility and community-based) sources (routine).



Population-based sources:

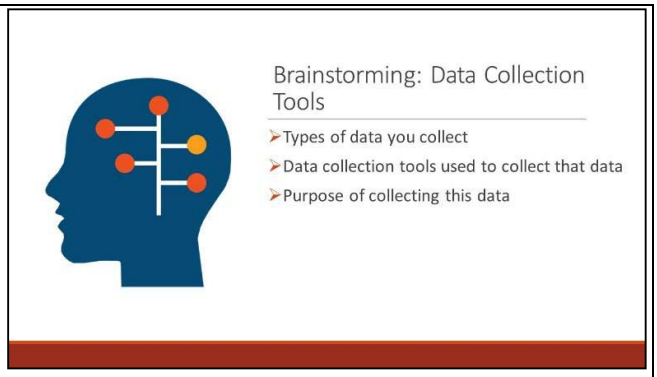
- Civil registration
- Census: Population information
- Demographic and Health Survey (DHS): Demographic and health information
- Other surveys: Could be specific to health, but even non-health surveys provide some relevant information

Institution-based sources (also known as routine health information systems (RHIS)):

- HIS (e.g., DHIS): Health service utilization and programme data
- Administrative records: facility data, HR data, other resources
- Financial: Budget and expenditure

TELL participants that this course focuses on RHIS data.

Slide 8



EXPLAIN that before data are collected, there should be first be a solid understanding of how that data will be used. These decisions take place at the management level.

Health data are used at different levels of the system, and for different purposes. Therefore, they require different methods and tools. All health facilities in Malawi use standardized data collection, compilation, and reporting tools. A set of tools is also used for data aggregation and monitoring at facilities.

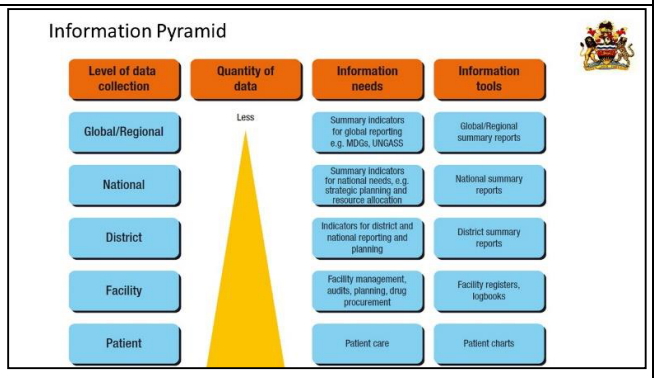
ASK participants if they can name one or two examples of data they collect, the tools they use to collect that data, and the ultimate purpose of collecting that data.

INSTRUCT participants to do this for each level of the health system.

Examples include:

- *Patient and client data forms: Individual records such as immunization cards*
- *Health facility data forms: Tick register, registry and tally sheets*
- *Community data forms: Register, tally sheets*

Slide 9



EXPLAIN that, to avoid overburdening the system, decisions about the type of data to be collected should be made based on the purpose and use of that data.

Here we can see that every level of the health care system has its corresponding information needs and tools.

EXPLAIN that essential to maintaining a strong HIS at every level of the health system is to determine what, where, and why data should be collected, and by whom.

ENSURE that participants understand this graphic.

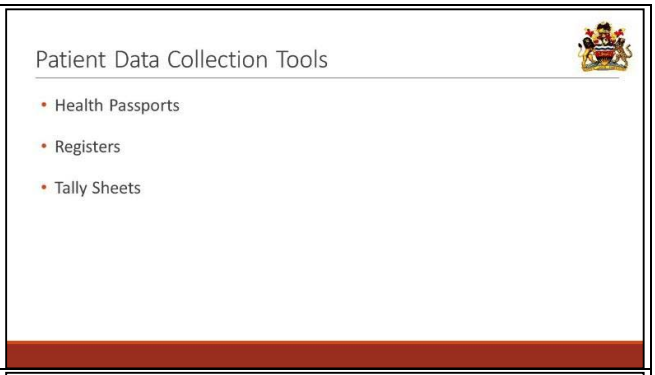
ASK: At which level does data get aggregated?

Answer: *at the facility and district levels*

CONCLUDE by saying: We will now look at some of the tools we use to collect patient data.

Slide 10

ASK: Which collection tools are patient-held (kept by patients)? Which are facility-held (kept by facilities)?



Slide 11

DISCUSS the use of health passports for each of the following groups:

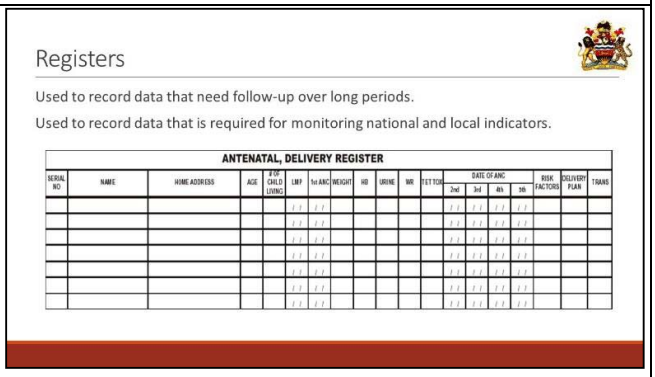
- Women (yellow): TTV, ART, family planning, previous deliveries
- Children (red): immunization and growth monitoring
- General (blue): general notes on disease processes

NOTE that the colour of the health passport is used to help identify the type of user/client. These passports are held by the patient.

Slide 12

DISCUSS the content and common data elements usually collected using a register.

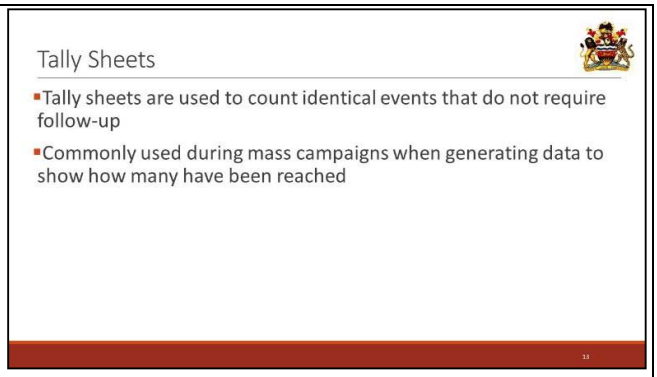
ASK participants for examples of data that need follow-up over long periods.



EXPLAIN that service providers at health facilities use registers to record data as they provide services. Data are compiled daily, and contribute to monthly figures that are analysed, discussed, and used for decision-making purposes. Each register has instructions on how to correctly fill it out. If filled out incorrectly, incorrect data will be reported.

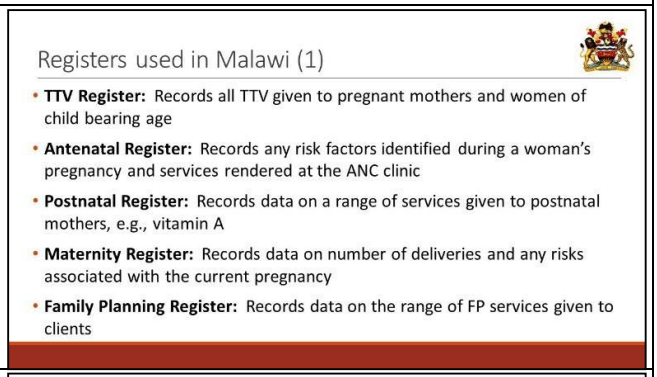
Slide 13

EXPLAIN that tally sheets are used to count identical events that do not require follow-up. They are also commonly used during mass campaigns when generating data to show how many patients have been reached. An example would be a tally sheet for taking head counts of numbers of children weighed.

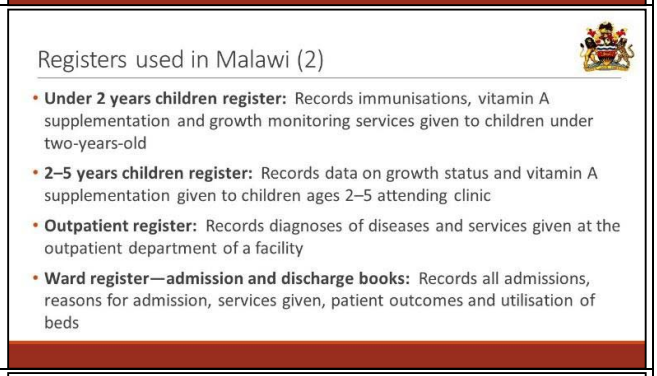


ASK: What are other common data elements collected using tally sheets?

Slide 14



Slide 15



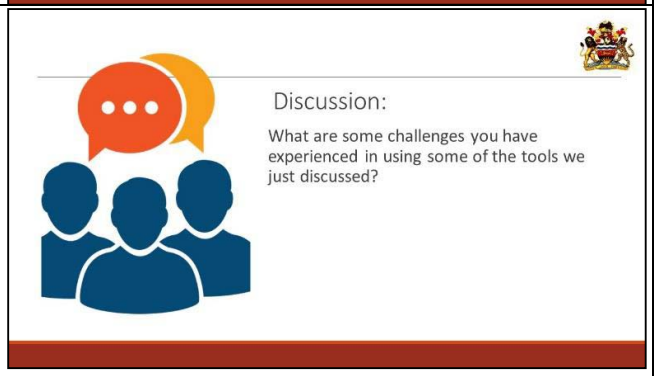
Slide 16

DIVIDE participants into small groups of three or four to talk about the challenges they've experienced in using some of the data collection tools we have just discussed.

ALLOW five (5) minutes for discussion.

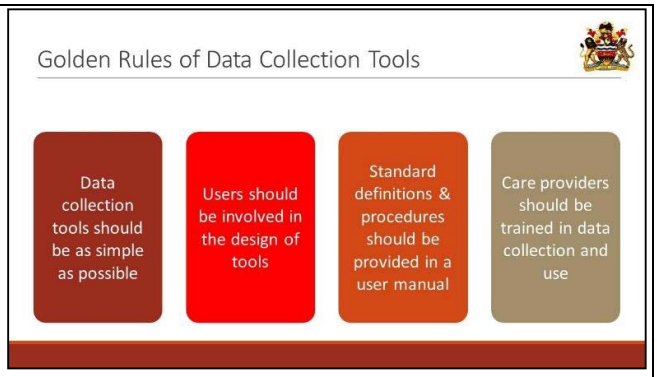
After five (5) minutes, **RECONVENE** the larger group to discuss their challenges as a class.

RECORD answers on a flip chart.



Slide 17

NOTE: This slide is animated. Wait for participants to answer the question below before clicking to reveal the golden rules of data collection tools.



EXPLAIN that one of the most difficult parts of improving the HMIS is ensuring that the people completing forms at the facility level have sufficient skills and training to do so accurately.

ASK: What are some good practices to keep the data collection process simple and user-friendly for data collectors?

PROMPT the discussion if needed.

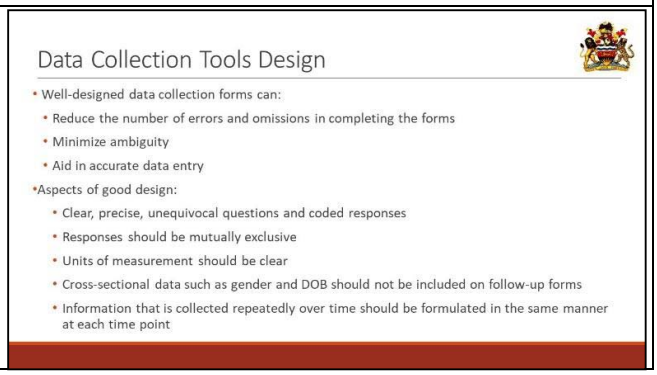
ALLOW a few responses and then **CLICK** to reveal the golden rules of data collection tools.

REFER to the flip chart showing challenges in working with data collection tools.

GO THROUGH 3–5 of the challenges noted in the previous exercise.

ASK whether following the golden rules might improve that experience (challenge), and for which challenges it is more up to the health worker to improve the situation.

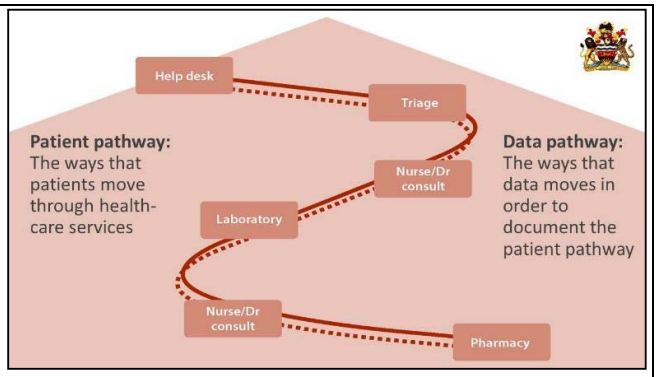
Slide 18



Trainer Instructions: Step 3 (10 minutes)

Use slides 19–20 and the facilitator notes to guide this step.

Slide 19

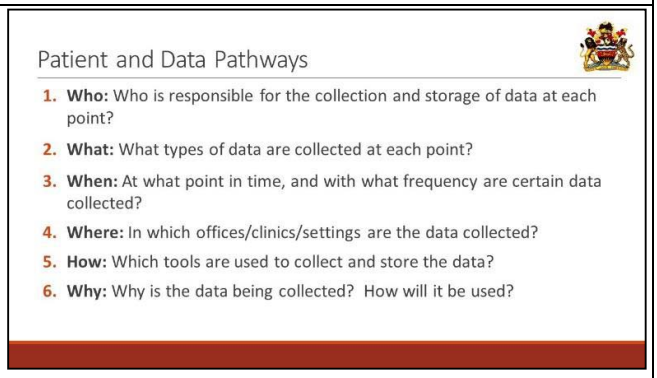


EXPLAIN that in this graphic, the solid line represents the patient pathway, and the dashed line represents the data pathway.

The patient pathway begins when the patient identifies a health problem, such as a cough, then goes to the clinic for an evaluation; it finishes when the patient receives treatment. Though it may vary from one community or health facility to another, the data pathway is generally similar. In this example, the data follow the same pathway. This occurs most of the time, but not always.

ASK the participants to explain the common pathways at their facility. Pathways differ according to the setup of the facility.

Slide 20

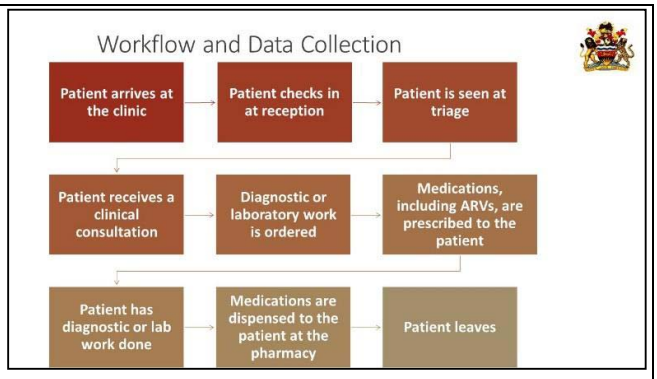


EXPLAIN to participants that for all types of health issues, there is a pathway followed, along which disease prevention, assessment, diagnosis, care, and treatment take place. As we consider how data flow through the system, it's important to think about the who, what, when, where, how, and why of data collection, both within the facility and in the health system.

Trainer Instructions: Step 4 (15 minutes)

Use slides 21–24 and the facilitator notes to guide this step.

Slide 21



EXPLAIN that facilities usually have a system or workflow that guides the order in which their various personnel complete these tasks.

SHOW this diagram of the workflow at a typical HIV clinic.

HIGHLIGHT the activities that occur at each point in the workflow: patient histories are taken, consultations conducted, diagnoses made, treatments determined, and follow-up actions decided upon.

REFER to any examples of data collected during these activities that participants brought up during the previous brainstorming discussion. **PROMPT** participants to reflect and identify other data that they collect and handle in their work.

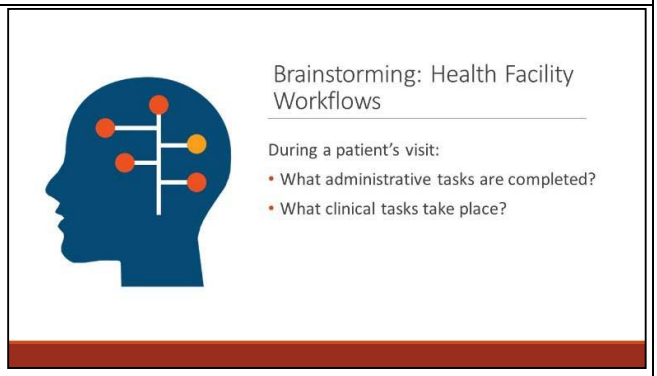
ASK participants to identify the primary sources of the data being collected (i.e., where the data come from).

Answers: a) from the patient him or herself or b) from the clinician (i.e.: lab test orders, prescriptions)

SUMMARIZE: All of these activities generate data, which are captured at different points in the workflow. Therefore, just as a patient flows through a facility, information flows as well.

Briefly go through each point in the workflow, and have participants identify the paper tool used to collect data at that particular juncture.

Slide 22



NOTE: This slide is animated. **CLICK** to reveal the brainstorming questions.

ASK participants to reflect on the regular activities that take place when a patient arrives at their facility.

GUIDE participants in brainstorming responses to the first question displayed on this slide: What administrative services are completed [during a patient visit]?

Participant responses should include:

- *Scheduling*
- *Collecting patient demographic data*
- *Retrieving and storing patient records*
- *Billing and claims*
- *Counselling or educating patients*

Then **CLICK** on the slide and **ASK**: What clinical tasks or work take place during a visit?

Participant responses should include:

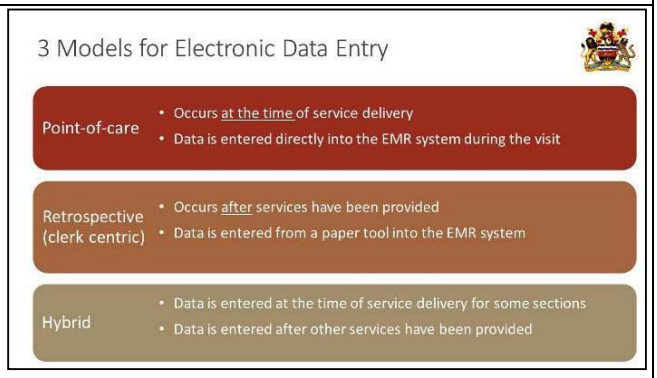
- *Triage*
- *Take patient history*
- *Examine and diagnose patients*
- *Come up with treatment plans*
- *Prescribe medication*
- *Refer to specialists*
- *Order laboratory procedures*
- *Conduct follow-up*

HIGHLIGHT that both sets of tasks depend on each other. Administrative tasks are done to support the clinical tasks.

Slide 23

NOTE: This slide is animated. Wait for participants to answer the question below before clicking to reveal the models for data entry.

LEAD an interactive discussion with participants focusing on different models that facilities can adopt for entering data into an EMR system.



ASK participants to describe when data is entered into an EMR system at their facility, where, and by whom.

Participant responses may reflect components of both real-time and retrospective data entry models: done at point of care by a clinician, then afterwards by a data clerk (or clinician) in a computer laboratory or records room.

CLICK on the slide to reveal the data entry models.

EXPLAIN the three models to participants, starting with point of care:

Point-of-care data entry happens at the time of service delivery, when both patient and health care provider are present. In Malawi, some health facilities are using real-time data entry, such as Queen Elizabeth Central Hospital (QECH).

ASK participants if they know of sites that are using Malawi EMR or other EMR systems for point-of-care data entry. **REFER** back to the demonstration and **NOTE** that data entry clerks, nurses, doctors, and in-charges will all need to know how to navigate and enter data into the Malawi EMR using this data entry model

EXPLAIN that **retrospective (clerk-centric) data entry** happens after services have been provided. Neither health caregiver nor patient is present. Usually, the health records officer or data clerk will enter patient files or records into the system at the end of the work day, or the following day.

Many sites initially use the retrospective model to migrate data from existing patient files, then move to the point-of-care model for patients who are actively coming in for services. A site can continue to use this model by having staff continue to fill in ART cards and other paper tools when providing services, then having a data entry clerk enter the data from the completed paper form into the Malawi EMR.

EXPLAIN that with **hybrid data entry**, an EMR system makes use of both real-time and retrospective data entry methods. The real-time data entry module may be used in some sections of the hospital or health facility, while other sections of the same facility use retrospective data entry. In Malawi, a number of EMRs use the hybrid model. For example, QECH uses real-time data entry in its outpatient departments, and retrospective data entry in its specialized clinics and inpatient departments. In addition to the main workflow pages (registration, triage, clinician), the Malawi EMR has an MOHP 257 form where data can be entered retrospectively. As a result, the Malawi EMR can also be used in facilities choosing to adopt a hybrid data entry model.

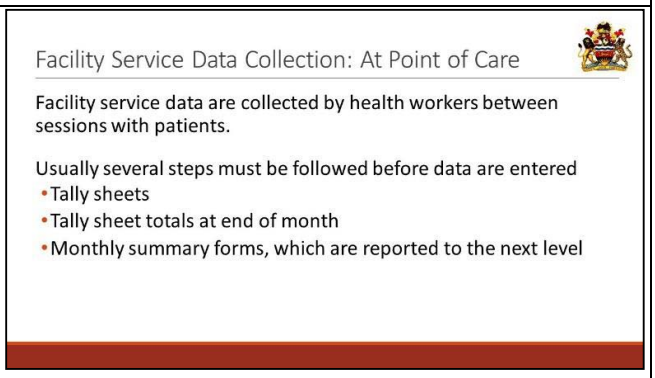
INSTRUCT participants to think of situations where it may not be feasible to use point-of-care data entry at a facility.

ASK: What conditions would make this model difficult to use? Why?

Slide 24

ASK participants which health workers collect data at the facility level?

Answer: *data clerks, nurses, and clinicians*



EXPLAIN that as Malawi's HIS evolves, it is likely that point-of-care data collection will be done electronically. This will make a great difference for already overworked staff, eliminating several steps and saving time.

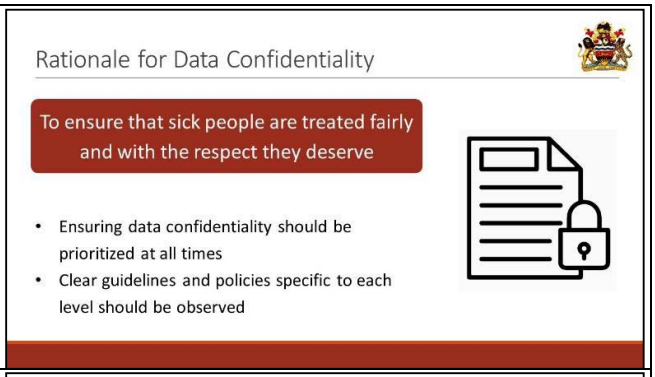
NOTE that community service data is collected by community health workers, volunteers, and community-based distributors.

Trainer Instructions: Step 5 (5 minutes)

Use slides 25–26 and the facilitator notes to guide this step.

Slide 25

EXPLAIN that data confidentiality should be prioritized at all times. Confidentiality is essential to ensuring that all patients are treated fairly, and with the respect they deserve. Clear guidelines and policies specific to each level should be observed.

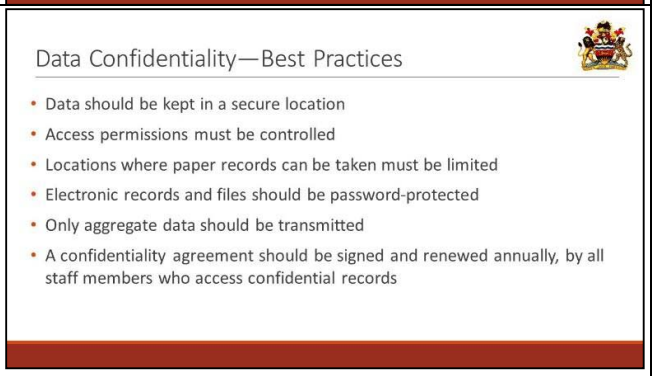


Slide 26

NOTE: this slide is animated. Wait for participants to answer question below before clicking to reveal best practices.

ASK: How do we ensure that data kept confidential? What are the actions we might take?

ALLOW several responses, and then **CLICK** to reveal answers on the slide.



EXPLAIN that confidentiality is a much broader topic that will be discussed in more depth in Module 7: Data Security.

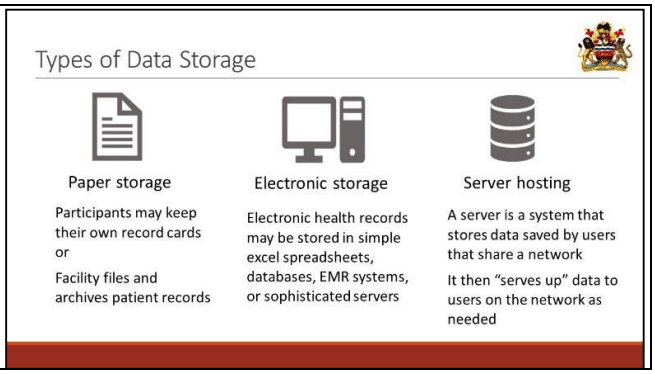
Trainer Instructions: Step 6 (30 minutes)

Use slides 27–30 and the facilitator notes to guide this step.

Slide 27

EXPLAIN the types of data storage.

ASK participants which ones they've had experience with.

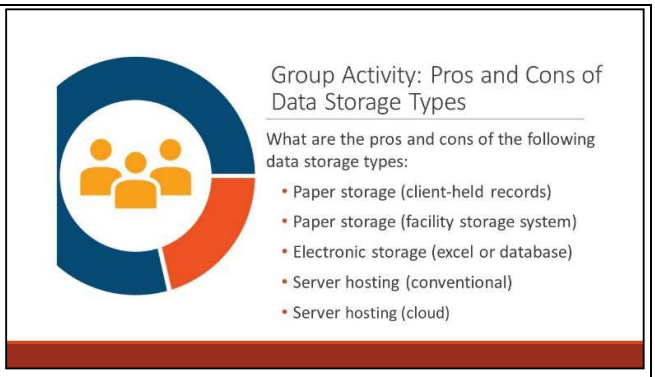


Slide 28

REFER participants to **Handout 2.2.1: Pros and Cons of Data Storage** in their manual.

DIVIDE participants into groups of three.

ASK participants to brainstorm the pros and cons of each data storage type.



ALLOW the groups 10 minutes to brainstorm and discuss before bringing them back together as a class.

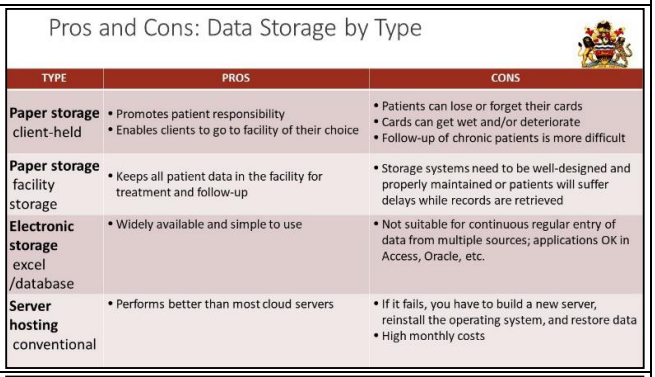
INSTRUCT group 1 to give their responses related to paper storage (both types), then ask the other groups to add their feedback. **RECORD** responses on a flip chart.

INSTRUCT group 2 to give their responses related to electronic storage, then ask the other groups to add their feedback. **RECORD** responses on a flip chart.

INSTRUCT group 3 to give their responses related to server hosting (both conventional and cloud), then ask the other groups to add their feedback. **RECORD** responses on a flip chart.

Slide 29

EXPLAIN that this is an example of how you might fill out the matrix.

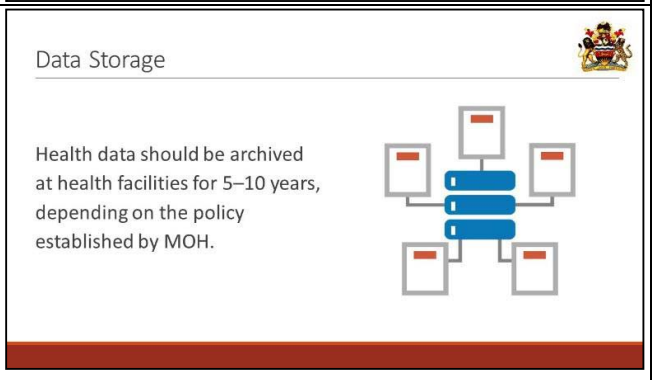


TYPE	PROS	CONS
Paper storage client-held	• Promotes patient responsibility • Enables clients to go to facility of their choice	• Patients can lose or forget their cards • Cards can get wet and/or deteriorate • Follow-up of chronic patients is more difficult
Paper storage facility storage	• Keeps all patient data in the facility for treatment and follow-up	• Storage systems need to be well-designed and properly maintained or patients will suffer delays while records are retrieved
Electronic storage excel /database	• Widely available and simple to use	• Not suitable for continuous regular entry of data from multiple sources; applications OK in Access, Oracle, etc.
Server hosting conventional	• Performs better than most cloud servers	• If it fails, you have to build a new server, reinstall the operating system, and restore data • High monthly costs

Slide 30

ASK: Why do you think it is useful to archive health data? What could these data be used for later?

Answer: *Documenting medical histories, maintaining continuity of care, monitoring and evaluating service delivery, resolving legal disputes, and performing data quality assessments and audits*.



EXPLAIN that Increasingly, programmes are being audited to demonstrate programme achievement or performance to investors (e.g., donors, taxpayers).

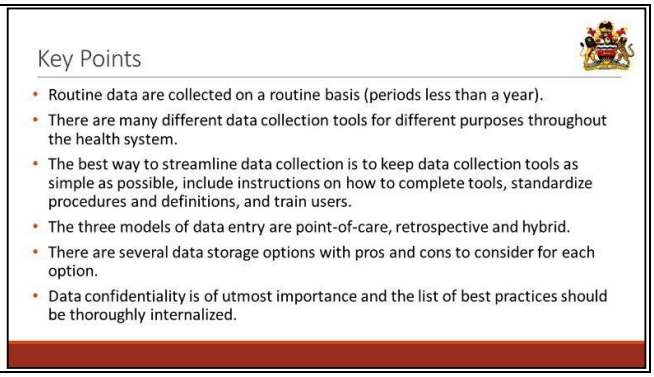
Regular data quality audits can increase confidence in programme results and processes.

Historical records are also useful for resolving data quality issues that may be detected only after a significant passage of time.

Trainer Instructions: Step 7 (5 minutes)

Use slide 31 and the facilitator notes to guide this step.

Slide 31



Handout 2.2.1: Pros and Cons of Data Storage Types

Identify pros and cons for each of the data storage types.

TYPE	PROS	CONS
Paper Storage (Client-Held Records)	•	•
Paper Storage (Facility Storage System)	•	•
Electronic Storage (Excel)	•	•

Server Hosting (Conventional)	•	•
Server Hosting (Cloud)	•	•

Session 2.3: Step 2—Processing Data

Time: 75 minutes

Learning Objectives

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

1. Discuss the purpose of data processing
2. Describe the steps of data processing
3. Explain the purpose of data aggregation
4. Discuss data aggregation methods at different levels of the health system
5. Discuss when and by whom data processing is done for each data entry model

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	5 minutes	Large group discussion	Purpose of gathering and summarizing data (slide 4)	Flip chart, markers, tape, LCD
3	30 minutes	Facilitator presentation	Data processing, different elements involved in data processing (slides 5–13)	Flip chart, markers, tape, LCD
4	30 minutes	Facilitator presentation/Large group discussion	Data aggregation (slides 14–21)	Flip chart, markers, tape, LCD
5	5 minutes	Facilitator presentation	Key points (22)	Flip chart, markers, tape, LCD

Resources Needed

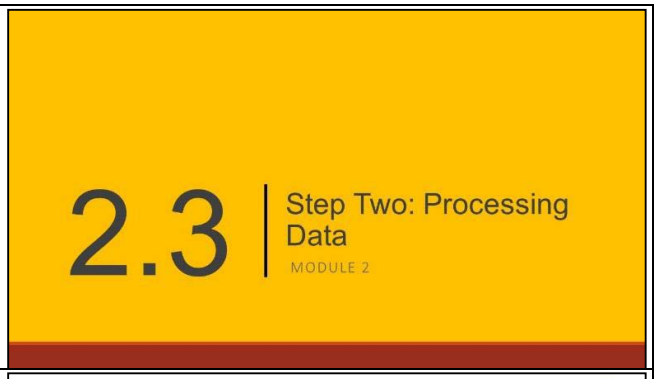
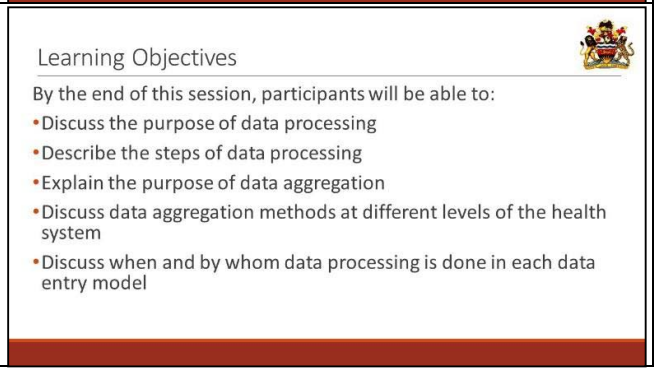
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following eLearning Assignments:
  Module 2: Data Management Concepts

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this session will focus on the second step of data management, processing data.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (5 minutes)

Use slide 4 and the facilitator notes to guide this step.

Slide 4

LEAD a discussion with participants using the question: What is the purpose of gathering and summarizing data?

Possible answers include:

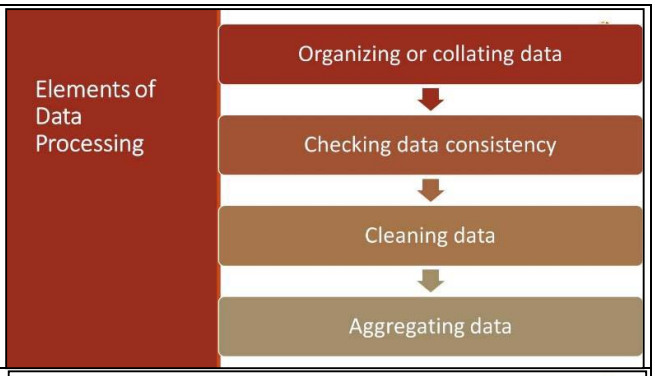
- *Get more information about particular groups of patients*
- *Identify common characteristics that might predict the course of disease*
- *Provide information about the most effective way to treat a disease*
- *Spot trends*

Trainer Instructions: Step 3 (30 minutes)

Use slides 5–13 and the facilitator notes to guide this step.

Slide 5

EXPLAIN that there are many elements to data processing. In this session, we will focus on data aggregation, which is any process in which information is gathered and expressed in the form of a summary.

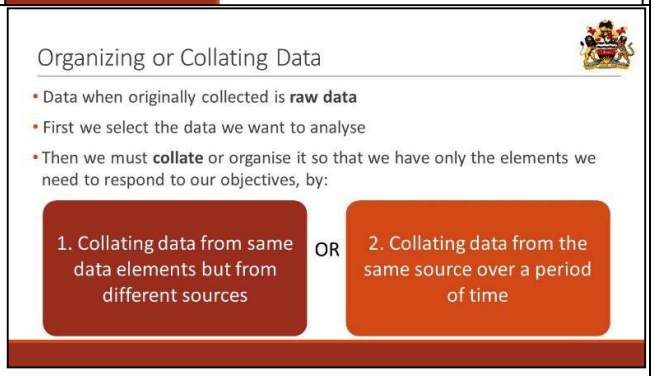


Slide 6

EXPLAIN that when we first collect data, it is considered RAW.

ASK: What do you think this means? Are data useful when raw?

Answer: *Yes, it may be useful for clinicians at the patient level (working with patients), but it will not help facility or district managers make decisions for the greater population.*



EXPLAIN that for the data to be analysed and used, we must first select and then process this raw data. Then we need to **collate** or organize it so that we have only the elements we need to respond to our objectives. We can do this in two ways:

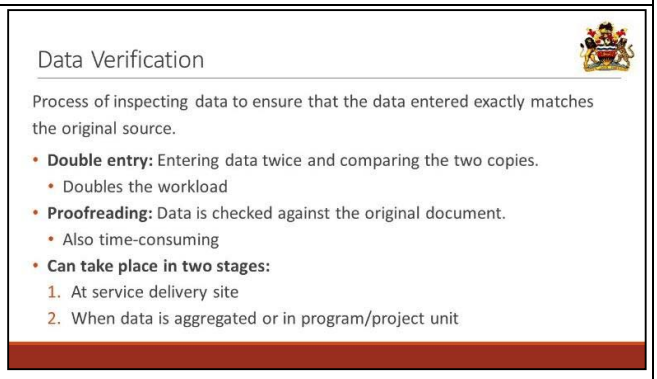
1. **Summarizing data from the same data elements but from different sources**. For example, we may provide a summary of all voluntary HIV testing and counselling done at the facility by collating data on tests done in the antenatal clinic, the outpatient clinic, the laboratory, the inpatient ward, and any other sites within the health facility from HIV testing service (HTS) registers.
2. **Summarizing data from the same source over a period of time**. For example, we may choose to summarize chief complaints in the outpatient clinic over the past year by collating primary health care head-count data from the registers for each month.

Slide 7

NOTE: This slide is animated. Wait for participants to answer the question below before clicking to reveal the two stages of data verification.

REVIEW the definition for verification.

ASK: When do you think verification should take place?



ALLOW a few responses and then **CLICK** to reveal the two stages of data verification.

EXPLAIN that there are two stages of data verification. The first involves in-depth verification (e.g., description, document review, trace and verification, cross-checks, spot checks) at service delivery sites. The second involves follow-up verification (document review, trace and verification) when data are aggregated, and when data are evaluated at the programme/project M&E unit.

ASK: What are some of the data errors or issues that verification might uncover?

Possible answers include:

- *Missing data*
- *Duplicate data*
- *Automatically copying data from USB flash drives when inserted into a computer can result in a breach of confidential data)*
- *Data captured in wrong box or fields*
- *Unlikely values for a variable*
- *Contradictions between variables*
- *Calculation errors*
- *Typing errors*

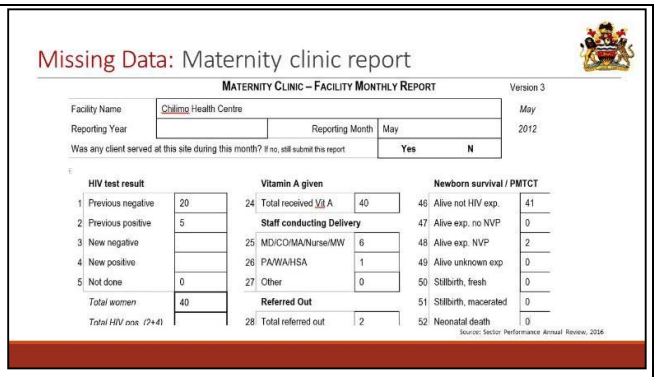
HIGHLIGHT how data verification can contribute to assessing the strength of the system (data quality assurance) by detecting issues that may be present in the data management system as a whole.

Slide 8

EXPLAIN that this slide covers verifying potentially incorrect data. In the example shown, we can see several blank spaces.

LISTEN for:

- *Call the facility*
- *Look at data from previous years*
- *Do what you need to locate and verify*



EXPLAIN how to handle missing data:

Consider: are the data truly missing?

- Could it be that data were not captured or counted?
- Ask! Do what is necessary to locate or verify the missing data.

If data are truly missing:

- Check in the register.
- Are data missing for all fields?
- Are there other sources to check or compare?

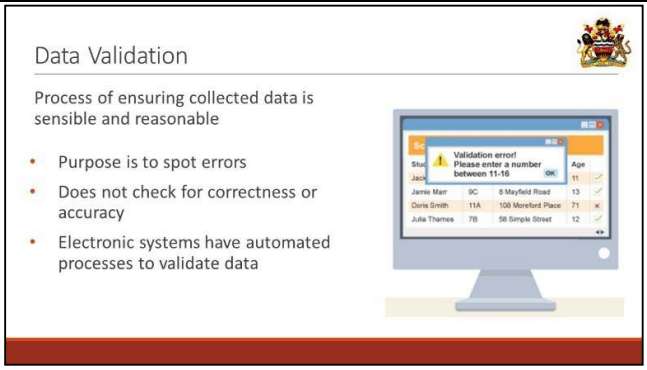
Slide 9

REVIEW the definition of validation.

ASK participants to brainstorm different types of validation processes.

ALLOW a few responses and **ENSURE** that they have a good understanding of data validation.

CLICK to the next slide to reveal examples.



Slide 10

EXPLAIN that the validation processes listed here are commonly done manually with paper-based systems—but they can be automated in electronic systems.

REVIEW the examples on the slide.

EXPLAIN that this is one of the many ways that electronic systems can improve data quality.

Validation type	Checks that a value…	Example
Range check	Falls within the specified range	Number of hours worked must be between 0-50
Length check	Isn't too short or too long	A password that needs to be six letters long
Format check	Is entered in the right format	A birth date cannot be misinterpreted by being entered as 3171
Consistency check	Is appropriate for the field	If title = Mr. then Gender = Male
Presence check	Has been entered	In most databases a field cannot be left blank

For example, a primary school student's age is likely 6 to 10 years. The computer can be programmed to accept only numbers between 5 and 16 for the age field. The validation process used in this case would be a **range check**. However, this does not guarantee that the number typed in is correct. For example, a student's age might be 14; if 11 is entered, it will be a valid entry, but incorrect.

Slide 11

PRESENT the data on this slide, showing the percentage of antenatal coverage in Malawi by year.

ASK: What do you notice about the table? Does anything look off?

ALLOW participants a few minutes to study the slide.

HINT, if necessary, that the values in the table are percentages.

Percentage of Antenatal Coverage

	7.1 ANTE NATAL COVERAGE							
YEAR	2013	2012	2011	2010	2009	2008	2007	2006
Blantyre	81.9	82.3	84.3	84.7	80.7	86.1	76.1	74.0
Zomba	95.5	100.4	110.6	82.3	97.9	102.1	101.8	97.4
Mangochi	89.3	97.7	107.7	106.1	109.1	115.5	108.7	103.8
Lilongwe	82.1	86.9	93.9	84.8	93.4	98.2	87.2	86.0
Thyolo	86.9	88.7	91.7	89.5	77.4	85.2	77.2	77.2
Mulanje	113.6	112.0	135.0	120.9	120.8	127.7	116.8	109.0
Mzimba	83.8	88.1	91.6	92.5	100.1	102.1	111.7	104.2
Dowa	87.7	84.4	86.2	88.8	88.9	93.5	96.3	90.3
Ntchisi	78.3	81.8	88.7	81	88.9	93.4	87.4	87.1
Kasungu	103.2	101.1	98.6	109.8	93.5	98.8	91.7	93.0
Totals	**90.0**	**92.2**	**98.2**	**93.3**	**92.4**	**97.8**	**91.1**	**88.1**

ALLOW a few responses and then move to the next slide to reveal the answer.

Slide 12

EXPLAIN that some of these percentages are above 100! Can this be correct?

This is an example of how we might validate data 'manually' or visually, whether we are looking at summaries, tables such as this one, or something closer to raw data.

Percentage of Antenatal Coverage

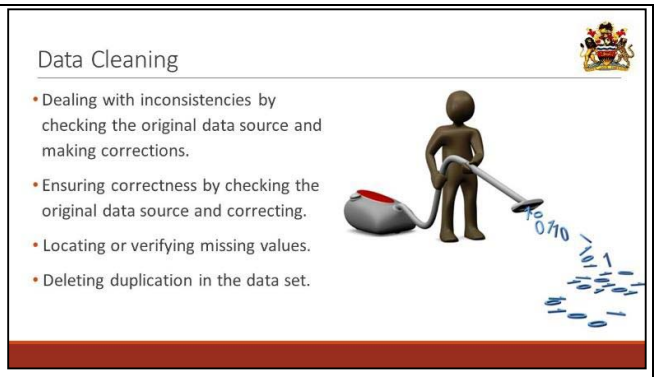
	7.1 ANTE NATAL COVERAGE							
YEAR	2013	2012	2011	2010	2009	2008	2007	2006
Blantyre	81.9	82.3	84.3	84.7	80.7	86.1	76.1	74.0
Zomba	95.5	100.4	110.6	82.3	97.9	102.1	101.8	97.4
Mangochi	89.3	97.7	107.7	106.1	109.1	115.5	108.7	103.8
Lilongwe	82.1	86.9	93.9	84.8	93.4	98.2	87.2	86.0
Thyolo	86.9	88.7	91.7	89.5	77.4	85.2	77.2	77.2
Mulanje	113.6	112.0	135.0	120.9	120.8	127.7	116.8	109.0
Mzimba	83.8	88.1	91.6	92.5	100.1	102.1	111.7	104.2
Dowa	87.7	84.4	86.2	88.8	88.9	93.5	96.3	90.3
Ntchisi	78.3	81.8	88.7	81	88.9	93.4	87.4	87.1
Kasungu	103.2	101.1	98.6	109.8	93.5	98.8	91.7	93.0
Totals	**90.0**	**92.2**	**98.2**	**93.3**	**92.4**	**97.8**	**91.1**	**88.1**

An electronic system would likely not let us enter these values, as they do not fall within the range of 0–100.

Ranges, lengths, and other formats can be programmed for each data entry field. This helps to ensure data quality by making it possible to automate the validation process.

ASK if there are any questions before moving on to the next slide.

Slide 13



NOTE this slide is animated. Wait for participants to answer questions before clicking to reveal the answers.

ASK: What do we mean by data cleaning? What are some ways that we can 'clean' data?

ALLOW a few responses and then **EXPLAIN** that when errors, missing values, or other inconsistencies are found via verification, validation, etc., they should be corrected.

CLICK to reveal the points on the slide. These are some of the ways that data can be cleaned.

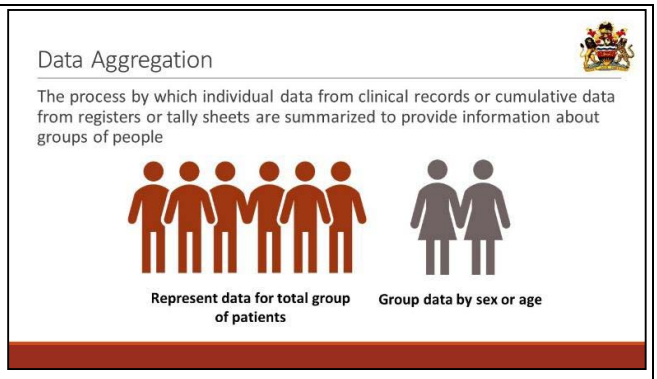
ASK if participants if they have participated in data cleaning. What other data cleaning processes have they undertaken?

EMPHASIZE that data cleaning CANNOT precede verification and validation.

Trainer Instructions: Step 4 (30 minutes)

Use slides 14–21 and the facilitator notes to guide this step.

Slide 14



NOTE: this slide is animated. Wait for participants to answer the question below and then click to reveal the answer.

ASK participants to define data aggregation. How are data aggregated?

CLICK to reveal the definition.

ASK: Why do we aggregate data?

EXPLAIN that aggregate data are used to develop information about groups of patients. This allows health care professionals to identify common characteristics that might provide information about either the most effective way to treat a disease, or who most commonly gets a particular disease, so that the information can be used for disease prevention purposes.

USE the first image to explain: for example, we may aggregate data collected from individual patients to represent the total group of patients seen. This would enable us to look at all of the people seen for TB at the district or national level, and see what treatments they received. Then we can analyse the information further to find out which treatments worked, which ones didn't, and why they did or did not work.

USE the second image to explain: We may also group data by sex or by age for reporting purposes.

ASK: Why might we do that?

ALLOW a few responses to ensure understanding.

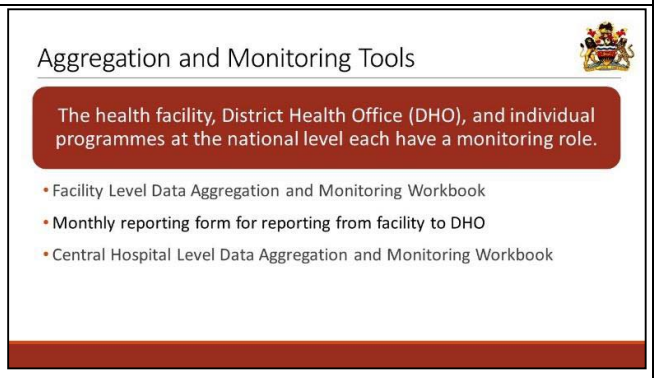
Possible answers include:

- *We may want to see if a certain sex or age group is more affected by a particular illness.*
- *We may want to see if a certain sex or age group responds better to treatment or to a public health programme.*
- *We may notice that a large number of small children are being affected by diarrhoea, and therefore discover an outbreak.*
- *It can provide information that can help promote patient safety, prevention and awareness.*

NOTE that aggregation may be performed manually or electronically (using specialized software).

Slide 15

EXPLAIN that the main purpose of routine HIS monitoring is to track changes in identified health indicators and take appropriate action to lead to the desired results. For this purpose, specific data aggregation and monitoring worksheets have been introduced at the facility, district, and central hospital levels.



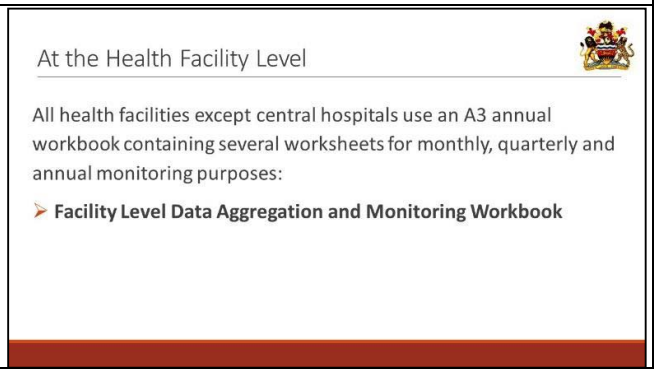
ASK participants to list data aggregation and monitoring tools.

REVIEW the tools noted on the slide.

Slide 16

DISCUSS how data aggregation takes place at the health facility level.

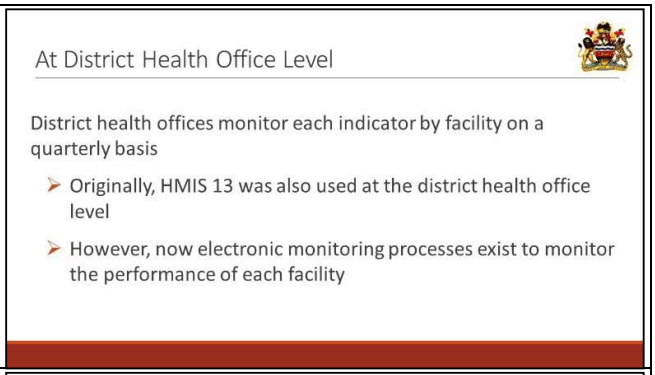
ASK participants to share their experiences—including both challenges and success—with this process.



Slide 17

DISCUSS how data aggregation takes place at the district health office level.

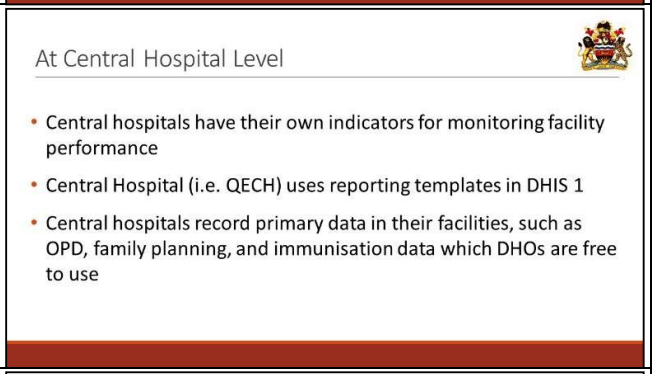
ASK participants to share their experiences—including both challenges and success—with this process.



Slide 18

DISCUSS how data aggregation takes place at the central hospital level.

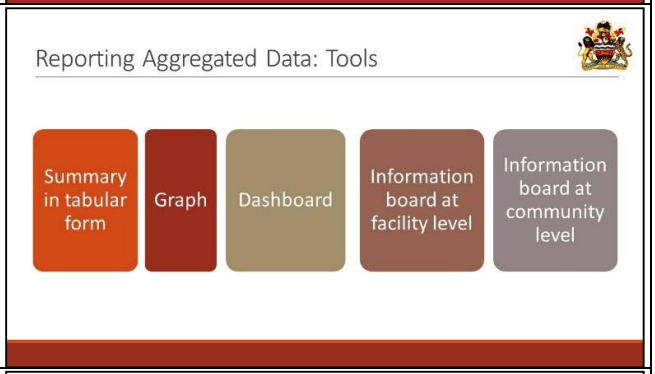
ASK participants to share their experiences—including both challenges and success—with this process.



Slide 19

EXPLAIN that aggregated data are usually presented in specific formats, such as those shown here.

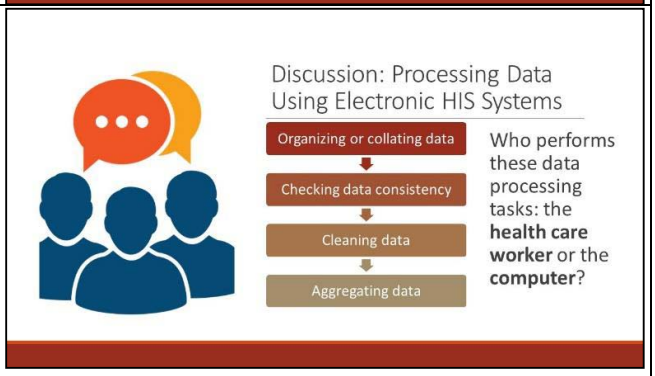
ASK: What formats have you seen or worked with?



Slide 20

EXPLAIN that data processing using an e-HIS is very similar to data processing using registers, workbooks, and reports.

The main difference lies with who processes the data: a human being or a computer?



LEAD an interactive discussion with participants focusing on who/what performs each step in processing data in electronic HIS systems.

- **Organizing or collating data**: Health workers or data clerks enter data into the e-HIS. However, each system will organize and collate the data according to its designated purpose.

- **Checking data consistency**: Electronic HIS systems may be programmed to check some data for consistency; however, health workers and data clerks can and should continue to check for data consistency as they would with paper registers and reports.
- **Cleaning data**: Similar to checking data consistency, the e-HIS can perform some checks; however, cleaning the data is a task that health workers and data clerks continue to be responsible for completing.
- **Aggregating data**: Each e-HIS includes reports or dashboards that present some of the data stored in its database in aggregate form. The burden of aggregating data using worksheets, pencils, and calculators is significantly reduced when an electronic system (such as an EMR, a LIMS, or DHIS2) is programmed to perform these calculations automatically.

HIGHLIGHT how their responses reflect components of real-time and retrospective data entry models. Real-time entry is done at the point of care by a clinician. Retrospective entry is done after a visit, usually by a data clerk (or clinician) in a computer laboratory or records room.

ASK participants to describe how the data entry model being used changes their data processing tasks.

EMPHASIZE that more information on how to perform these actions in electronic systems will be covered in module 4 (on electronic systems).

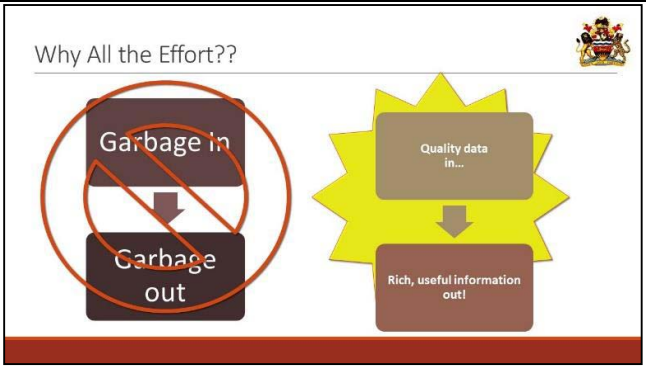
Slide 21

ASK: What happens when you put garbage into the HIS?

CLICK and **ANSWER:** You get garbage out!

ASK: What happens when you put quality data into the HIS?

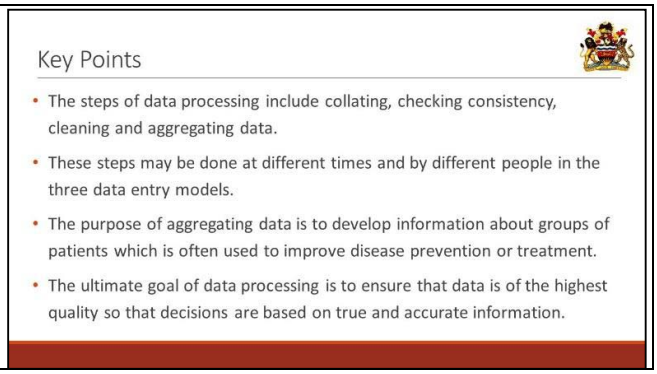
CLICK and **ANSWER:** You get rich and useful information out!



ASK: And what happens when you get rich and useful information out?"

Trainer Instructions: Step 5 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22		

Session 2.4: Step 3—Data Reporting Systems and Tools

Time: 60 minutes

Learning Objectives

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

1. Describe the types of reporting used at different levels of the health system
2. Identify tools used in data reporting
3. Discuss how to select the appropriate EMR reports to run
4. Discuss the roles and responsibilities of health workers in reporting
5. Discuss challenges and supporting factors for data use

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	15 minutes	Interactive lecture	Data reporting (slides 4–7)	Flip chart, markers, tape, LCD
3	15 minutes	Facilitator presentation, large group discussion	Data collection and reporting challenges (slides 8–10)	Flip chart, markers, tape, LCD
4	20 minutes	Small group activity	Roles and responsibilities in data management and flow of data (slides 11–12)	Flip chart, markers, tape, LCD
5	5 minutes	Facilitator presentation	Key points (13)	Flip chart, markers, tape, LCD

Resources Needed

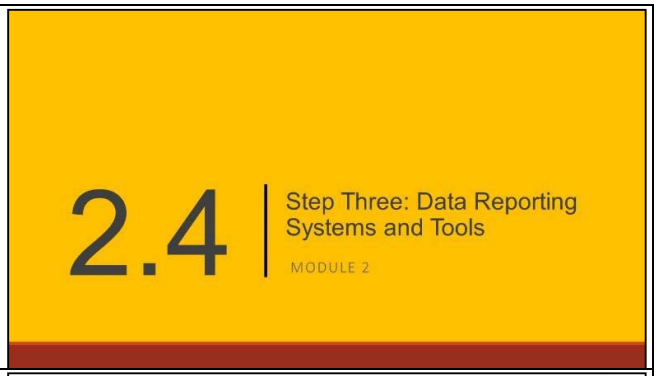
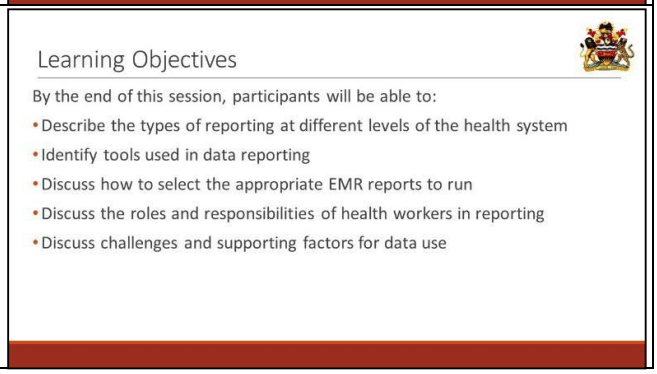
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following eLearning Assignments:
  Module 2: Data Management Concepts

Trainer Instructions: Step 1 (5 minutes)

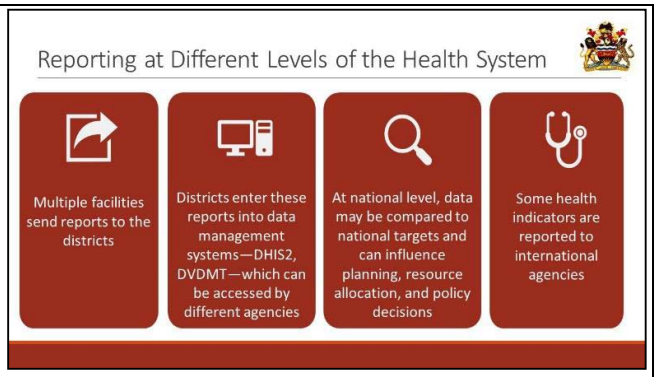
Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this session will focus on the third step of data management, data reporting systems and tools.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (15 minutes)

Use slides 4–7 and the facilitator notes to guide this step.

Slide 4



NOTE: This slide is animated. Wait for participants to respond to the question before clicking to reveal the different levels of reporting.

ASK: What levels of the health system are responsible for reporting?

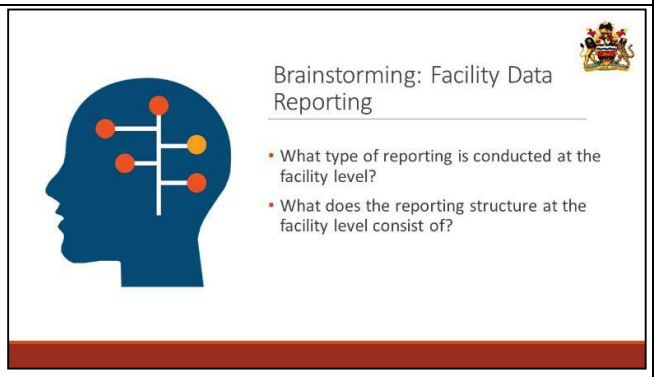
Answer: *All levels!*

ALLOW a few responses and then **CLICK** to reveal the levels on the slide.

EXPLAIN that reporting of data happens at all levels of the health system, from community to facility, facility to district, and district to national. Each level of the health system has a role to play in generating and receiving the reported data, and monitoring them for trends.

Some health indicators are reported to international agencies, such as when HIV/AIDS indicators are reported to UNAIDS.

Slide 5

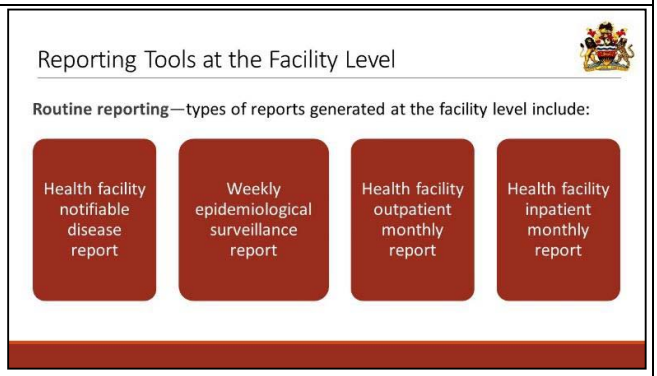


ASK the participants to brainstorm as a group on the types of reporting and who is responsible for them at a facility.

ASK: Name a report that is generated at the facility. What type of reporting is it? Who is it reported to?

After a brief discussion, **CLICK** to the next slide.

Slide 6



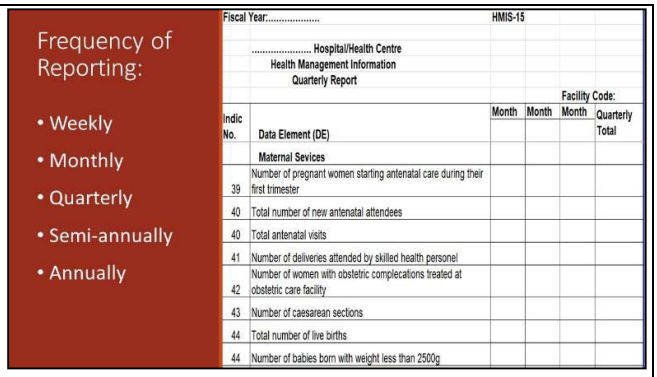
CONTINUE the discussion of reports from the previous slide.

REVIEW the types of routine reporting generated at the facility level.

GIVE examples of reports from the previous discussion that are not on this list.

NOTE that the inpatient monthly report is more relevant to a hospital than to a smaller facility.

Slide 7



EXPLAIN that aggregation is a periodic process. When done on a regular schedule, this makes it easier to calculate indicators for reporting. Reports may be generated weekly, monthly, quarterly, semi-annually, or annually.

ASK participants if they recognize this reporting form. What is it used for? Who is responsible for generating and submitting it?

ASK participants to think of a type of report that is generated or submitted:

- **Weekly**
  Possible answer: *for diseases that are potentially epidemic/endemic*
- **Monthly**
  Possible answer: *for medical health activities*
- **Quarterly**
  Possible answer*: for the follow-up of tuberculosis patients*
- **Semi-annually**
  Possible answer: *for monitoring*
- **Annually**
  Possible answer: *for summaries*

Slide 8

NOTE This slide is animated. Wait until participants have shared their answers to the first question before clicking to reveal the second question.

DIVIDE participants into groups of three.

ASK participants to answer the question on the slide.

GIVE the groups 5 minutes to discuss reporting challenges, then bring them back to share their responses.

CLICK to reveal the second question.

ASK groups to identify two possible solutions for every challenge they came up with.

GIVE the groups 5 minutes to discuss solutions, then bring them back together to discuss.

ENSURE that each group has an opportunity to contribute to the responses to the two questions.

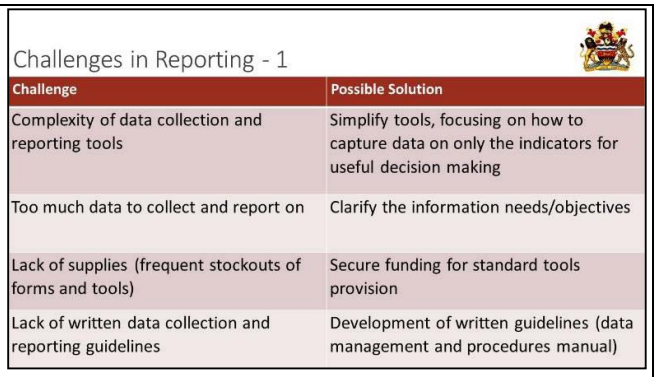
LEAD a brief discussion based on their responses.

Slide 9

REVIEW the challenges in the matrix on the screen.

DISCUSS other challenges, which could include:

- Lack of storage for data; inefficient filing system
- Test results get lost; do not make it to patient file
- Data entry errors
- Missing data
- Delays in entering data and creating reports
- Mistakes in collating or adding up data
- Not checking data for errors
- The presentation does not match the needs of the audience or does not answer the question



Challenges in Reporting - 1

Challenge	Possible Solution
Complexity of data collection and reporting tools	Simplify tools, focusing on how to capture data on only the indicators for useful decision making
Too much data to collect and report on	Clarify the information needs/objectives
Lack of supplies (frequent stockouts of forms and tools)	Secure funding for standard tools provision
Lack of written data collection and reporting guidelines	Development of written guidelines (data management and procedures manual)

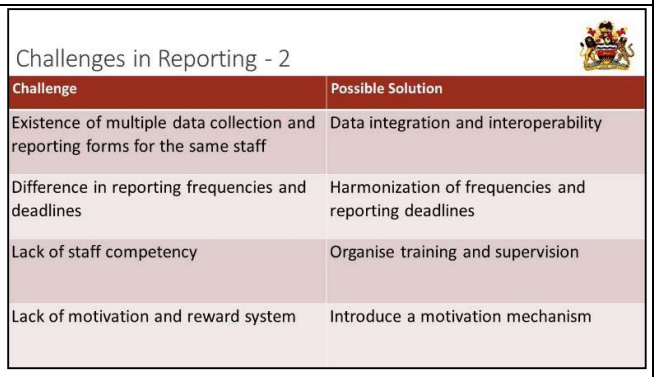
Slide 10

REVIEW the challenges in the matrix on the screen.

EXPLAIN that interoperability was discussed in session 1.2. Briefly **REVIEW** this concept, and talk about how it could reduce the need for multiple data collection forms.

DISCUSS other challenges, which could include:

- Lack of storage for data; inefficient filing system
- Test results get lost; do not make it to patient file
- Data entry errors
- Missing data
- Delays in entering data and creating reports
- Mistakes in collating or adding up data
- Not checking data for errors
- The presentation does not match the needs of the audience or does not answer the question



Challenges in Reporting - 2

Challenge	Possible Solution
Existence of multiple data collection and reporting forms for the same staff	Data integration and interoperability
Difference in reporting frequencies and deadlines	Harmonization of frequencies and reporting deadlines
Lack of staff competency	Organise training and supervision
Lack of motivation and reward system	Introduce a motivation mechanism

Trainer Instructions: Step 4 (20 minutes)

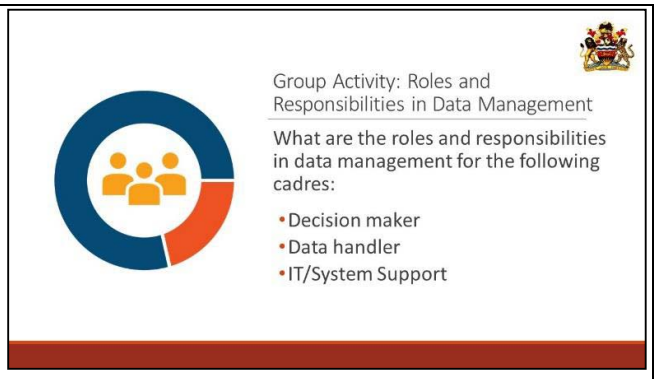
Use slides 11–12 and the facilitator notes to guide this step.

Slide 11

DIVIDE participants into three groups. Each group will outline the data management roles and responsibilities for one of the three cadres.

ALLOW 5–10 minutes for discussion, then **BRING** groups back to discuss their ideas.

Possible answers include:



Data handler

- *Use the data entry/collection system correctly and follow data quality procedures*
- *Check to make sure that the correct data are entered; flag paper forms with missing or inaccurate data, and follow up to make sure the data are completed or corrected; perform routine data quality checks*
- *Give feedback, and discuss data quality with facility staff*
- *Provide ongoing training to all facility staff on data element definitions and indicators*
- *Conduct data processing and data analysis functions*

Decision maker

- *Create a culture of data use by acknowledging all contributions and the importance of everyone's work*
- *Use data to make evidence-based decisions*
- *Follow data quality procedures*
- *Understand what data are being collected, what systems are managing the data, and how data will be used*
- *Understand the information cycle*
- *Understand basic troubleshooting for data management challenges*
- *Conduct routine data quality reviews; correct any inaccurate data detected, and fill in incomplete data*
- *Give feedback on data quality results and recommendations to data capturers and health care providers*
- *Resolve identified causes of data errors, such as the merging of duplicate patient records*
- *Generate and use reports*

IT/Systems support

- *Provide the right tools and systems for good data management*
- *Provide training to data handlers, health care workers, and managers*
- *Ensure system is working as intended*
- *Maintain systems as needed*
- *Respond to requests for support in a timely manner*

NOTE: Health care providers can be both decision makers and data handlers

ASK: Is any one group of HCWs more important in the data management process than another?

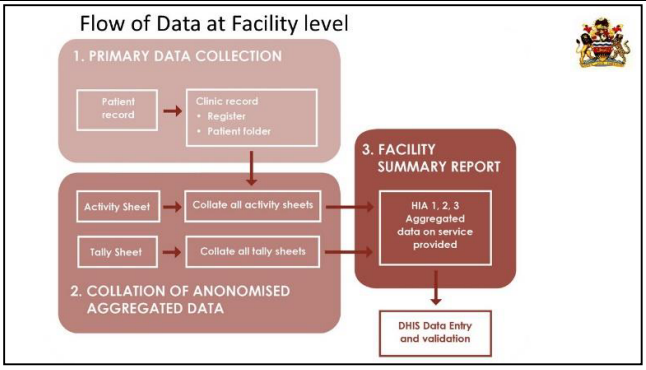
Answer: No. All roles and responsibilities are necessary and important to ensure effective data use.

Slide 12

EXPLAIN that this is an example of how data collection, collation, and reporting processes might flow in a health facility.

HIGHLIGHT each step as you explain the process.

- Patient records, activity sheets or tally sheets are updated at the same time.
- Verify the values between registers and activity sheets.



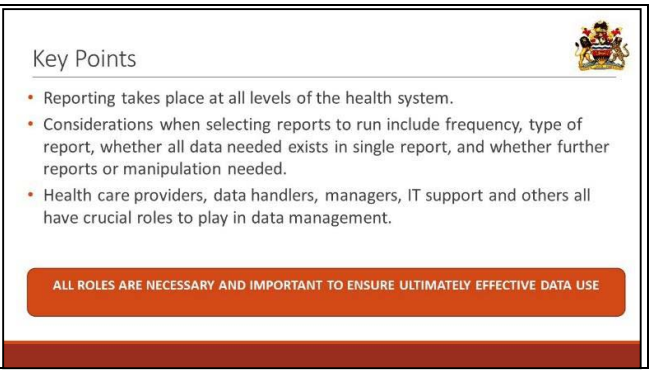
Trainer Instructions: Step 5 (5 minutes)

Use slide 13 and the facilitator notes to guide this step.

Slide 13

SUMMARIZE the key points on the slide.

ASK participants if there are any questions before concluding the module.



Session 2.5

Session 2.5: Data for Decision Making

Time: 120 minutes

Learning Objectives

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

1. Discuss the types of decisions made in the health sector
2. Distinguish between intuition- and evidence-based decision making
3. Discuss barriers to data use

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Facilitator presentation, large group discussion	Types of decisions (slides 4–7)	Flip chart, markers, tape, LCD
3	10 minutes	Large group discussion	Decision making process (slide 8)	Flip chart, markers, tape, LCD
4	40 minutes	Interactive lecture, case studies	Intuition-based and evidence-based decision making (slides 9–17)	Flip chart, markers, tape, LCD
5	50 minutes	Interactive lecture, large group discussion, partner activity, group activity	Using data for decision making (slide 18–22)	Flip chart, markers, tape, LCD
6	5 minutes	Facilitator presentation	Key points (slides 23)	Flip chart, markers, tape, LCD

Resources Needed

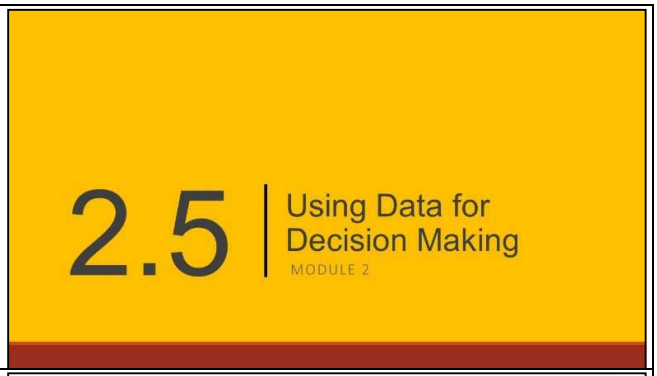
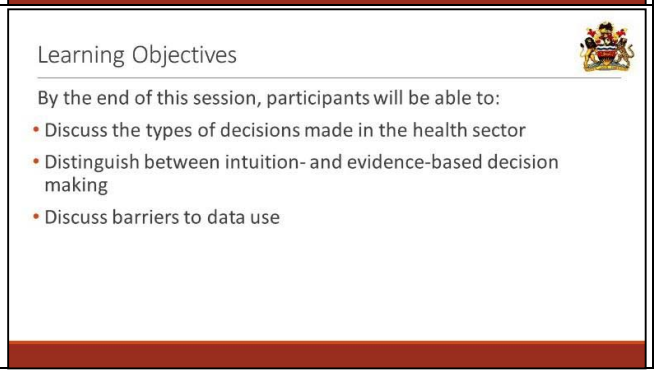
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following eLearning assignments:
  Module 3: Using EMR Data for Decision Making

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (10 minutes)

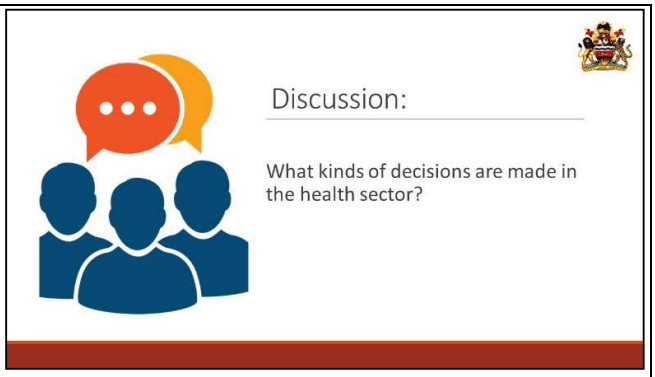
Use slides 4–7 and the facilitator notes to guide this step.

Slide 4

ASK participants to identify some of the reasons why we make decisions; **PROMPT** them to consider what we are hoping to achieve with the decisions that we make.

ALLOW participants 2–3 minutes for this activity.

RECORD their answers on a flip chart.



Then **CLICK** to present the reasons listed on the next slide.

Slide 5

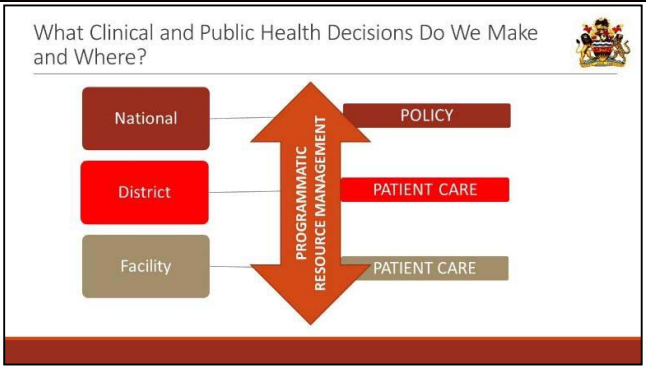
REFER to the types of health decisions the participants just came up with**.**

HIGHLIGHT any types of decisions shown here on the slide that participants did not come up with.

Slide 6

REMIND participants that different kinds of decisions are made at different levels of the health system; some decisions cut across all levels.

POINT OUT the three primary levels of decision making in Malawi: national, district, and facility.



For each level, **ASK** participants to provide an example. **USE** the list below to prompt them, if needed.

National decisions

- **Policy**: developing or updating standard treatment guidelines, essential medicines lists, dispensing protocols, standardizing or updating data collection tools

District- and/or facility-level decisions

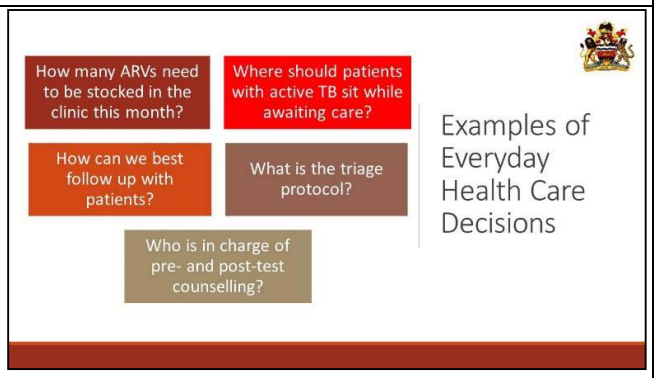
- **Patient care**: diagnoses, starting treatments, selecting appropriate treatments, changing treatment regimens due to side effects

Cross-cutting decisions (made at all levels)

- **Programmatic**: the design, implementation, and scale up of programme activities. Programme activities at the district and facility levels may include community outreach activities, peer support programmes, mentoring programmes, and service availability. Activities at the national level may include national media campaigns and population-wide incentive programmes.

Resource management: At district and facility levels, this includes stock (inventory) management, and staff and vehicle scheduling. At national and district levels, this includes stock (inventory) management; staff hiring, posting, and scheduling; vehicle scheduling; and budgeting.

Slide 7



EXPLAIN that at all levels of the health system, decisions are made that impact the care and treatment that patients receive. Decisions made anywhere at the national and district levels about policy, programme design and direction, and resource management will have implications for health facilities. Administrators and clinicians at facilities routinely make decisions about facility resources, activities, and clinical care and treatment. Decisions are choices about what to do, and how to do it.

EMPHASIZE that as health workers, we make many types of decisions every day. Decision areas may include patient management, programme management and improvement, strategic planning, design of health programmes and services, and advocacy and policy development. These decisions should be based on data.

Slide 8

ASK participants what influences the clinical and public health decisions being made in the Malawi Health System. **WRITE** their responses on a piece of flipchart paper under the heading 'Factors Influencing Decision Making.'

LISTEN for:

- *Data and information*
- *Power and influence of sectoral interests*
- *Corruption*
- *Political ideology*
- *Arbitrariness*
- *Anecdotes*

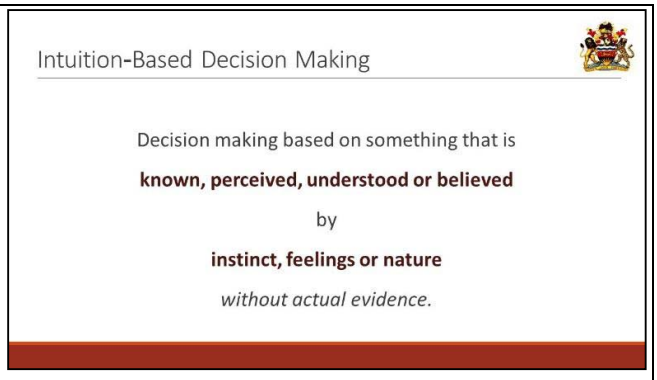
EXPLAIN to participants that some of these factors will always play a role in decision making. For instance, political ideology, power, and influence of other interests may not be the primary influence on the decision-making process, but will somehow inform what inputs are used and thus the outcome.

Trainer Instructions: Step 4 (40 minutes)

Use slides 9–17 and the facilitator notes to guide this step.

Slide 9

SHARE this definition of intuition-based decision making with participants.



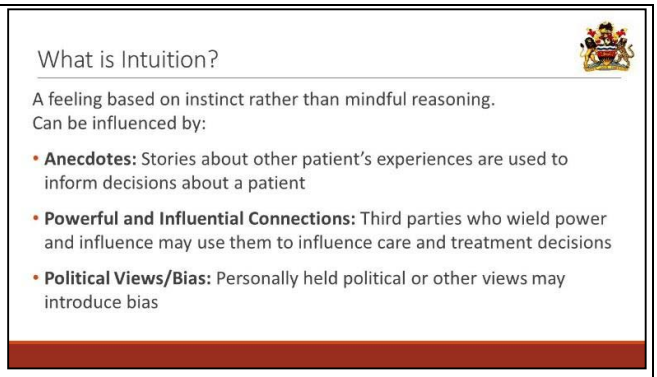
EMPHASIZE that intuition-based decision making:

- Is often made in the absence of data.
- Can frequently result in either overlooking routine events or overestimating rare ones.
- Can result in a decision that does not address the actual problem.

ASK participants to give a few examples of intuition-based decision making.

Slide 10

EXPLAIN that intuition-based decision making may be based on anecdotal evidence, the influence of those more powerful than us, our own biases, or any number of conscious or subconscious influences.

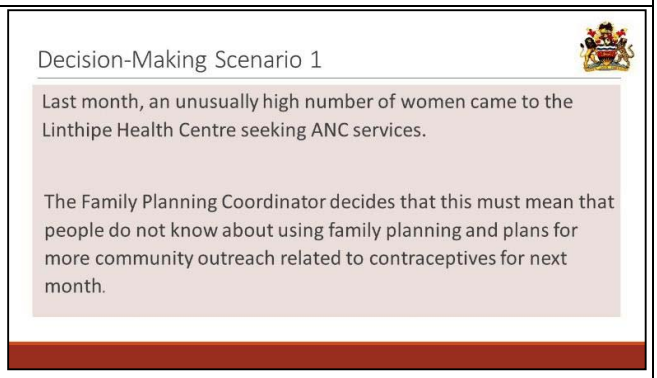


These decisions may draw upon clinical or managerial experience and expertise. But, when made in the absence of data, this approach to decision making can lead to overlooking routine events, overestimating rare ones, and introducing basic human error. More importantly, the decisions we make based on intuition or instinct do not always address the actual problem.

We sometimes refer to experts for their opinions. We do this assuming that their opinions are based on their experience as experts. However, we should keep in mind that experts can also be influenced by their experiences (as with anecdotes), connections, views, and biases, or by arbitrary factors. We should make sure that the opinions experts give us are supported by data.

Slide 11

ASK a participant to read the scenario.



ASK participants:

- Do you think the Family Planning Coordinator made the right decision? Why or why not?
- What other explanations might there be for the increase in women seeking ANC services?
- What additional actions could the FP coordinator take before making her decision?
- What if the family planning coordinator is wrong?
- Might resources be wasted? What other implications might this decision have?

ASK participants what they think the benefits of intuition-based decision making are. **WRITE** their responses on a flip chart.

Possible benefits they may identify:

- *Respects clinical or programmatic experience and expertise*
- *Captures the social context in which decisions are made*
- *Does not require high-quality data*

NOTE that in situations where there is a lot of uncertainty and little data available to clarify the situation, decisions tend to be based on intuition.

Then **ASK** participants to think of some limitations to intuition-based decision making. **WRITE** their responses on the flip chart.

They should identify:

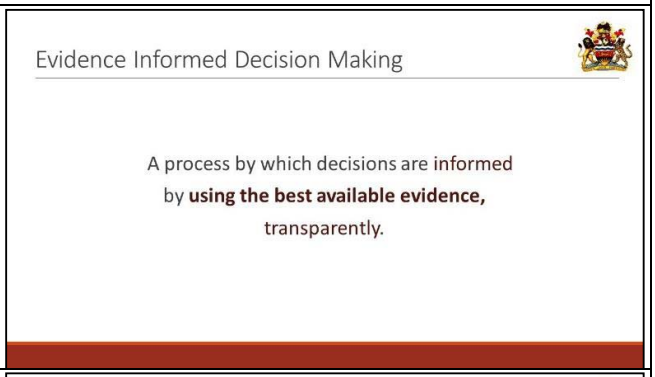
- *When decisions are based on perceived similarities between cases or situations, it can introduce errors and biases*
- *Not transparent*
- *Difficult to make decision makers accountable*

SUMMARIZE their comments, highlighting key points about intuition-based decisions.

Slide 12

PRESENT this definition of evidence-based decision making.

NOTE that this can apply to any type of decision we make.

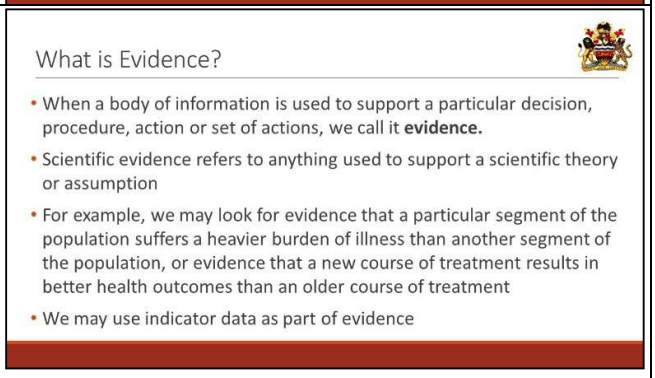


Slide 13

READ the slide.

ASK participants if they can think of an everyday example of evidence.

ALLOW a few responses and then **PROVIDE** the following example*:*

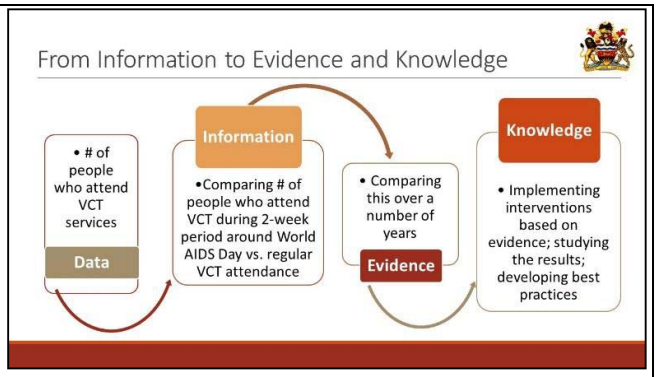


- Each and every day, we make decisions.
- For example, we decide what to wear when we leave the house. To make this decision, we may ask ourselves some questions:
    - What is the temperature?
    - Is it raining?
    - What do we have planned for the day?
- To answer these questions, we may check the thermometer, the weather report on the radio, or our daily calendar. And we know from past experience what to wear when the weather report or thermometer gives us certain information.
- In this instance, we are guiding our decision with information that has become evidence.

Slide 14

TELL participants that understanding the relationship between data, information, evidence, and knowledge is essential to being able to use data effectively for health care and health system decision making.

REMIND them that raw data alone is of little value without some sort of context.



LEAD participants through the example on the slide.

- Knowing the number of people who access VCT services in the two week period leading up to World AIDS day <u>on its own</u> is not necessarily valuable or usable.
- **BUT** Comparing the number of people who go to a facility for VCT services in the two weeks prior to World AIDS Day against the facility's established performance target *transforms* raw data into information that can be used to inform decisions.

ASK: If the number of patients accessing VCT services is lower than the performance target for that month, what questions would we ask that would give us more information about why the number is lower than the performance target?

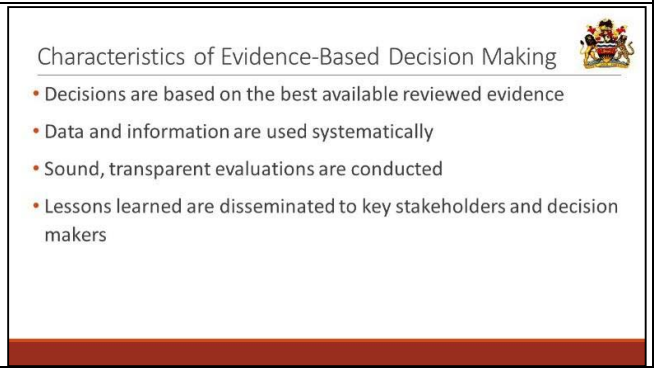
Potential answers:

- *Who is currently accessing VCT services? Who is not?*
- *Are there any geographical areas that are particularly low in terms of accessing services?*
- *Were there any behaviour change communication (BCC) activities to encourage the use of VCT services planned for the month? Did they happen as planned?*

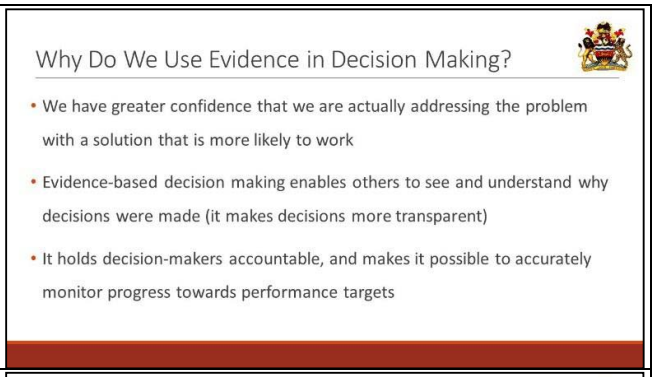
TELL participants that we use data and information to answer questions and **determine and select a course of action**.

CONTINUE working with the VCT services example; encourage participants to brainstorm different possible actions that can be taken, and then select one.

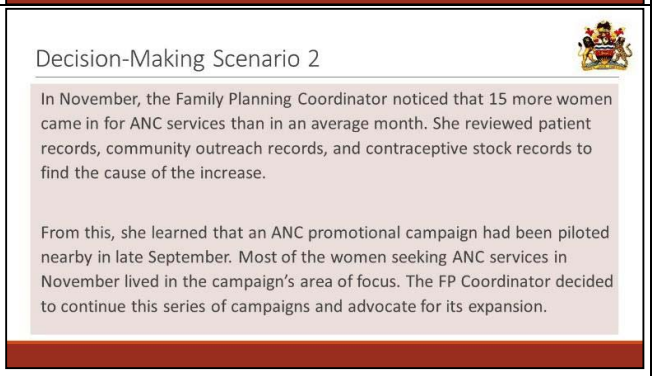
Slide 15



Slide 16



Slide 17



ASK a participant to read the scenario.

ASK participants:

- Do you think the FP coordinator made the correct decision?
- What did this FP coordinator do differently than in the last example?
- How did data influence the decision the FP coordinator made?

INSTRUCT participants to discuss the benefits of using evidence to inform decision making. **RECORD** their responses on a flip chart.

Then **INSTRUCT** participants to propose limitations of evidence-based decision making, **RECORD** these responses as well.

Benefits:

- Promotes transparency and consistency
- Allows for accountability
- Facilitates alignment of decisions with performance targets
- Able to monitor outcomes of decisions
- Improves health system's ability to respond to health needs at all levels

Limitations:

- Requires that data are available and of good quality
- Limited support for evidence-based decision making

PROCESS this brainstorming activity by asking participants to compare the benefits of evidence-based decision making with those of intuition-based decision making.

ASK them the following questions:

- Of the two examples, which decision do you have the most confidence in? Why?
- What parts of the decision-making process can benefit from the FP coordinator's experience or expertise? Her knowledge and understanding of the social context?

INSTRUCT participants to review the benefits of intuition-based decision making and compare them to the benefits of evidence-based decision making. **NOTE** that:

- Experience, expertise, and understanding of the social context can be a part of an evidence-based decision-making process
- Relying SOLELY on feelings/gut/instinct to make a decision is a weakness of intuition-based decision making

SUMMARIZE this part of the session by highlighting the following points:

- Decisions are made to improve a number of aspects of the health system and the population it serves
- A number of factors influence the decision-making process
- Intuition-based decisions rely on feelings, experience, perceptions and beliefs, whereas evidence-based decisions use data and consultation to guide decision making. The key difference is how the evidence and data are used.
- If available, quality data can be used to improve the effectiveness of decision making.
- Data constitute an essential component of evidence-based decision making.

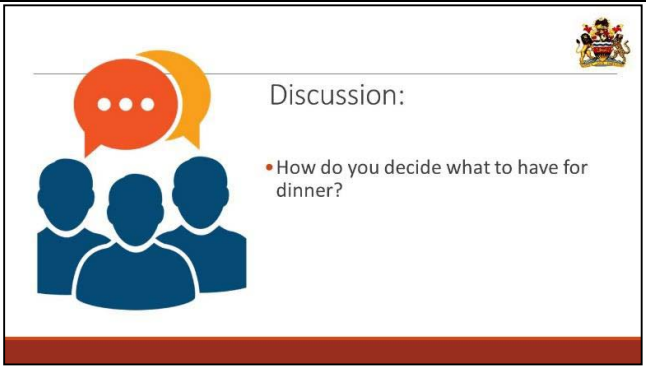
ASK participants if they have any questions about intuition or evidence-based decision making.

Trainer Instructions: Step 5 (50 minutes)

Use slides 18–22 and the facilitator notes to guide this step.

Slide 18

ASK participants to think about a decision that they make on a recurring basis—for example, what to have for dinner. How do you decide what to have for dinner?



NOTE that many of these reasons will likely be based on intuition, but a few may be based on evidence. For example, if you know you do not feel well after eating eggs, you have likely gathered information over time that now acts as evidence.

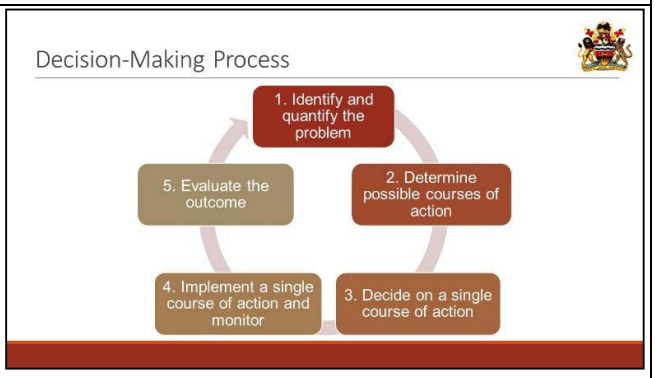
Things the participants may suggest:

- *Budget and time of the month—you may have a more lavish meal after payday but something more basic just before.*
- *Special occasions—you may have a nicer meal if there is a special occasion, such as a birthday or anniversary.*

- *Consider the pros and cons—this means weighing evidence for or against having a particular meal or going out for dinner.*
- *You notice that the meat in the refrigerator will go bad tomorrow—so the decision to have meat for dinner is based on prioritizing the meat that will go bad if not prepared now over the chicken that will still be good for another two days.*
- *Choose whatever appears to be the easiest option.*
- *Craving for something specific.*
- *If you are going to an event (such as a wedding), you may not have an option; you will eat whatever is on the menu for the event.*

Slide 19

USE an example given by a participant as you take them through the decision-making process shown on this slide.



NOTE that while a number of different factors influence what decision is made, the process itself remains relatively simple: identify the problem, determine possible actions, select one and act on it while monitoring the results, and then evaluate whether or not the action taken solved the problem.

1. **Identify and quantify the problem**: Use data to understand what the problem actually is, who is involved, and where and when it occurs.
2. **Identify options**: Use data to identify different outcomes of possible solutions. How has this problem been resolved in the past?
3. **Decide on a single course of action**: Data can be used to assess the different possible outcomes of each solution.
4. **Implement and monitor**: Depending on the solution you arrive at, seeking out additional data may be part of putting your decision into place.
5. **Evaluation**: Subsequent data on the problem can indicate whether the solution you implemented has been resolved.

In the dinner example, the meal options would be the possible courses of action, and the factors considered would be the data used to help decide on a single course of action (i.e., which meal to have).

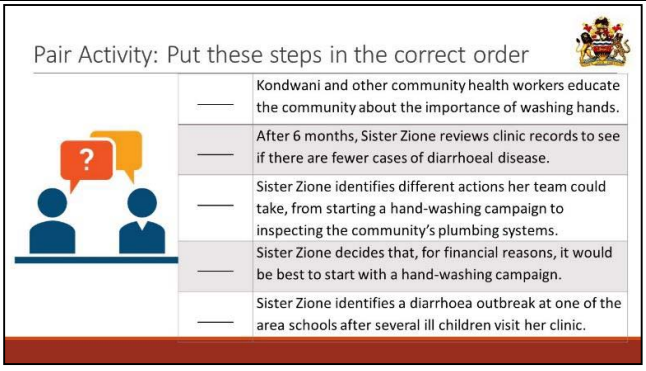
Slide 20

10 minutes

ASK participants to work with a partner to put these steps in the correct order.

REVIEW responses by asking one group to provide their responses.

The correct order is:
4—5—2—3—1



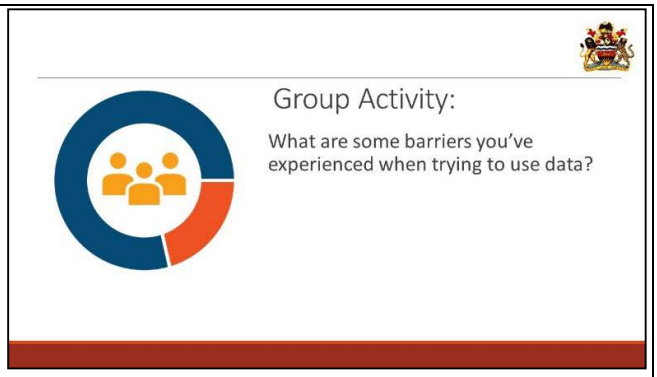
Slide 21

10 minutes

DIVIDE participants into small groups of three or four people.

GIVE them 5 minutes to discuss the barriers to data use they have encountered.

BRING them back to the larger group and have each group share the barriers they discussed.



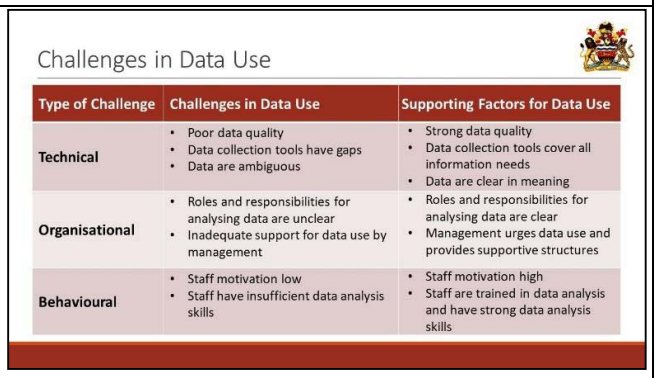
RECORD the barriers they came up with on a flip chart for future reference.

Slide 22

EXPLAIN the challenges to data use outlined above.

EXPLAIN that other challenges include:

- Those who need to use the data do not receive it.
- The right data are not available.
- Health care staff and managers are not held accountable for results.
- Current information is not comparable to information from the past, because either past information is not available, or indicators or forms have changed.
- Targets are unclear or unrealistic.



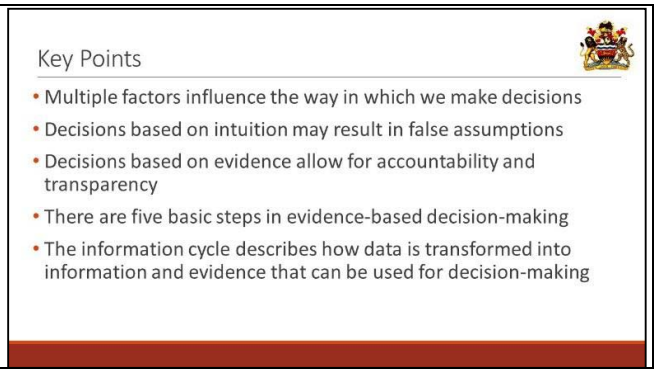
Trainer Instructions: Step 6 (5 minutes)

Use slide 23 and the facilitator notes to guide this step.

Slide 23

USE the key points to close the session.

ASK if there are any questions before moving on to the next session.



Module Three
Session 3.1

MODULE 3: DIGITAL LITERACY
Session 3.1: Introduction to Computers

Time: 100 minutes

Learning Objectives

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

1. Distinguish between hardware and software
2. Identify four categories of hardware devices
3. Identify the hardware components of a computer
4. Demonstrate how to use the keyboard and mouse

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Facilitator presentation	Definition and Function (slides 4–5)	Flip chart, markers, tape, LCD
3	10 minutes	Interactive lecture	Role in health care (slide 6)	Flip chart, markers, tape, LCD
4	10 minutes	Interactive lecture	Hardware and Software Definitions (slides 7–9)	Flip chart, markers, tape, LCD, Handout 3.1.1
5	20 minutes	Interactive lecture	Input Devices: Using a keyboard and mouse (slide 10–14)	Flip chart, markers, tape, LCD, individual computers
6	15 minutes	Interactive lecture/ demonstration	Demonstration: Using a keyboard and mouse (slide 15)	Flip chart, markers, tape, LCD
7	5 minutes	Facilitator presentation	Output Devices (slide 16)	Flip chart, markers, tape, LCD, individual computers, Handout 3.2.2
8	10 minutes	Facilitator presentation	Processing Devices (slides 17–19)	Flip chart, markers, tape, LCD
9	5 minutes	Facilitator presentation	Storage Devices (slides 20–21)	Flip chart, markers, tape, LCD

Step	Time	Method	Content	Resources
10	5 minutes	Facilitator presentation	Key points (slide 22)	Flip chart, markers, tape, LCD

Resources Needed

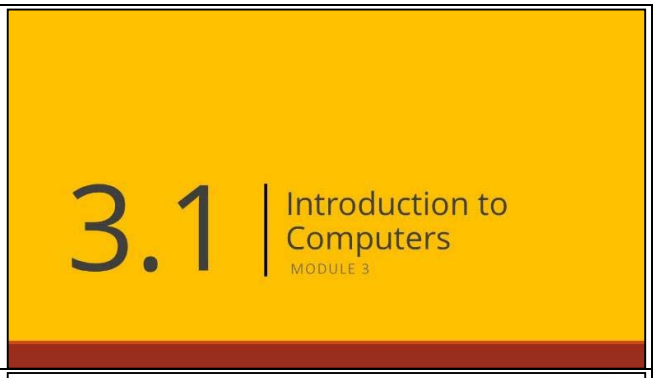
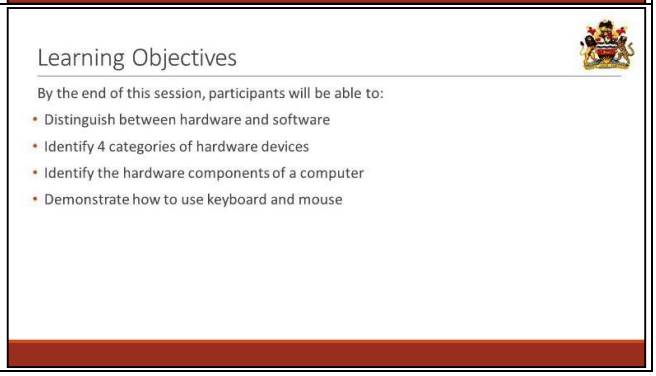
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- Individual computers, if possible

Handouts

Handout 3.1.1: Basic Hardware and Software Components

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this session will orient participants to different types of computer hardware.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (10 minutes)

Use slides 4–5 and the facilitator notes to guide this step.

Slide 4

NOTE: This slide is animated. First ask the question below and allow a few responses before clicking to reveal the definition.

ASK: What is a computer? How would you define it?

ASK participants to give examples of a computer system; examples they come up with may include:

- ATMs
- Mobile phones
- Calculators

ALLOW a few responses and then **EXPLAIN** that the computer has its roots in the development of numbering systems and mathematical notations and operations. The term 'computer' was originally used to describe humans who were able to do calculations that were often long and tedious. Over time, humans invented a series of tools designed to assist these human computers with more complex calculations.

The abacus is one example of such a tool, invented in Babylon around 2400 BC. The electronic calculator, developed within the last 50 years, is another example.

The computer is a more recent development. As a technological tool, it has evolved to assist with a much larger variety of tasks beyond the calculations that human computers originally performed—among them writing, editing, sending documents, researching information, and communicating with people in a variety of places.

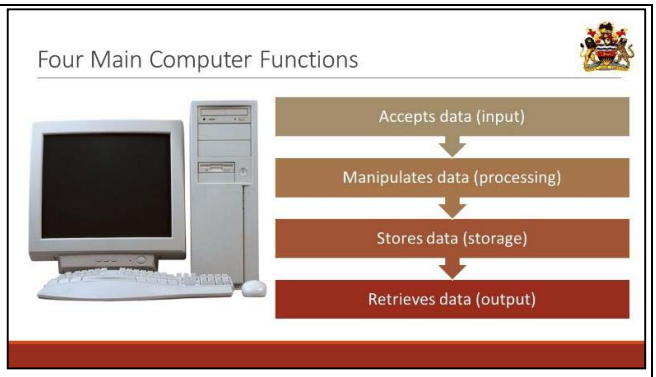
CLICK on the slide and show this definition of a modern computer.

TELL participants that the main advantage of a computer is that it has greater capacity to store and manipulate data than do humans or simple mechanical calculators.

Slide 5

NOTE: This slide is animated. Only the image of the computer shows when the slide first appears.

SAY: We just discussed the different activities computers can be used for. All of these activities can be distilled into four main functions. What do you think these are?



ALLOW a few responses, then **CLICK** the mouse to reveal the functions above.

GIVE participants the following example to show participants how a computer follows this process when a user is working with a document:

- Chisomo types a memorandum to her staff using the word processing application on her computer. The computer **accepts the words (data)** that she is entering and shows them on the monitor screen.
- Chisomo completes her document and uses the s[feature to find and correct any spelling mistakes in the document. The computer **manipulates the data (the text)** to find the spelling errors and to correct them based on additional input from Chisomo.
- Chisomo saves the document and the **computer stores it in the electronic file** designated by Chisomo.
- Chisomo is now ready to print and distribute the memorandum. She finds the document in the files stored by the computer and opens or **retrieves the document**.

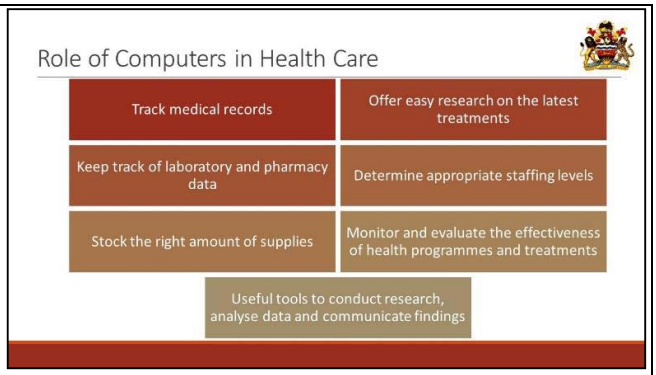
Trainer Instructions: Step 3 (10 minutes)

Use slide 6 and the facilitator notes to guide the activity or demonstration, depending on whether or not individual computers are available for participants.

Slide 6

NOTE: This slide is animated.

EXPLAIN to participants that computers are powerful tools and have had a profound impact on the world. They are now a part of everyday life for many people on the planet, and have expanded into almost every area of life—such as business, entertainment, education, and health care. Health care has benefited greatly from computers.



ASK: What are some of the ways in which health care has benefited from computers?

ALLOW for a few responses and then **CLICK** to reveal those below that they perhaps did not mention.

- They track medical records
- Offer easy research on the latest treatments
- Keep track of laboratory and pharmacy data
- Determine appropriate staffing levels
- Stock the right amount of supplies
- Monitor and evaluate the effectiveness of health programmes and treatments

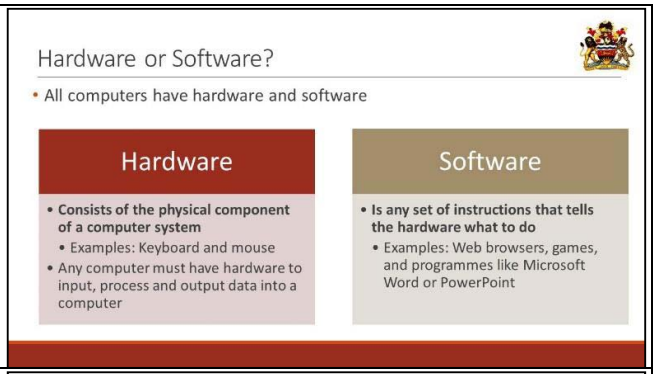
Useful tools to conduct research, analyse data and communicate findings

Trainer Instructions: Step 4 (10 minutes)

Use slides 7-9 and the facilitator notes to guide the interactive lecture/demonstration.

Slide 7

EXPLAIN that all computers consist of hardware and software. In the next sections, we will take a closer look at computer software and networks. Finally, we will discuss how to manage and maintain computers so that they continue to perform the tasks we ask them to.

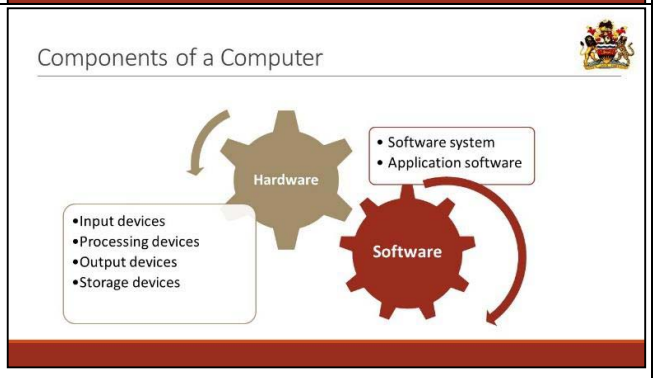


Slide 8

ASK participants if they are familiar with EMRs and DHIS software.

EXPLAIN to participants that people and data are two essential components of a strong HIS.

EMPHASIZE that people cannot use an EMR system or the data it stores effectively—or at all—if the technological components of an EMR system are not in place and functioning properly.



A basic understanding of a computer system's hardware and software components is essential to understanding how to maintain and use any e-HIS.

REFER to **Handout 3.1.1: Basic Hardware and Software Components**.

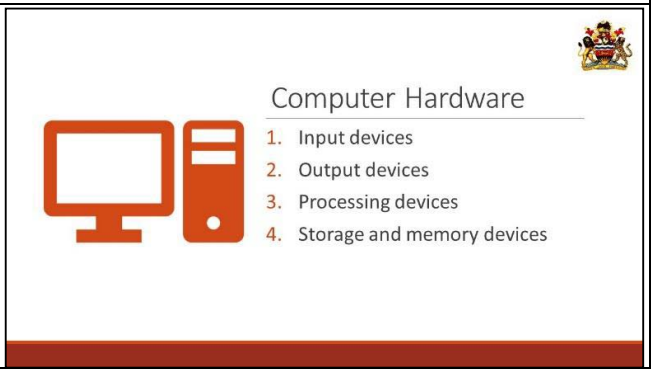
EXPLAIN that the rest of this session will focus on each of the four types of hardware components. The next session will focus on software. Hardware and software work together to help people use computers to do a variety of tasks.

EXPLAIN that none of the hardware or software will work until the computer is powered on.

Slide 9

EXPLAIN that hardware components can be split into four categories.

SAY: We will start by looking at the parts of a computer you will most often use.



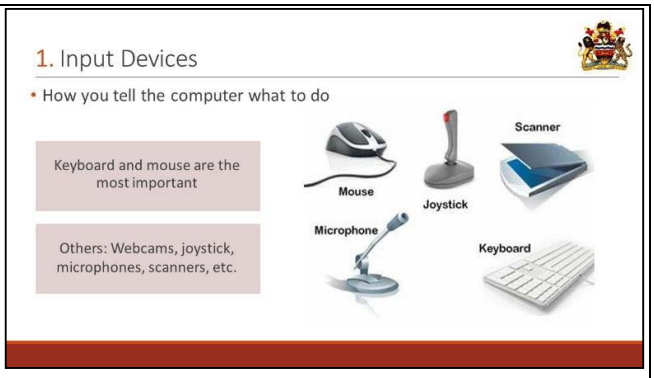
Trainer Instructions: Step 5 (20 minutes)

Use slides 10–14 and the facitilator notes to guide this step.

Slide 10

EXPLAIN to participants that a computer is of very little use to people without mechanisms to interact and communicate with its software and hardware. Without input devices, participants wouldn't be able to do anything but look at the desktop!

Everything we tell the computer is input.



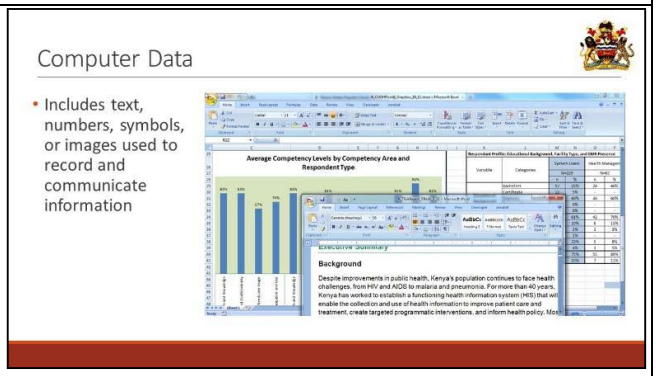
Input devices allow users to enter data and commands into the memory of a computer. Common examples include:

- **Keyboard**—contains keys that allow users to type letters of the alphabet, numbers, spaces, punctuation marks, and other symbols.
- **Mouse**—a small handheld device that contains at least one button, the mouse enables users to interact with a computer's graphical user interface in order to enter data and control the actions of the computer.
- **Touchpad**—a touch-sensitive pad that lets you control the pointer by making a drawing motion with your finger. **Also called a trackpad**. Touchpads are common on laptop computers.
- **Stylus**—a pen-like device that enables handwriting, either directly on the screen or using a tablet; it can also be used as a mouse.

- **Microphone**—allows users to speak to the computer in order to enter data, control the actions of the computer, and communicate with other users.
- **Scanner**—used to transfer images and text from printed material into a computer.
- **Joystick**—mainly used to control computer games.
- **Webcam**—a camera that captures video in a format appropriate for transfer over the Internet in real time.
- **Digital camera**—unlike analogue (film) cameras, a digital camera stores the images it captures in digital format.
- Additional examples of input devices: Barcode scanners, touch screens

Slide 11

ASK participants what type of data they use on a daily basis at work, and how that data are captured and stored.



EXPLAIN that when we talk about entering data into computers, we should keep in mind that there are different types or formats of data. People may enter text sometimes; at other times they may enter numbers or symbols. Data might also be entered as an image, such as a graph, picture, or other visual format. Data are entered into a computer using input devices, such as a keyboard to enter text and numbers, a webcam to enter pictures, or a microphone to enter sound.

Slide 12

EXPLAIN that the **keyboard** is one of the main ways to communicate with a computer. There are many different types of keyboards; although not all have the same layout style, most are very similar, and allow you to accomplish the same basic tasks.

The most common kind is referred to as a QWERTY keyboard, which is named after the keys on the top rows of letters. The keyboard can be divided into **four** groups based on function.

- **Functional pad:** This consists of the function keys, labelled F1 to F12. They are used to perform specific tasks, depending on the computer, operating system, and software used. For example, with most programs, the F1 key is commonly used to access the Help file. In some cases, the function keys are used to control monitor brightness or the sound volume.

ASK participants to press F1 key (they should see a Help window or tips appear on their screen).

- **Numeric pad:** Many keyboards have a numeric keypad located on the right side. It has a set of 17 keys with numbers from 0 to 9, the decimal point, mathematical symbols, and navigation symbols. The numeric key performs more like a calculator to enable quick and easy entry of numeric and mathematical data. The NUM LOCK key on this keypad allows you to switch between numeric input and navigation.

OPEN the **Notepad** application on participants' computers, if possible

If applicable, **ASK** participants to try typing 1234 using the numeric pad. Then, **INSTRUCT** them to press NUM LOCK and repeat typing 1234. The second time, the numbers will be displayed on the screen. The first time, before NUM LOCK has been pressed, the keys of the numeric pad will function as navigation keys.

- **Alphabetic pad:** The alphabetic pad covers most (if not all) of the typical keyboard. The alphanumeric keys include numbers, letters, and common punctuation marks, plus the **space bar** and **Shift** keys.

EXPLAIN that the **Shift** key is used for capital letters and accessing the common symbols found above the number keys. The **Caps Lock** key is used for a series of capital letters. The **Enter** key is used to begin a new paragraph in a word processing application and may also be used to choose 'OK' in a dialogue box, or 'submit' in a form.

- **Special key pad:** The special keys are used alone or in combination with other keys to perform certain actions. These include the Control (Ctrl), Alternate (Alt), Escape (Esc), Windows, and navigation keys. For example, in many programmes the keyboard shortcut 'Ctrl+S' is used to save a file.

The **navigation keys** are used for moving around in documents or webpages. Navigation keys include Delete (or Del), Insert (Ins), Home, End, Page Up, and Page Down keys. The Home key is used to move the cursor to the beginning of a line or to move to the top of a webpage.

Slide 13

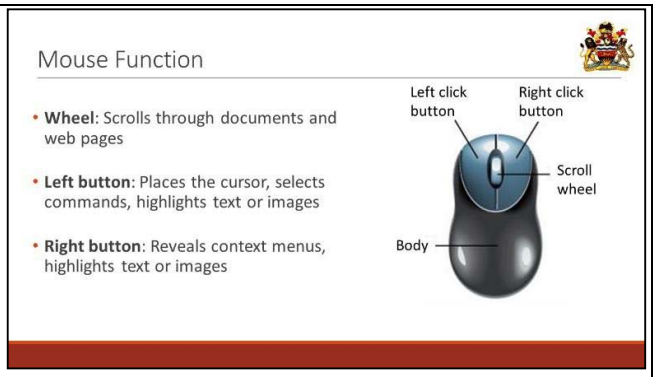
EXPLAIN that the **mouse** is another important tool for communicating with computers. A type of **pointing device**, it lets you **point** to objects on the screen, **select** them, **click** on them, and **move** them. It also reveals menus and allows you to select commands.

There are other devices that can do the same thing as a mouse. Many people find them easier to use, as they require less desk space than a traditional mouse. The most common are a trackball and touchpad.

Trackball: A trackball has a ball that can rotate freely. Instead of moving the device like a mouse, you can roll the ball with your thumb to move the pointer.

Touchpad: A touchpad—also called a **trackpad**—is a touch-sensitive pad that lets you control the pointer by making a drawing motion with your finger. Touchpads are common on laptop computers.

Slide 14



TELL participants that there are three main parts to a mouse: the **left and right buttons**, and the **scroll wheel**.

SHOW participants the scroll wheel, informing them that it helps to scroll through documents and webpages more easily. Tell them that their mouse may have a ball instead of a scroll wheel, depending on which kind of mouse they have.

EXPLAIN that the **left and right buttons** are found on either side of the scroll wheel. Each of these buttons will do different things based on whether or not you click the button once, twice, or hold it down.

FOCUS the attention of participants on the left button; **EXPLAIN** the following:

- The **left** button is the most frequently used.
- Among the things a single click of the left button can be used for:
  - placing the cursor in a document
  - opening the Start menu
  - selecting a command from a context menu or menu bar.
- Among the things double-clicking the left button will do:
  - open or start a program
  - quickly select entire words in a document or on a webpage

FOCUS the attention of participants on the right button. **NOTE** that the right button is used when you want to reveal a context menu with key commands.

Note: If participants have individual computers: ASK participants to practice moving the pointer or arrow around the screen with their mouse.

Then **GIVE** the following instructions:

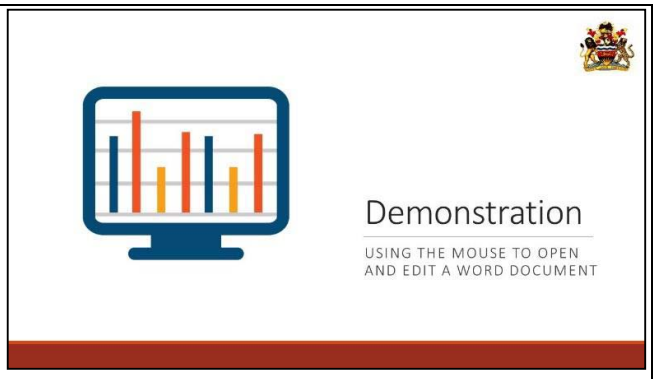
- Place your mouse beside the keyboard on the mouse pad.
- Hold the mouse with your index finger resting on the left button and your thumb resting on the side.
- To move the mouse, slide it slowly in any direction.

INSTRUCT them to notice as they move the mouse that there is a **cursor** or an **arrow/pointer** on their screen. It is usually an arrow, but the appearance will vary depending on whether the cursor is over text, blank space, an image, or a website link. When navigating webpages, when one moves the cursor over a link, it will change to a hand.

Trainer Instructions: Step 6 (15 minutes)

Use slide 15 and the facilitator notes to guide this step.

Slide 15



Note to facilitator: demonstration instructions are in italics.

DEMONSTRATE how to use these mouse functions to open and edit an MS Word document.

TELL participants that their task during the demonstration is to observe the movement of the pointer, the cursor, and what mouse functions the facilitator uses to open and edit a Word document. The facilitator should use the guidance below:

- *Move the pointer to the Windows start menu.*
- *Single-click the left button.*

ASK: What button did I use to open this menu? How many times did I click on this button?

- *Single-click on the MS Word icon.*

ASK: What button did I use to open MS Word? How many times did I click on this button?

- *Move the pointer to the MS Word icon in the top left corner.*
- *Single-click on the MS Word icon to open the MS Word menu.*

ASK: What button did I use to open the MS Word menu? How many times did I click on this button?

- *Move the pointer and single-click the left button to select the Open command.*

ASK: What button did I use to open this directory? How many times did I click on this button?

- *Move the pointer to the Desktop folder in the directory and single-click the left button to open the Desktop folder.*

ASK: What button did I use to open the Desktop folder? How many times did I click on this button?

NOTE that this directory shows the different drives and folders where different files are stored.

EXPLAIN that these will be covered during the storage discussion later in this session.

- *Move the pointer to Recycle Bin icon and double-click the left button.*

ASK: What button did I use to open this Word document? How many times did I click on this button?

- *Move the cursor to the beginning of the second paragraph. Click once on the left or right button to place the cursor at the beginning of this paragraph.*

ASK: What button did I use to move the cursor? How many times did I click on this button?

For this example, be sure to note that either button can be used to place the cursor.

- *Hold the left button down and move the mouse over the text to select the first sentence of this paragraph.*

ASK: What button did I use to highlight or select this sentence? How many times did I click on this button?

Participants should note that the facilitator did not click on the button but pressed the button down while moving the mouse over the text to select.

- *Move the pointer to the 'Cut' command on the menu bar and click the left button once.*

ASK: What button did I use to select the 'Cut' command? How many times did I click on this button?

- *Scroll down the page using the wheel.*

ASK: What button did I use to move down the page? How many times did I click on this button?"

Participants should note that the wheel was used and that the facilitator did not click on the wheel.

- *Move the pointer to the end of the fourth paragraph and click on the right or left button once to place the cursor.*

ASK: What button did I use to move the cursor? How many times did I click on this button?

- *Click on the right button to reveal a context menu.*

ASK: What button did I use to open this context menu? How many times did I click on this button?

Note that the context menu allows one to perform common operations that are also available from the menu bar at the top of the screen.

- *Move the pointer to the 'Paste' command on the context menu and click the left button once.*

ASK: What button did I use to select the 'Paste' command? How many times did I click on this button?

- *Move the pointer to the 'Save' icon on the menu bar. Click on the left button to save the document.*

ASK: What button did I use to select the 'Save' command? How many times did I click on this button?

TELL participants that they will have an opportunity to practice using both the keyboard and the mouse. They will first need to boot up their computers.

Trainer Instructions: Step 7 (5 minutes)

Use slide 16 and the facilitator notes to guide this step.

Slide 16

EXPLAIN that output devices are used to convey information generated by a computer to the user. Three commonly used output devices are the printer, monitor, and speaker.

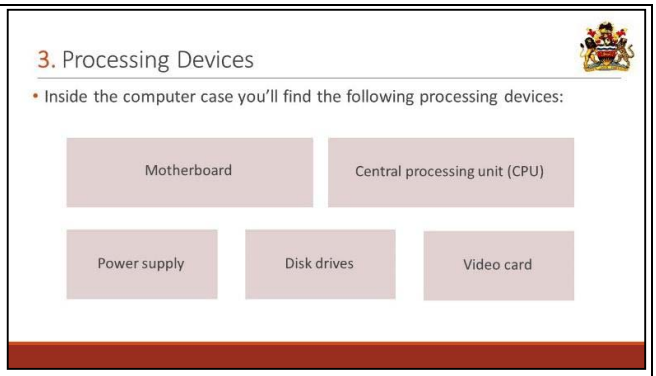
- **Monitor**—used to display text and graphics.
- **Speaker**—used to reproduce music, voice, and other sound generated by the computer.
- **Printer**—produces text and graphics, such as photographs, on paper or other hardcopy media.

Trainer Instructions: Step 8 (10 minutes)

Use slides 17–19 and the facilitator notes to guide this step.

Slide 17

EXPLAIN that computer cases or system units come in different shapes and sizes. The processing unit is like a house that protects and organizes a family and its belongings.

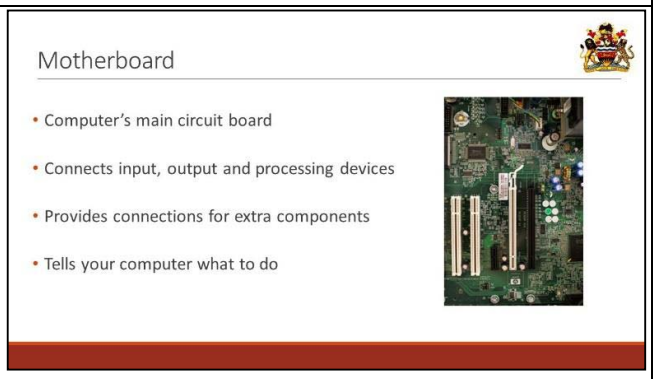


A desktop case lies flat on a desk; the monitor usually sits on top of it. A tower case is tall and sits either next to the monitor or on the floor. All-in-ones and laptops combine all the internal components and the monitor in one piece of equipment, so there is no need for a separate case or unit.

Inside the computer case you'll find the motherboard, CPU, power supply, disk drives and video card.

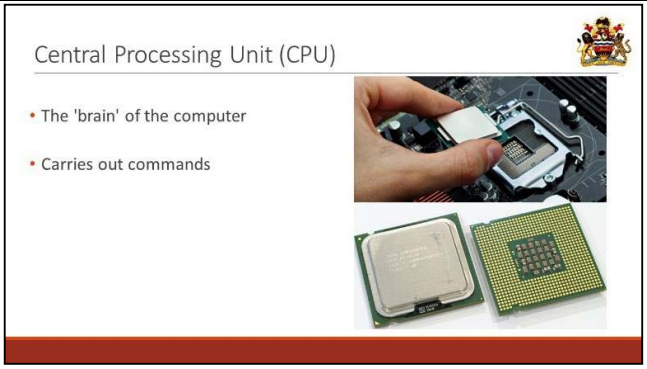
- The power supply for all components is located on the processing unit, which is where you will find the switch to turn it on or off.
- A disk drive allows you to insert a CD, DVD, or other storage device. (Note that many newer computers no longer come with disk drives.)
- A video card converts data so that it can be viewed on a monitor.

Slide 18



The **motherboard** is the most important component—the computer's main circuit board. It is a thin plate that holds the CPU, memory, and connections to the disk drives (hard drive and optical drive). Because it connects all the different hardware devices in one place, it allows them to communicate and tell your computer what to do. The motherboard also provides connections for extra components that are connected via your computer's ports (such as USB ports). The motherboard connects directly or indirectly to every part of the computer.

Slide 19



EXPLAIN that the **central processing unit (CPU)**, also called a **processor**, is located inside the computer case, on the motherboard. It is often called the brain of the computer; its job is to carry out commands. Whenever you press a key, click the mouse, or start an application, you're sending instructions to the CPU.

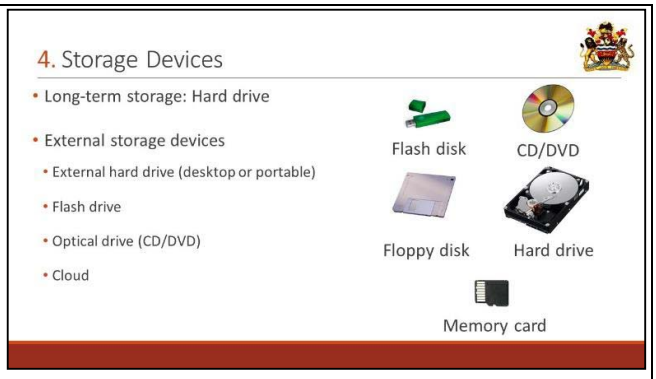
The CPU is usually a **two-inch ceramic square** with a **silicon chip** located inside. The chip is usually about the size of a thumbnail. The CPU fits into the motherboard.

CPUs are typically made to be installed in a specific device (e.g., server, laptop, desktop, mobile). The number of cores refers to how many processors are contained within one CPU. Clock speed refers to how fast the CPU processes program instructions. Processing speeds are expressed in **megahertz (MHz)**, or millions of instructions per second; and **gigahertz (GHz)**, or billions of instructions per second. A faster processor can execute instructions more quickly. However, the actual speed of the computer depends on the speed of many different components—not just the processor.

Trainer Instructions: Step 9 (5 minutes)

Use slides 20–21 and the facilitator notes to guide this step.

Slide 20

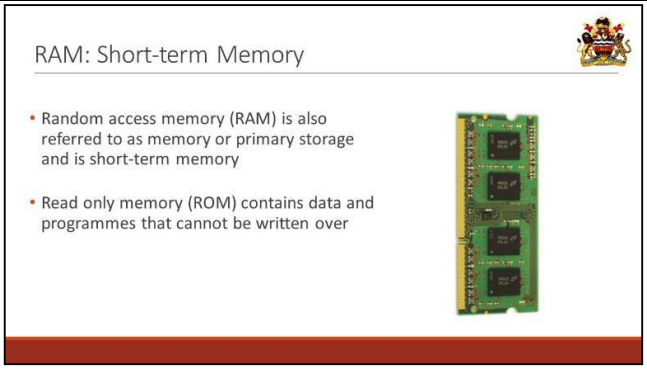


EXPLAIN that when you want to store data and information permanently on a computer, it is stored in a hard drive that may be located inside or outside your computer. Hard drives are a type of long-term storage where you save software, documents and other files—which means the data is still saved even if you turn the computer off or unplug it.

When you run a program or open a file, the computer copies some of the data from the **hard drive** into **random-access memory (RAM)**. When you **save** a file, the data is copied back to the **hard drive**. The faster the hard drive, the faster your computer can **start up** and **load** programs.

Flash disks, floppy disks, memory cards, CD/DVDs are external storage devices, because they are not part of the computer itself.

Slide 21



EXPLAIN that:
RAM is your system's **short-term memory**, which also attaches to the motherboard. Whenever your computer performs calculations, it temporarily stores the data in RAM until it is needed. This **short-term memory disappears** when the computer is turned off. If you're working on a document, spreadsheet, or other type of file, you'll need to **save** it to avoid losing it. When you save a file, the data is written to the **hard drive**, which acts as **long-term storage**.

- RAM is measured in **megabytes (MB)** or **gigabytes (GB)**. The more RAM you have, the more things your computer can do at the same time. If you don't have enough RAM, you may notice that your computer is sluggish when you have several programs open. Because of this, many people add **extra RAM** to their computers to improve performance. RAM is the location where data and portions of programs are temporarily stored until the program manipulating the data is closed or the computer is shut off.
- Read-only memory (ROM) is stored on chips on the motherboard. ROM contains operating system programmes. Unlike RAM, data is neither written to nor erased from ROM; rather, it contains data that can only be read.

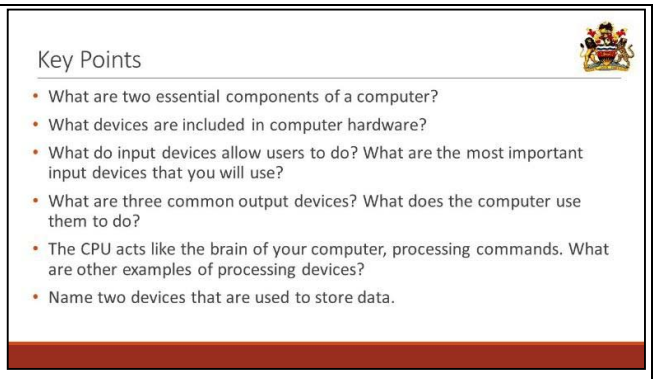
- When a computer performs a task, it stores data in its memory. Computer data is represented by 0's and 1's. Each 0 or 1 is a bit.
- Byte is the basic unit used to refer to computer memory:
  - 8 bits = 1 byte
  - 1024 bytes = 1 kilobyte (KB)
  - 1024 kilobytes = 1 megabyte (MB)
  - 1024 megabytes = 1 gigabyte (GB)
  - 1024 gigabytes = 1 terabyte (TB)

Trainer Instructions: Step 10 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22

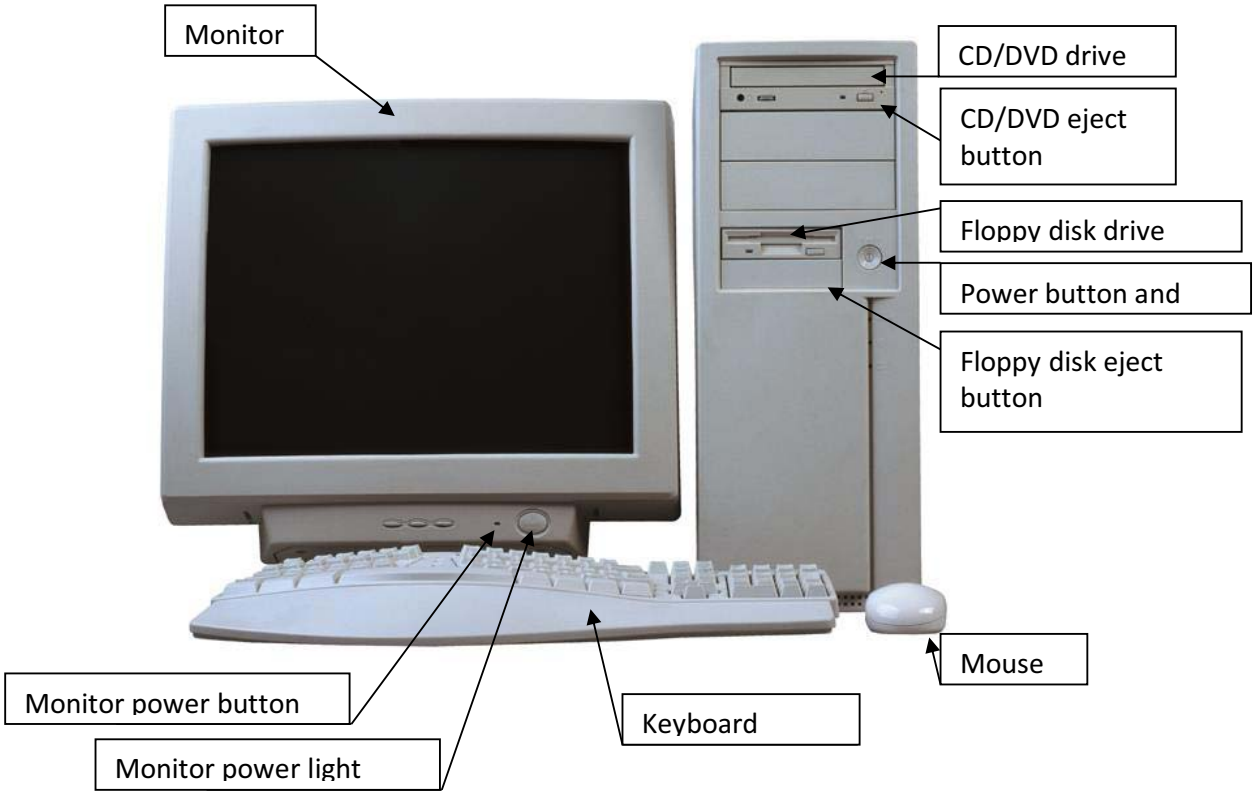
ASK participants to recall information for each key point.



SUMMARIZE the key points on the slides with the following information:

- The essential components of a computer are hardware and software. A basic understanding of an EMR system's hardware and software components is essential to understanding how to maintain and improve an EMR system.
- Computer hardware includes input and output devices, processing devices, and storage and memory devices.
- Input devices allow users to enter data and commands into the memory of a computer. The keyboard and mouse are the most important input devices that communicate with the computer's software and hardware.
- Three common output devices are the printer, monitor, and speaker, which are used to convey information generated by a computer to the user.
- Processing devices include the motherboard, CPU, power supply, disk drives, and video card. The CPU acts like the brain of your computer, processing commands.
- External storage devices include flash drives, floppy disks, memory cards, and CD/DVDs.

Handout 3.1.1: Basic Hardware and Software Components



Session 3.2

Session 3.2: Computer Software

Time: 90 minutes

Learning Objectives

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

1. Explain the functions of each type of software
2. Distinguish between a file and a program
3. Demonstrate how to use basic software features and functions
4. Create a new folder and document

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	5 minutes	Facilitator presentation	Overview of software (slides 4–5)	Flip chart, markers, tape, LCD
3	5 minutes	Facilitator presentation	Operating system (slides 6–8)	Flip chart, markers, tape, LCD
4	5 minutes	Facilitator presentation	User interface (slide 9)	Flip chart, markers, tape, LCD
5	20 minutes	Individual activity or demonstration	Powering on and signing into a computer, desktop navigation (slides 10–12)	Flip chart, markers, tape, LCD, individual computers
6	15 minutes	Interactive lecture	Application software (slides 13–18)	Flip chart, markers, tape, LCD, individual computers
7	10 minutes	Interactive lecture	Filing Systems (slides 19–20)	Flip chart, markers, tape, LCD
8	20 minutes	Individual activity or demonstration	Create a new folder and document (slide 21)	Flip chart, markers, tape, LCD, individual computers, Handout 3.2.1
9	5 minutes	Interactive lecture	Key points (slide 22)	Flip chart, markers, tape, LCD

Resources Needed

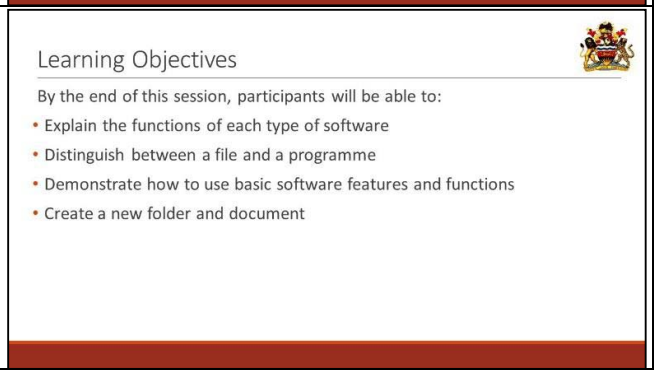
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- Individual computers, if possible

Handouts

Handout 3.2.1: Creating a Document about Software

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**INTRODUCE** the session as an orientation to different types of computer software.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (5 minutes)

Use slides 4–5 and the facilitator notes to guide this step.

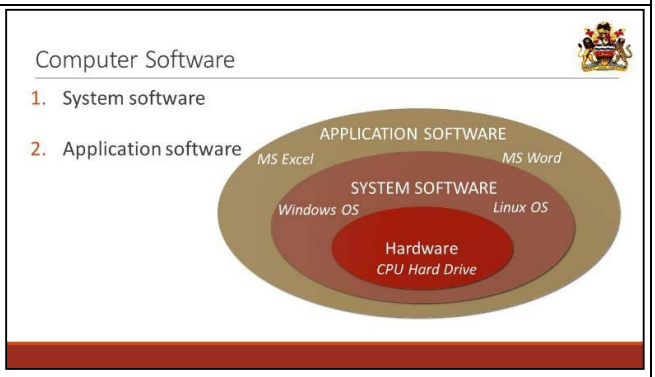
Slide 4

NOTE: This slide is animated. First ask the question below and allow a few responses before clicking to reveal the definition.

A computer is much like a human being. What you see is the hardware, and what operates inside would be the software (the thinking, decision making, control). Unlike hardware, which is tangible, software is abstract.

EXPLAIN to that a computer is much like a human being. What you see is the hardware, and what operates inside (the thinking, decision making, control) would be the software. Unlike hardware which is tangible, software is abstract.

Slide 5



TELL participants that there are two types of software.

ASK: Does anyone know the difference between the two?

ALLOW and **ACKNOWLEDGE** a few responses.

EXPLAIN that system software includes all programs that are dedicated to managing the computer hardware and resources, such as an operating system.

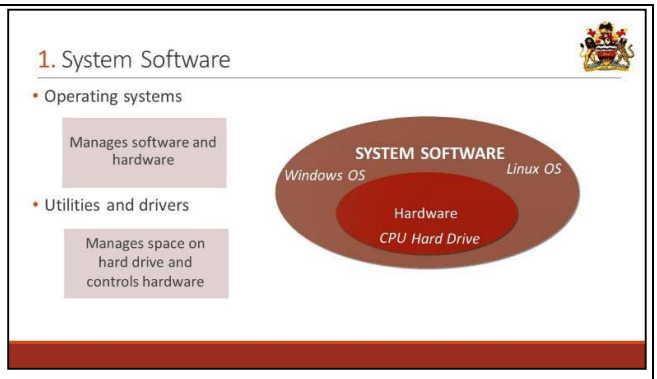
Application software is often referred to productivity or end-user programs because such programs enable the user to complete tasks, such as creating documents, spreadsheets, and databases.

Trainer Instructions: Step 3 (5 minutes)

Use slides 6–8 and the facilitator notes to guide this step.

Slide 6

EXPLAIN that your computer's operating system (OS) manages all of the software and hardware on the computer. Most of the time, there are several different programs running at the same time; they all need to access the computer's CPU, memory, and storage. The OS coordinates all this activity to make sure each program has the resources it needs.



Utilities are programs used for the limited purpose of maintaining or changing the overall condition of the system (mostly its hardware, but sometimes other software). Typical functions of utilities include:

- Managing space on a hard drive
- Backing up files (including music and photos)

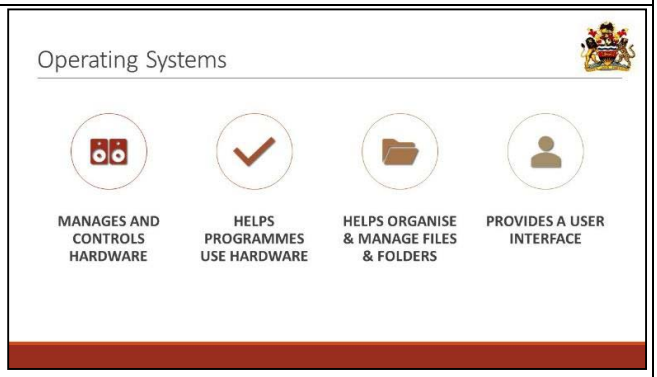
Drivers are a type of software that is used to control hardware. Typically, drivers connect specific hardware devices—for example, scanners and printers—with the OS. There are drivers for every card and disk in your computer. Each driver is written for a specific OS, such as Windows 10 or Macintosh OS X. Therefore, to use a card in your computer, you must use a driver that is designed to work with both the device and your OS. Drivers are often updated—for example, when new versions of an OS are released. However, hardware and operating systems eventually become so old that it is no longer economical or practical to for the manufacturer to produce new drivers for them.

Slide 7

EXPLAIN that the OS is the most important software that runs on a computer. It performs four primary functions:

First, It manages the computer's memory and processes, as well as all of its software and hardware.

Second, it enables the programs running on the computer to access and use the hardware.

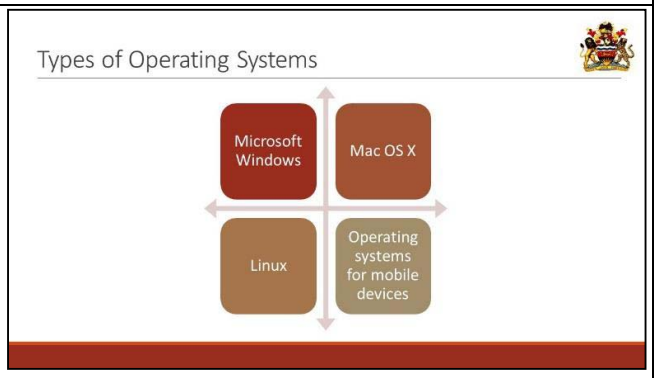


Third, it enables you to organize and manage the files and folders on the computer.

Fourth, it provides the user interface (UI) that enables you to interact with the computer, so that you can run programs and perform tasks without having to know how to speak the computer's language.

Without an OS, your computer is useless.

Slide 8



EXPLAIN that Microsoft created the **Windows** OS in the mid-1980s. Over the years, there have been many different versions of Windows, but the most recent are Windows 10 (released in 2015), Windows 8 (2012), Windows 7 (2009), and Windows Vista (2007). Windows comes pre-loaded on most new PCs, which helps to make it the most popular OS in the world.

However, Windows is not the only OS available. Others include:

- **Mac OS:** A Unix-based OS created by Apple, it comes pre-loaded on all new Macintosh computers, which are often referred to as Macs. Many people prefer the look and feel of Mac OS X over Windows.
- **Linux** (pronounced LINN-ux) is a family of open-source operating systems, which means they can be modified and distributed by anyone around the world. This is different from proprietary software like Windows, which can only be modified by the company that owns it. The advantages of Linux are that it is free, and there are many different distributions—or versions—you can choose from.

The operating systems we've been talking about so far were designed to run on desktop and laptop computers. Mobile devices—such as phones, tablet computers, and MP3 players—are different from desktop and laptop computers, so they run operating systems designed specifically for mobile devices. Examples include **Apple iOS** and **Google Android**.

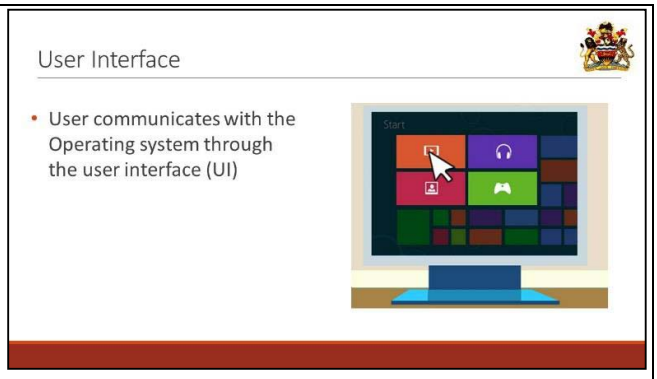
Operating systems for mobile devices generally aren't as fully featured as those made for desktop and laptop computers, so they aren't able to run all of the same software. However, you can still do a lot of things with them—for example, watch movies, browse the web, manage your calendar, and play games.

Trainer Instructions: Step 4 (5 minutes)

Use slide 9 and the facilitator notes to guide this step.

Slide 9

EXPLAIN that a computer's UI is similar to when two people interact through a handshake—they interface with each other. Everything an OS does is done through the UI. Today, the typical OS easier than ever to navigate, thanks to simplified tiles, icons, and graphics that enable users to access programs and tasks with the click of a mouse or the tap of a finger.



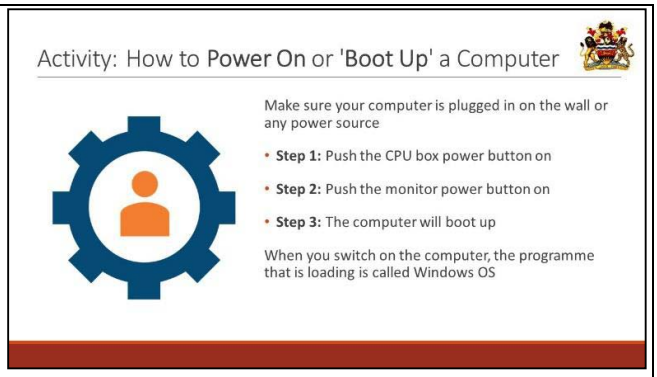
Trainer Instructions: Step 5 (20 minutes)

Use slides 10–12 and the facilitator notes to guide this step.

Slide 10

NOTE: This activity can be done individually if participants have access to individual computers, or demonstrated to the group if they do not.

NOTE: This slide is animated. Only the slide title appears when the slide is first loaded.



Step 1: CLICK on the slide and **TELL** participants that the first thing to do is to press the power button on the computer's case or system unit. **ASK** them to locate the power button, and then to press down the power button to boot up the computer.

Step 2: CLICK on the slide again; **EXPLAIN** that if the monitor is separate from the system unit, they should check to make sure the monitor's power button is also on.

Step 3: CLICK on the slide again; **EXPLAIN** that after the power button is pressed on, the computer will boot up. Use the following to briefly **EXPLAIN** to participants what happens during the boot up process.

EXPLAIN that during the boot up process, the OS does a lot of work—performing background checks, ensuring all the components of a computer, both internal and external, are functioning well, and allocating required memory space so that when you start working on the computer, you are able to do so well.

You may see different kinds of messages on the computer screen after switching on:

- MS WINDOWS starting up
- Hit CTRL ALT DEL if you want to run setup
- Keyboard not attached properly
- Mouse not attached properly
- Printer drivers not available

Unless you know what you are doing, you should never respond to requests to hit buttons, as with the second message above, as they may end up changing the settings of the computer, adversely affecting how the PC functions. You should refer any such messages to the IT/system administrator.

Slide 11

EXPLAIN that Windows 10 is the latest version of the widely used computer OS developed by Microsoft.

When you first switch on the computer you will be presented with what is known as the sign-in screen (shown on the slide). You will notice that somewhere in the middle of the screen you should see a white arrow-like symbol. This is the **cursor** (sometimes called the mouse pointer). This pointer is controlled by moving the mouse; therefore the direction in which you move the mouse is the direction in which the pointer on the screen will move.

INSTRUCT participants to try signing in.

EXPLAIN that in a health facility setup, one computer may be used by different personnel, depending on who is on duty. Windows 10 allows for multiple accounts; if you are already added as a user, the user names will be listed in the bottom left corner of the screen. Simply move the mouse pointer over to the account that corresponds to your account name and click on the left mouse button to bring up the sign-in screen for your account.

For this exercise, **INFORM/DEMONSTRATE** that after completing a successful boot up process, they will be taken to the log in screen, where they will need to input the user name assigned to them and their password.

NOTE: If participants have access to individual computers, DO the following activity. (If they do not have access to individual computers, demonstrate instead.)

DISTRIBUTE usernames and passwords to participants, or provide them with the guest username and password. **INSTRUCT** participants to enter the log in information and click the log in button.

TELL them that use of user names and passwords will be revisited and here they will need to just type the passwords exactly as they read, as passwords are case sensitive, and click the log in button.

TYPE the username and password using the keyboard.

NOTE that as you type in your password, black dots will appear in the rectangular white box for the password, instead of the actual characters you are typing. This is for security purposes, because you do not want others to view your password. This part of the screen is known as a text box. The number of dots within the box will correspond to the number of characters that you have typed. Once you have completed typing your password, you should then press the **Enter key** on the keyboard.

After booting up:
ASK participants what they see once they have logged in. **EXPLAIN** that the area that they see on the screen when the computer is on is called the desktop.

Slide 12

EXPLAIN that once you have successfully signed in into your account, you will be presented with the screen similar to the one shown in the slide. This is known as the **desktop.** The desktop can be thought of as the main workspace for the computer. It is the UI, or point of user interaction with the computer.

From the desktop, you can manage and view files, open applications, access the Internet, and more.

ASK participants what their desks usually have on or around them. They should say that they have drawers for files and papers, writing tools, a trash can, etc.

ASK if any participants are familiar with what is found on a computer's virtual desktop. If needed, encourage them to identify those that have a real desk equivalent and describe what each icon does. Choose a participant to write the suggestions on the flip chart.

LISTEN for:

- **My computer**: This is like the drawers of your desk where you store files. This shows the different areas of the computer, including the drives and desktop, where files can be found.
- **Recycle bin**: The recycle bin is like the trash can you have next to your desk. Note that when you delete an electronic file or folder, it doesn't actually get deleted right away—it goes to the recycle bin. If you ever change your mind and decide you need a deleted file, you can get it back—provided you have not already emptied it.
- **Commonly used applications** (Internet Explorer, Firefox, MS Outlook, Adobe Acrobat, Skype, etc.)—these are the blank paper, pens, calculators, rulers, etc., that you may have on your desktop to help you complete your work.

EXPLAIN that the primary function of desktop **icons** is to help in easily accessing the most frequently used applications and files on the computer. Shortcuts to these files and applications are often placed on the desktop so that the user does not need to open the Start menu and locate a program every time they want to use it.

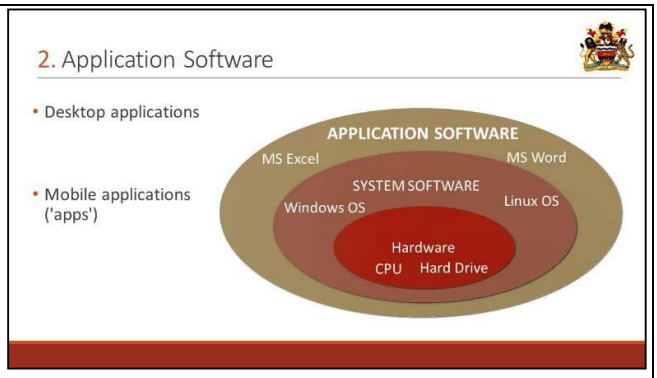
EXPLAIN that the desktop is made up of several components:

- **Background:** Sometimes referred to as **wallpaper**, your desktop can be personalized by changing the background. You can choose from several built-in backgrounds, or use one of your own images.
- **Start button:** This opens the **Start menu**, which is used to open programs on the computer.
- **Taskbar:** The taskbar contains shortcuts to applications, date and time, and more. Open programs also appear on the taskbar; this enables the user to easily switch between different programs by selecting the corresponding icons on the taskbar.

Trainer Instructions: Step 6 (15 minutes)

Use slides 13–18 and the facilitator notes to guide this step.

Slide 13

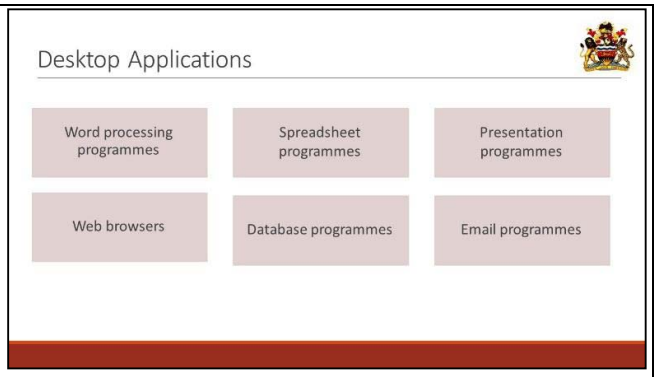


EXPLAIN that you may have heard people talking about using a program, application, or app. But what exactly does that mean? Simply put, a program, application, or app is a type of software that allows you to perform specific tasks. Applications for desktop or laptop computers are sometimes called desktop applications, while those for mobile devices are referred to as apps or mobile apps.

When you open an application, it runs inside the OS until you close it. Most of the time, you will have more than one application open at the same time; this is known as multitasking.

ASK: What are some examples of desktop applications? What are some examples of mobile apps?

Slide 14



EXPLAIN that applications exist for just about every task or project you do that requires the creation, organization, or storage of information in the form of text and images.

The most frequently encountered types of applications are:

Word processor: An application used to manipulate words and produce documents of your choosing—e.g., letters, flyers, reports, proposals, or newsletters. The best-known word processor is Microsoft Word.

Spreadsheet: An application that simulates a paper ledger or worksheet. Spreadsheets are mostly used to perform mathematical calculations—for example, you can use a spreadsheet to create a budget—but they are also frequently used to organize information. The best-known spreadsheet program is Microsoft Excel.

Presentation: An application used to create visual presentations (slideshows) to give to an audience. The best-known presentation software is Microsoft PowerPoint.

Web browsers: An application used to access websites on the Internet. Most computers come with a web browser already installed, but you can also download a different one if you prefer. Examples of browsers include Internet Explorer, Mozilla Firefox, Google Chrome, and Safari.

Database: An application used to centrally organize, manipulate, and store data in a searchable and manageable format. You can store inventory, patient details, and other data in a database.

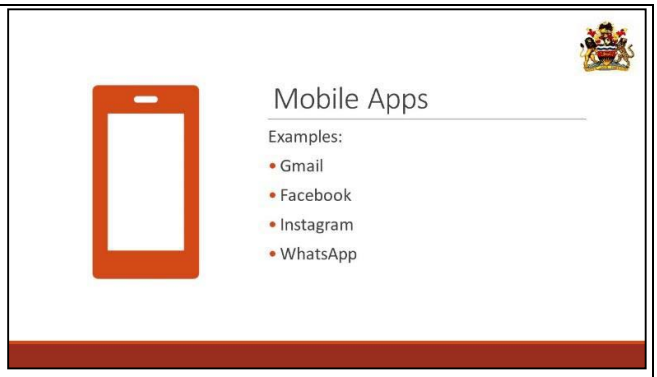
ASK: Are there any types of programs that are missing from this list?

LISTEN for:

- *Graphic design/editing programs*
- *Media players*
- *Games*
- *Instant messaging programs, such as WhatsApp*
- *Social media, such as Facebook and Instagram*
- *Project management software*

Slide 15

EXPLAIN that desktop and laptop computers aren't the only devices that can run applications. You can also download apps for mobile devices, such as smartphones and tablets.



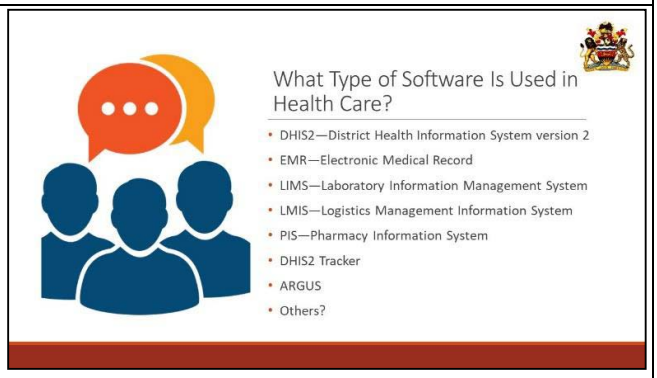
Every computer and mobile device will come with some applications already built in, such as a web browser and media player. Most of them also have these capabilities:

- **Sending email:** Sending email is the exchange of messages from one computer user to another. Outlook and Gmail are two well-known email applications.
- **Instant messaging:** Instant messaging applications allow you to send and receive messages immediately. WhatsApp is a widely used messaging application.
- **Social media:** Social media allows you to share messages, ideas, pictures and news with your friends, co-workers, classmates, and family. You can also purchase and install new apps to add more functionality. Examples of social media include Facebook, Instagram, and Twitter.

ASK participants if they use any of these mobile apps in their day-to-day activities. Which ones? What are they used for (work or leisure)?

Slide 16

NOTE: This slide is animated. After participants answer the first question below, click to reveal possible responses.



ASK: What types of software are used in our health system?

ALLOW and **ACKNOWLEDGE** a few responses, then **CLICK** to reveal the answers on the slide.

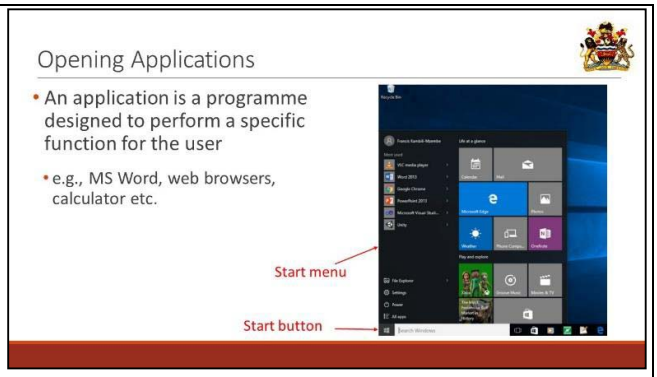
ASK:

- How many of you use any of the software listed?
- Which ones specifically?

TELL participants we will discuss how to use a few primary types of HIS software in module 4.

Slide 17

EXPLAIN that to open programs on your computer, use the **Start menu**. The Start menu can be brought up by clicking the **Start button** in the bottom left corner of the desktop. From the Start menu you have access to all the applications installed on your computer. In the top right of the Start menu, you will find a list of the most used applications.

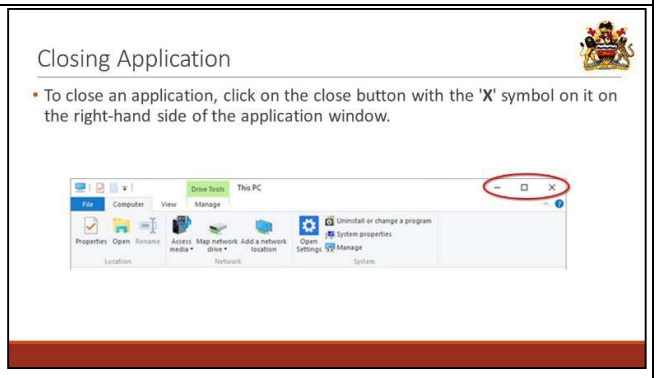


EXPLAIN that to open an application that does not already appear on the list, click on All Apps to bring up the full list of applications, which is organized in both numerical and alphabetical order.

EXPLAIN that there alternative ways of accessing applications and files using shortcut keys.

Slide 18

EXPLAIN that to close an application, first locate the symbols in the upper right hand corner of the window – here they are circled in red. The dash (-) will 'minimize' the window, which does not close it but temporarily sets it aside so that you may view other windows. The square will 'maximize' the window so that it takes up the entire screen. The X will close the window. If there are no other windows open in that application, the application will close when you click on the X.



EXPLAIN that shortcut keys are keys on the keyboard that can be used as an alternative to using the mouse when working in Windows. These can be used for a variety of functions, such as closing Windows, navigating the Start menu, dialog boxes, manipulating files and folders etc.

The **Windows key** is a standard key on most keyboards on computers built to use a Windows operating system. It is labelled with a Windows logo, pressing the Windows key on the keyboard in Windows 10 also bring up the Start menu.

NOTE: If applicable, have participants practice with their own computers. Otherwise **DEMONSTRATE** closing an application using the X, right clicking on the application icon for a menu option to close, and using a shortcut described below.

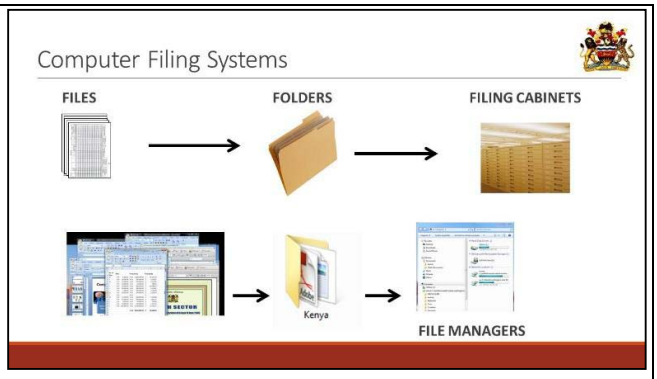
ALLOW participants to press the Windows key to bring up the Start menu, and then press it again to disable the Start menu. The Windows key in itself is a shortcut key for enabling and disabling the Start menu.

EXPLAIN that there is also a shortcut for closing an application or programme, which applies to all programmes in Windows 10. You can close any programme in Windows 10 by pressing the ALT and F4 keys together (ALT + F4).

Trainer Instructions: Step 7 (10 minutes)

Use slides 19–20 and the facilitator notes to guide the activity.

Slide 19



NOTE: This slide is animated. Only the images on the top half of the slide will load when the slide first appears.

ASK participants to describe the filing system they use to manage paper records in their facility. They should describe some variation of a system where documents or files are placed in folders, and where folders are stored in a filing cabinet or similar storage area. Note how this is reflected on the slide.

CLICK on the slide and **EXPLAIN** that computers have a similar filing system, which is electronic instead of paper. Participants should already be familiar with files since they worked with a file document during the Keyboard and Mouse activity.

EXPLAIN that electronic files can also be grouped and saved in folders, such as the Kenya folder shown in the slide.

ASK participants to describe why file cabinets are used.

EXPLAIN that filing cabinets are a means of organizing and storing file folders. Computers have file managers, where users can see the different filing systems and storage devices available to them on a particular computer.

ASK participants what they understand when they hear the term **computer storage device**.

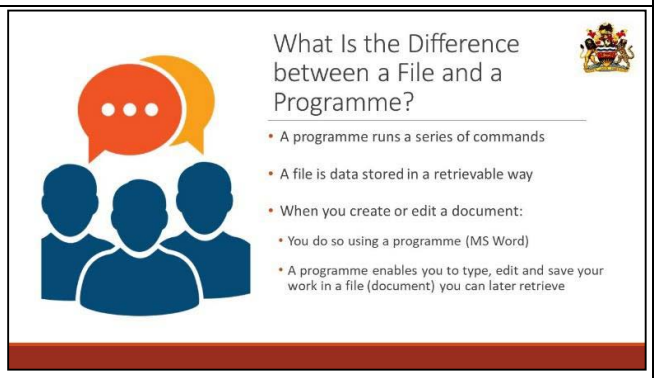
EXPLAIN that a file is an item that contains information—this information could be text, images, sound, or music. Depending on the type of information it contains, when you open a file on your computer, it can look like a text document or a picture that you might find on someone's desk or filing cabinet. The computer files are represented by what are known as icons.

EXPLAIN that a folder is a container which can be used to store files. In a computer, folders function in a similar manner to physical file folders. Therefore you can store multiple files within the same folder. Folders can even contain other folders within them. Folders that are contained within another folder are known as subfolders. Thus folders help you organize files and other folders.

EXPLAIN that files are stored within folders. When you create a new file for use, you do so within a folder. In Windows 10, files and folders can be viewed and organized using a built-in file management application called File Explorer.

EXPLAIN that a storage device is a mechanism used to record and retrieve data, information, and instructions.

Slide 20



NOTE: This slide is animated.

ASK: What is the difference between a file and a program?

CLICK to reveal points on the slide.

EXPLAIN how a file and a program are different. **REFER** participants to the exercise they just completed, noting that:

- Participants used the Microsoft Word program to edit an existing document, which is a unique file of data saved in the computer's storage or memory.
- When they go to retrieve the document, they will retrieve a file using the Word program.

EXPLAIN that although programs are useful in helping them carry out tasks where they must record and handle text or numerical data, the program helps them only after they have all of the data and information they need to carry out their tasks.

USE the following example to make this clear:

- Microsoft Excel is a program that enables numerical data to be entered into an electronic spreadsheet.
- Excel can perform a number of different calculations very quickly and produce a number of different charts and graphs.
- On a paper register, you may need to manually tally the total number of patients you have seen in a certain facility or clinic during a particular month.
- The total number of patients seen can be entered into Excel.
- To keep this data separate from other numerical data (such as billing data), you would create a new Excel file where only the data you want to store and use later on is saved. You could then use the data in that file to create graphs that you would then present to facility management or the district health management team (DHMT).

ASK participants if the Excel program will collect the patient data to enter into the programme. **ASK** participants if the Excel will know what calculations to do on its own. Make sure participants understand that individuals need to give the computer and the program the data to work with.

EXPLAIN that the computer also needs a person to tell it which calculations to make for which data, and what types of charts or graphs to create for that data.

Trainer Instructions: Step 8 (20 minutes)

Use slide 21 and the facilitator notes to guide the interactive lecture.

Slide 21

NOTE: This slide is animated. Only the title loads when the slide first appears.

NOTE: If applicable, have participants practice with their own computers. Otherwise **DEMONSTRATE** the following.

ASK participants to turn on their monitors. **CLICK** on the slide once to reveal the first part of the instructions for this activity.

TELL participants to create their own personal folders in the Libraries/Documents folder. **CIRCULATE** to monitor their progress, and give assistance as needed.

Once all participants have created their own folders, **DIRECT** their attention back to the front of the room. **REMIND** them that after completing the mouse and keyboard exercises, they should be familiar with typing and editing an existing document.

ASK participants to describe situations where they may need to create a brand-new document.

ALLOW a few responses, then **EXPLAIN** that the following demonstration and activity will prepare them for the situations that they just identified.

REFER to **Handout 3.2.1: Creating a Document about Software.**

NAVIGATE away from the presentation and **DEMONSTRATE** to participants how to create a new MS Word document:

1. Use the mouse to find the MS Word Icon on either the Start menu or the desktop.
2. **CLICK** on the MS Word icon (once if using the Start menu, twice if using the desktop icon).
3. **SELECT** the 'Blank Document' option from the window menu presented.
4. **CLICK** OK.

ASK participants if they have any questions, then **CLICK** to reveal the remaining instructions for the individual activity.

NOTE: Make sure participants fully understand the activity, from creating a new document to creating their own folder. Reassure participants that they may not be able to copy all of the text; they should just try to copy as much as they can.

ASK if participants have any questions, then **ALLOW** them 20 minutes to complete the activity.

MONITOR participant progress. After 20 minutes, **INSTRUCT** all participants to stop where they are and save the document in the folder they created earlier.
Once all participants have created their folders and saved their work, **EXPLAIN** to them that they can finish creating their document during the open lab time if they have not already completed their work.

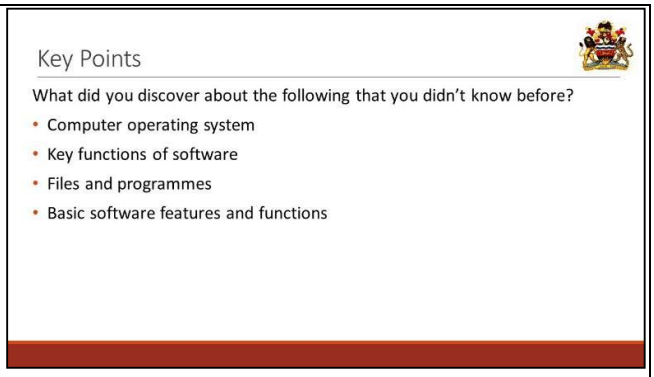
ASK participants if they had any challenges or questions related to opening a blank document, creating a new document, and creating and/or renaming a new folder.

Trainer Instructions: Step 9 (5 minutes)

Use slide 22 and the facilitator notes to guide the interactive lecture.

Slide 22

ASK participants to share any new information that they did not know before about each key point listed on the slide.



LISTEN for:

- An OS is the most important software that runs on a computer. It manages the computer's memory and processes, as well as all of its software and hardware. Computers come with an OS that allows users to interact with their programs and files by giving commands to complete tasks.
- Software is a set of instructions that tells the hardware what to do. Computer software includes system and application software.
- System software includes all programs that are dedicated to managing computer hardware and resources, such as the OS. Application software enables users to complete tasks such as creating documents, spreadsheets, and databases.
- Files are stored within folders. In Windows 10, files and folders can be viewed and organized using a built-in application called File Explorer.
- Desktop applications or software programs exist for just about every task or project you do that requires the creation, organization, or storage of information in the form of text and images.

Handout 3.2.1: Creating a Document About Software

Directions:
Open the Word application, by either selecting Microsoft Word from the Start menu or clicking twice on the Word desktop icon. Open a blank document and create a document by typing the text provided below.

What is software?

The software that regular computer users most often use is called application software. Application software assists users with specific tasks, such as creating, designing, and modifying documents and presentations (MS Word, MS PowerPoint, MS Publisher, etc.) or organizing, storing, and manipulating data (MS Excel, Lotus 1-2-3, MS Access, EMR, SQL Server, etc.).

Software applications are made available to users in several different forms.

1. Packaged software (such as Microsoft software) is designed to meet the needs of a wide variety of users.
2. Custom software (such as EMR software) refers to applications developed to perform specific functions based on defined user needs.
3. Shareware refers to software that is distributed free of charge for a trial period. The user then pays if they elect to use the software after the trial period ends.

Session 3.3: Networks

Time: 60 minutes

Learning Objectives

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

1. Explain the purpose of networks
2. Describe the two main types of networks
3. Discuss how the Internet can be used in health care
4. Demonstrate how to connect to and navigate the Internet

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape,, LCD
2	15 minutes	Facilitator presentation	Networks, networks in health care, types of networks, characteristics, Internet (slides 4–8)	Flip chart, markers, tape LCD
3	10 minutes	Brainstorm	The Internet in health care (slide 9)	Flip chart, markers, tape, LCD
4	25 minutes	Interactive lecture/ individual activity or demonstration	Using web browsers (slides 10–12)	Flip chart, markers, tape, LCD, individual computers, Handout 3.3.1
5	5 minutes	Interactive lecture	Key points (slide 13)	Flip chart, markers, tape, LCD

Resources Needed

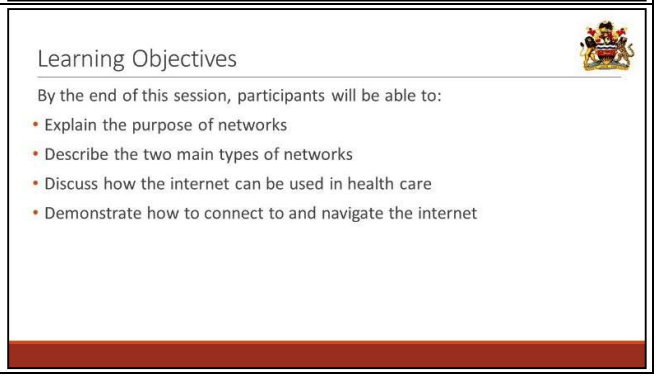
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- Individual computers, if possible

Handouts

Handout 3.3.1: Internet Seek and Search

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**INTRODUCE** this session as an orientation to different types of networks.	
Slide 3	**REVIEW** the learning objectives for this session..	

Trainer Instructions: Step 2 (15 minutes)

Use slide 4–8 and the facilitator notes to guide this step.

Slide 4

NOTE: This slide is animated. **CLICK** to reveal the answer to *What does a network do?*

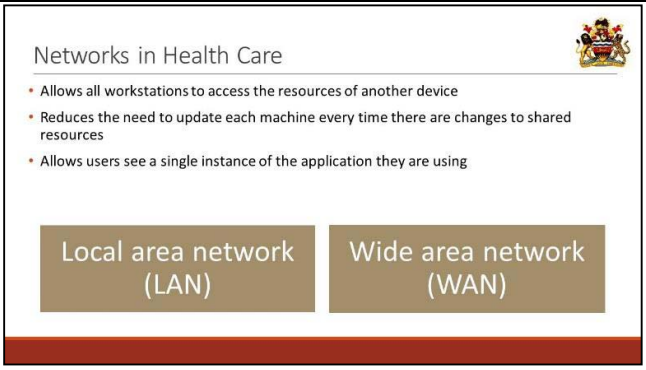
ASK participants what networks do.

ALLOW a few responses, and then **CLICK** to reveal the definition.

ASK: Once DHIS2, the EMR, or the LIS system is set up, how many people will need to access it at the same time?

ALLOW and **ACKNOWELDGE** responses, then **SUMMARIZE** by saying that each site is likely to have several workstations, each of which requires its own computer or client machine.

Slide 5



ASK: What do you think the purpose of a network is?

ALLOW a few responses, and then **SUMMARIZE** with the following information:

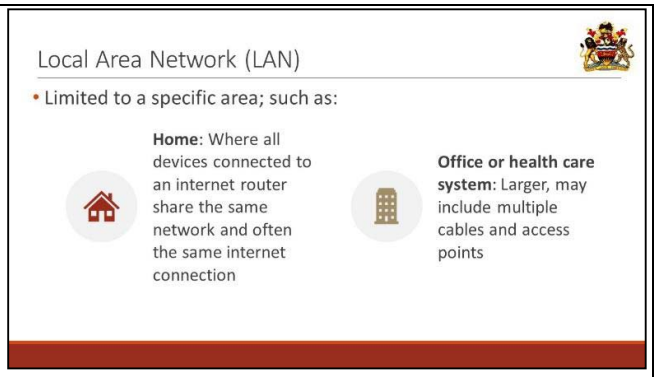
A network serves three main purposes:

1. It allows all workstations connected to it to access the resources of another device— such as a server, OS, or application (for example, an EMR or DHIS2).
2. It reduces the need to update each client machine (the computers connected to the network) every time there are changes to shared resources (operating systems, application frameworks, database manager, or system hardware).
3. It allows users to see a single instance of the application they are using.

A network can be as small as two computers, or as large as billions of devices. Although a traditional network comprises desktop computers, modern networks may include laptops, tablets, smartphones, televisions, gaming consoles, smart appliances, and other electronics. Many types of networks exist, but they fall under two primary categories: local area networks (LANs) and wide area networks (WANs).

Slide 6

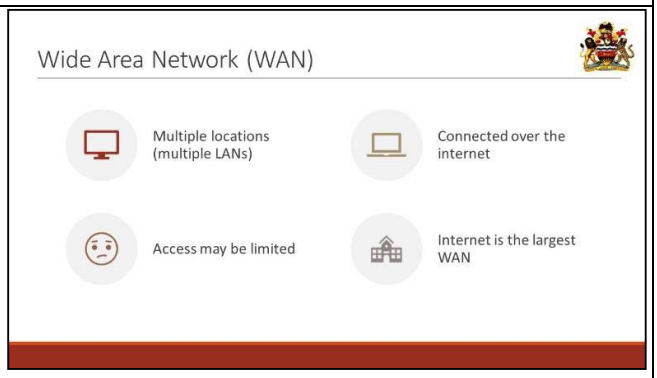
EXPLAIN that a LAN is limited to a specific area, such as a home, office, or campus. A home network may offer both **wired** and **wireless** connections. An example of a wireless network is **Wi-Fi**.



A larger network, such as the network of an educational institution, may be made up of many connecting devices. Although this type of network is much more complex than a home network, it is still considered a LAN since it is limited to a specific location.

Slide 7

EXPLAIN that a WAN is not limited to a single area; rather, it spans multiple locations. WANs are often comprised of multiple LANs that are connected via the **Internet**.



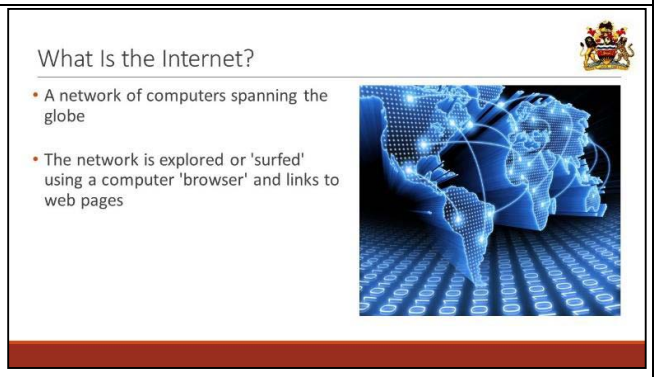
A corporate WAN, for example, may extend from headquarters to other offices around the world.

The Internet itself is the largest WAN.

Slide 8

ASK: What is the Internet?

ALLOW a few volunteers to give their responses.



EXPLAIN that the Internet can be defined in several ways. It is basically a comprehensive network, analogous to a web, of computers spanning the globe. As a global web of computers, the Internet allows individuals to communicate and share information with each other. Often called the World Wide Web, the Internet provides a quick and easy exchange of information and is recognized as a central tool in this Information Age.

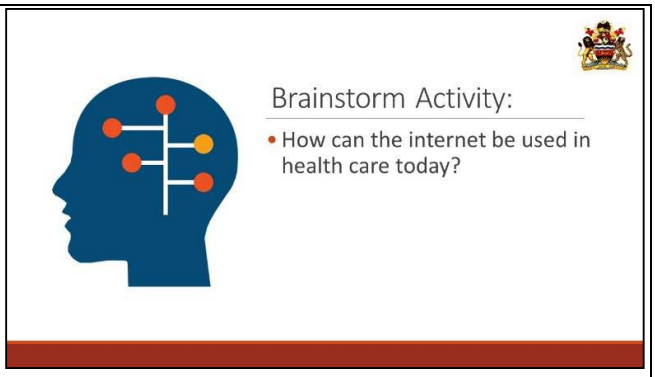
Trainer Instructions: Step 3 (10 minutes)

Use slide 9 and the facilitator notes to guide this step.

Slide 9

LEAD a brainstorming session on the application of the Internet. First take a poll and ask participants to raise their hand if they have used the Internet to:

- Send email
- Look up information (address, phone number, article)
- Read a news article
- Chat with someone
- Download documents



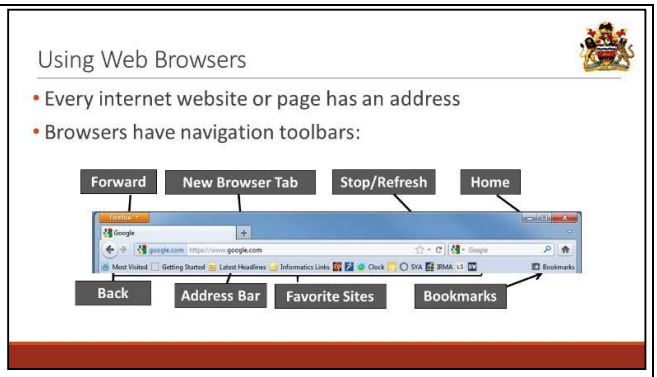
Then **ASK** participants to reflect on how the Internet can be used in health care today. Participants should be able to identify the following applications:

- Obtain information
- Communicate with professionals
- Deliver first-line support especially where distance is a critical factor
- Promote preventive medicine programmes.
- Develop and use electronic patient records
- Use multimedia decision support systems
- Remotely monitor patients or facilities
- Update patient notes using wireless personal digital assistants (PDA)
- Efficiently move necessary data to clinicians
- Integrate clinical information across the health system
- Consistently share views of patient data
- Match resources to activity levels through relevant up-to-date information
- Find and use evidence to make reliable decisions

Trainer Instructions: Step 4 (25 minutes)

Use slides 10–12, the facilitator notes, and **Handout 3.3.1: Internet Seek and Search** to guide this step.

Slide 10



NOTE: This slide is animated. The tags and arrows for the navigation bar are NOT displayed until you describe and click.

EXPLAIN that the most important feature of a web browser is the navigation toolbar, which contains a variety of tools to help you move from one website to another, and even to locate websites for which you do not know or remember the address.

ASK participants to see if they can identify some of the tools or features on the toolbar. **ALLOW** a few responses.

Note: If participants have individual computers, follow the instructions below. If not, demonstrate for participants using the instructions below.

ALLOW participants to **OPEN** a web browser.

CLICK ONCE to reveal the box and arrow pointing to the address bar. Explain to the participants that to go to any location on the Internet, you will use an address to help you access a website, similar to the way you use an address to help you find a specific place in a town or city.

TELL participants that a Uniform Resource Locator (URL), or web address, is typically composed of the following parts:

- A protocol name. A protocol is a set of rules and standards that enable computers to exchange information. For websites, this will typically be http:// or https://.
- The location of the site. When present, this usually designates a particular server at the host site.
- The domain name of the site.
- A suffix that identifies the domain type.
- A country suffix. Usually two letters, this is optional.

So, if we have the URL http://www.cmed.gov.mw, **http://** designates the protocol, **www** designates the server on the host, **cmed** designates the domain name, **gov** designates the domain type, and **mw** identifies the country (Malawi).

CLICK on the slide again to take participants through the eight other navigation toolbar functions.

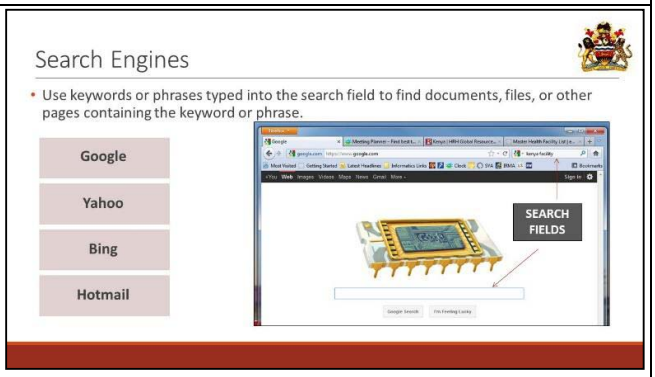
After revealing each one, **ASK** a participant to describe what it does.

ORIENT participants to unfamiliar functions using the information below:

- **Address bar**: A text box where you enter the address of the website you would like to view. The address bar also displays the address of the page that is currently being viewed.
- **Stop/Refresh**: When a page is loading in the browser, this will appear as an X, either in or next the address bar. Clicking on it will stop the page from loading. When a page has been loaded, it will appear as an open circle with an arrow at one end. Clicking on this will reload the page shown in the address bar.
- **Back**: Clicking on the back button will take you back to the previous page.
- **Forward**: If you have gone back one or more pages, clicking on the forward button will return you to the next page you were on.
- **Bookmarks**: Lets you store the addresses of sites that you visit frequently, or would like to return to later.
- **Favourite sites**: Creates shortcuts to the sites that you go to most frequently or need to access quickly. Similar to bookmarks, but usually remaining visible at all times.
- **New tab**: Usually displayed as a plus sign (+), this opens another site within the same browser window. This enables you to have several sites open at the same time and move easily among them. The logo and name of the site that you enter will appear in the tab header.
- **Home**: Usually displayed as a small house, clicking this icon will take you to your browser's homepage, which will be either that browser's default or another page you have designated.

Slide 11

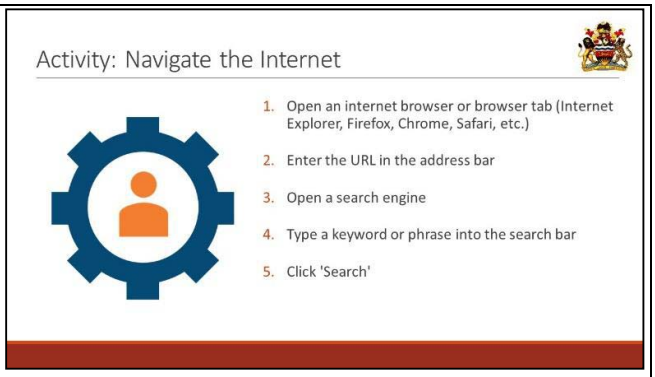
EXPLAIN that most browsers have a search engine as the main feature of their homepage.



NOTE that most browsers also allow you to perform searches directly from the address bar. Some navigation toolbars also include mini-search engine fields.

HIGHLIGHT that to save time, you can set up your browser so that every time you click on it or log onto the Internet, it opens a site that you frequently visit. That site then becomes your homepage. For example, if you frequently use Yahoo! mail, instead of typing in the URL each time, you can set up Yahoo! mail as your homepage. After that, every time you start up your browser, Yahoo! mail will be the first page that opens.

Slide 12



Note: If participants have individual computers, follow the instructions below. If not, demonstrate for participants using the instructions below.

REVIEW these steps with participants as you **DEMONSTRATE** each one.

TELL participants that they will have a chance to use the Internet.

INSTRUCT participants to turn to **Handout 3.3.1: Internet Seek and Search**. **EXPLAIN** that they will have 10 minutes to find as many of the responses to the questions on this handout as possible.

EMPHASIZE that they will need to write the responses down to share with the group after 10 minutes. After 10 minutes, the person with the most complete responses will receive a prize.

NOTE that they can use any web browser or search engine that they want.

INSTRUCT participants to begin and **MONITOR** their progress.

After 10 minutes **STOP** the group and **EVALUATE** how many participants have responded to all five questions.

INSTRUCT a participant who has responded to all five questions to lead the sharing of responses, with other participants contributing as time allows. Spend no more than two minutes on each question.

After reviewing all five questions and responses, **HIGHLIGHT**:

- A specific address will take you to a specific page
- Using specific keywords and phrases will narrow the results generated by a search

EXPLAIN that when searching for information, you will not always immediately find the information you are looking for, or even the most accurate information.

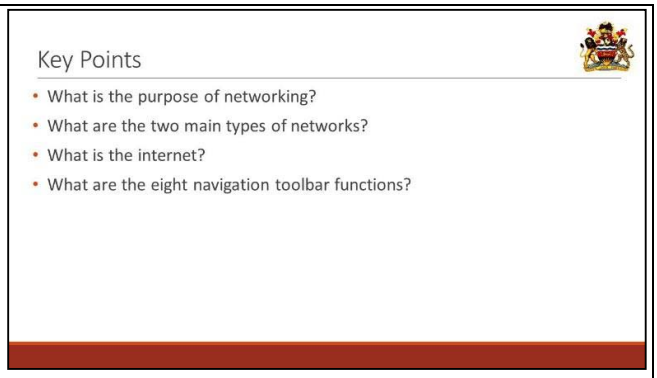
You need to practice care when you search and use information found on the Internet, making sure to cross-check the information with other sites and/or use sources you know to be reliable.

CONGRATULATE all participants and **GIVE** everyone a candy prize.

Trainer Instructions: Step 5 (5 minutes)

Use slide 13 and the facilitator notes to guide this step.

Slide 13



ASK participants to recall information on each key point using the questions on the screen.

SUMMARIZE with the following information:

- Networks allow all employees to share information while sitting at different desks, print to the same printers, and more. Using a network allows multiple workstations to access the resources of another device (such as a server, OS, or application software, such as an EMR or DHIS2).
- Networks fall under two primary categories: local area networks (LAN) and wide area network (WAN). A LAN is a small network that is confined to a small and limited area that is usually the size of a home or a small group of offices. A WAN is a very large network that can be connected throughout the whole world via long wires, optical cables, or satellites. A great example of a WAN is the Internet.
- The Internet is a worldwide collection of public networks that are linked to each other for information exchange.
- There are eight navigation toolbar functions, including: stop/refresh, back, forward, bookmarks, favourite sites, new tab, address bar, and home.

Handout 3.3.1: Internet Seek and Search

Use a web browser and search engine answer the questions below.

1. Where can you find 10 helpful keyboard shortcuts?

2. What information do you find when you go to the following address: http://globalhealthworkforce.org/

3. What are the first three search results that are returned when you type 'Malawi' into the search field?

4. Where can you find a glossary or dictionary of computer terms?

5. Who invented the Internet?

MODULE 4: USING e-HIS IN MALAWI
Session 4.1: Overview of Electronic HIS in Malawi

Time: 60 minutes

Learning Objectives

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

1. Explain how electronic health information (e-HIS) systems support evidence-based decision making
2. Describe the purpose, key features, and functionality of the different e-HIS applications used at different levels in Malawi

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Interactive lecture	Session introduction (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Interactive lecture	Review Malawi HIS and sub-systems (slide 4)	Flip chart, markers, tape, LCD
3	30 minutes	Small group activity, group activity	Characteristics of Electronic sub-systems (slide 5–6)	Flip chart, markers, tape, LCD, Handout 4.1.1
4	10 minutes	Group discussion	Challenges using electronic systems and how to address them (slide 7–8)	Flip chart, markers, tape, LCD
5	5 minutes	Interactive lecture	Key points (slide 9)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- Sticky notes

Handouts

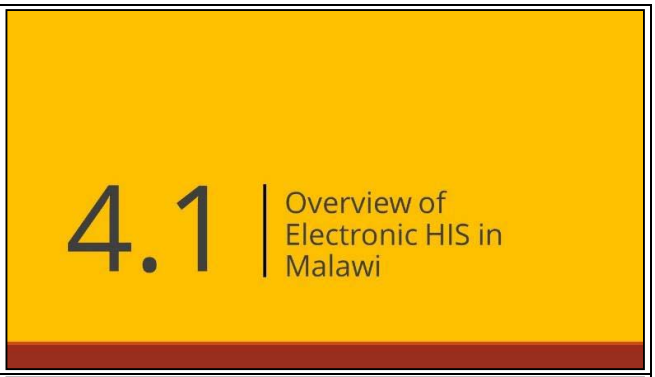
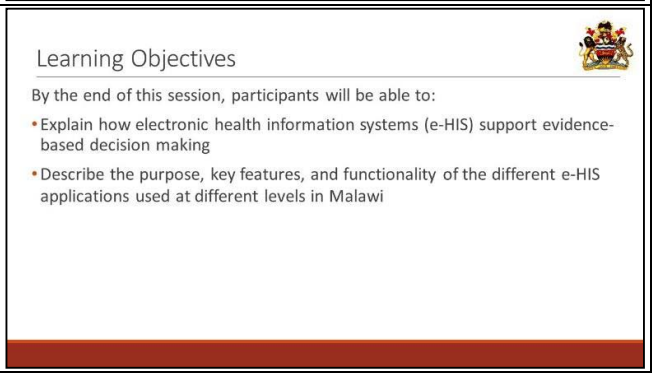
Handout 4.1.1: Characteristics of Electronic HIS Subsystems

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- This session begins with a brief review of concepts from Module 1 and from the following eLearning
- Assignment. Review those materials and Step 2.
  Module 1: Introduction to Health Information Systems

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this initial session will orient participants to the different e-HIS applications used in Malawi.	
Slide 3	**REVIEW** this session's learning objectives with participants.	

Trainer Instructions: Step 2 (10 minutes)

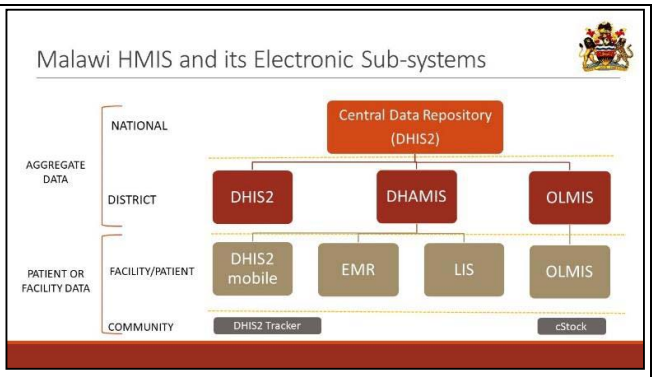
Use slide 4 and the facilitator notes to guide this step.

Slide 4

USE this slide to show the structure of the HIS in Malawi.

EMPHASIZE the specific electronic HIS applications currently being used.

ASK: What is the difference between district- and facility-level systems?



LISTEN for :

- Facility-level systems collect data on individual patients, such as age, blood pressure, and medications.
- Aggregate data means that the data of individual patients and individual facilities have been consolidated. Examples include the numbers of positive cases of malaria, and patients on ART.
- DHIS2, DHAMIS, and OLMIS manage aggregate data

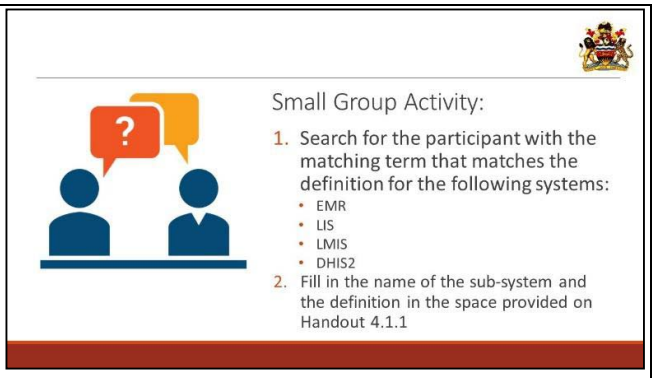
RECALL that each of these sub-systems has a unique purpose—and they all work together to support evidence-based decision making at all levels of Malawi's health system.

This module focuses on how different health workers use these different e-HIS tools. The next activity will provide more information on the advantages of some of these digital systems.

Trainer Instructions: Step 3 (30 minutes)

Use slides 5–6, the facilitator notes, and **Handout 4.1.1: Characteristics of Electronic HIS Subsystems** to guide this step.

Slide 5



REFER to **Handout 4.1.1: Characteristics of Electronic HIS Subsystems.**

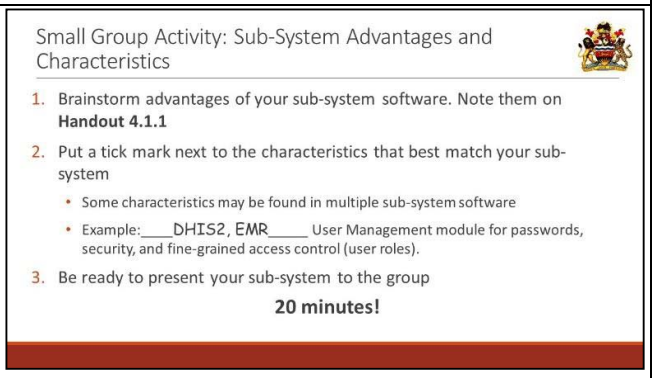
EXPLAIN that now that we understand what sub-systems are, let's make sure we know exactly what they do.

EXPLAIN that participants will each receive a piece of paper. Four participants will have a piece of paper with the name of one of these four sub-systems. For the other participants, on that paper will be a definition.

- Those who get the name of a sub-system will need to find the participant with the matching definition for that sub-system.
- Those who get the definition of a sub-system will need to find the participant with the matching name of that sub-system.
- Together, each pair will fill in the name of their sub-system and the corresponding definition in the space provided in **Handout 4.1.1.**

After 10 minutes, bring the participants back together as a group, and go on to the next part of the activity using the next slide.

Slide 6



INSTRUCT participants to continue to work in their small groups. Now their task is to brainstorm advantages of using their group's electronic sub-system tool or software. Next, they should go through the list of characteristics in **Handout 4.1.1**. They should figure out which characteristics best describe their electronic sub-systems, putting tick marks in the spaces provided.

REVIEW the example shown on the slide by reading the characteristic, then asking participants which of the electronic sub-systems they think have this feature. Participants may respond with any of the following: EMR, eLMIS, LIMS, DHIS2, DHAMIS, MST app. This is a standard feature of any electronic health information system, so any of these responses is correct.

EXPLAIN that they will have 20 minutes to match as many e-HIS applications with features as possible.

After 10 minutes, **GIVE** participants another 5 minutes to share what they know about their sub-system. After 5 minutes, **ASK** other participants if they would like to add any advantages or characteristics to those that were mentioned.

Trainer Instructions: Step 4 (10 minutes)

Use slides 7–8 and the facilitator notes to guide this step.

Slide 7

NOTE that each of these systems has its own advantages. This does not mean that they are without challenges.

ASK participants to identify what they see as potential challenges in using these systems and other digital products.

RECORD their responses on a piece of flip chart paper. If possible, group the responses by the type of challenge: user issue, hardware/infrastructure issue, software issue.

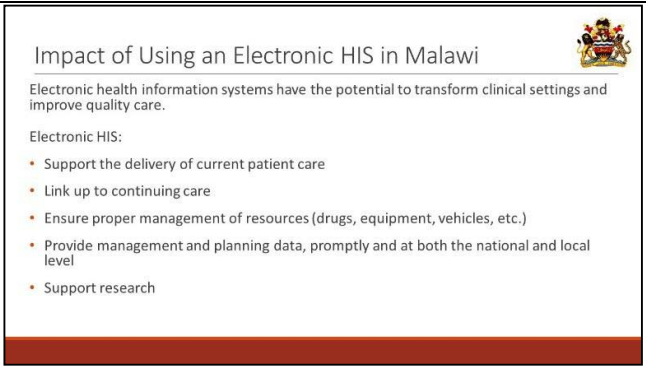
For hardware/infrastructure and software issues, **HIGHLIGHT** some actions that the Ministry is taking in response to these challenges.

Then **FOCUS** attention on the user challenges identified by the group. **ASK** what they can do to address these challenges.

RECORD their responses on a piece of flip chart paper.

Slide 8

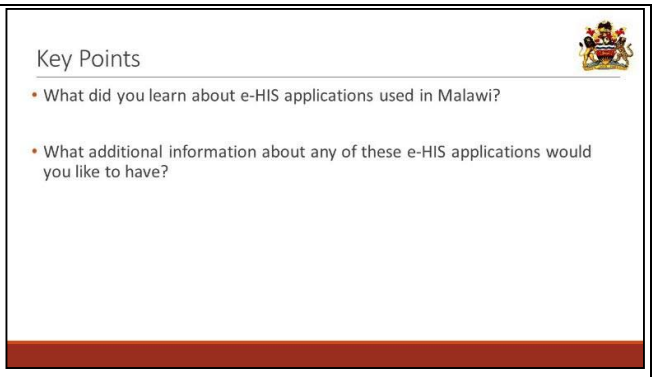
EXPLAIN that e-HIS have the potential to transform clinical settings and improve quality of care. With data stored in a central repository, an e-HIS can use real-time analytics and reports to identify opportunities to lower costs, improve services, increase productivity, and improve patient outcomes more effectively.



Trainer Instructions: Step 5 (5 minutes)

Use slide 9 and the facilitator notes to guide this step.

Slide 9



DISTRIBUTE 5–8 sticky notes to each participant. **ASK** participants to write something that they learnt about e-HIS applications during this session down on the sticky notes (one item per note).

ENCOURAGE them to write down any additional information they would like to have about any of the e-HIS applications mentioned during this session. They should use as many of the sticky notes given to them as they can.

STICK each note onto a piece of flip chart paper with the heading **Key Points**.

After 5 minutes, **READ** out the different learning points from the sticky notes.

Handout 4.1.1: Characteristics of Electronic HIS Sub-Systems

Name of sub-system:

Definition:

Advantages:

Read through the characteristics listed below. Which ones best describe what you think your subsystem does or can do? Put a tick mark in the space before the characteristics that go with your subsystem.

_____ Allows data entry of data sets for different organizational units (hospital, health centre, etc.) by health system level

_____ Tracks specimens throughout the testing process

_____ Integrates a tally pad

_____ Used to search for and create new patient records

_____ Supports use of pivot tables to customize reporting

_____ Used to view and edit patient details

_____ Generates charts and graphs to facilitate trend identification and create a data picture

_____ Filters existing patients using a search engine

_____ Enrols patients into programs

_____ Allows data validation at data entry

_____ Exports pivot tables to Excel

_____ Generates charts to compare performance across organizational units

_____ Creates and links laboratory test orders with patient records

_____ Provides customizable dashboards that offer a snapshot of critical aggregate data

_____ Supports quality assurance procedures (accept or reject samples)

_____ GIS/mapping capability

_____ Provides pivot-table-like reports for individual programs (either event or tracker based)

_____ Supports laboratory test referrals

_____ Accepts data from DHIS2 Mobile and DHIS2 Tracker

_____ Add, remove, and edit analysers, facilities, visit types, etc.

_____ Allows for data capture in online or offline mode

_____ Records vital signs and diagnoses

_____ Uploads data directly to central repository (DHIS2) once an Internet connection is available

_____ Configures tests according to lab section, specimen type, test type, test panels, etc.

_____ Used to view medical history

_____ Used to track entities such as commodities

_____ Provides a summary of reporting rates (actual versus expected) by organizational unit and health system level for a given period

_____ Data entry of anonymous, individual events occurring at any given point in time and location

_____ Generates reports on turnaround time, patient test results, daily counts of tests performed, rejection reasons, user statistics.

_____ Ability to trace people accessing types of services across health programs

_____ Ability to add, remove, or edit user profiles

_____ Supports online or offline data entry from supervision visits

_____ Ability to validate data after entry

_____ Provides historical data views

_____ Allows users to customize charts and tables using indicators, defined data elements, reporting rates, periods, or organizational units

_____ User credentials required to access different modules within the application

_____ Captures data usually reported on monthly reports (i.e., ANC Monthly Facility Report v4)

_____ Used to enter patient demographic data

Answer Sheet 4.1.1: Characteristics of Electronic HIS Sub-Systems

Electronic Medical Record (EMR) System

Each patient has a computerized medical record that is created and updated when they seek care at a health care organization, such as a clinic site or a hospital.

This record contains data related to a single patient, such as name, age, medical history

The EMR system stores individual electronic medical records for all patients who seek services at a specific facility. This makes data accessible and lets you retrieve data any time.

Data can be retrieved & presented as reports, dashboards, decision support

Provides support alerts to clinicians

EMR may include interfaces with other systems

Advantages

- Individual patient data can support clinical management
- Generates warnings for abnormal lab or imaging results
- Provides reminders for appointments, routine screenings, prescriptions, administration of vaccines, and other health maintenance benefits
- Improves legibility of clinical notes, reducing clinical errors
- Better diagnosis of disease and mortality (linked to ICD-10)
- Facilitates speed and accessibility in obtaining consultations from distant specialists
- Supports service monitoring
- Backs up and archives data
- Easy information transfer and sharing with other databases

Characteristics

- Used to view and edit patient clinical details
- Filters existing patients using a search engine
- Enrols patients into programs
- Used to view medical history
- User credentials required to access different modules within the application

Laboratory Information Management System (LIMS)

- Manages patient-level laboratory data (test orders, specimen quality, samples, authorization)
- Reports results for tests ordered by a clinician
- Provides aggregate data on laboratory services
- Signals potential disease outbreaks

Advantages

- Simultaneous access to records from multiple locations
- Legibility
- Variety of views on data
- Support for structured data entry
- Fast retrieval of data for research
- Decision support
- Support for other data analysis
- Electronic data exchange and sharing care support
- Confidentiality
- Security

Characteristics

- Used to search for and create new patient records
- Creates and links laboratory test orders with patient records
- Supports quality assurance procedures (accept or reject samples)
- Supports laboratory test referrals
- Used to add, remove, and edit analysers, facilities, visit types, etc.
- Configures tests according to lab section, specimen type, test type, test panels, etc.
- Generates reports on turnaround time, patient test results, daily counts of tests performed, rejection reasons, user statistics.
- Ability to add, remove, or edit user profiles
- Used to enter patient demographic data

District Health Information System (DHIS): DHIS2

- Collecting aggregate data
- Running quality checks
- Reporting
- Making graphs and maps and other forms of analysis
- Enabling comparison across time and space (e.g. across facilities and districts)
- Displaying trends (displaying data in time series to see their min, max levels)

DHIS2 Mobile and Tracker

- Can collect aggregate reports on a device, even when there is not an internet connection
- Collects data on events at the community or individual leve
- Tracks entit
- Can be used at rural facilities or within a community
- Data collected can be uploaded to DHIS2 Aggregate

Advantages

DHIS2 stimulates local level health workers to:

- Know what programmes are trying to achieve by setting local targets
- See how well they are progressing towards achieving targets by analysing data and turning them into indicators
- Monitor trends and compare programmes with others in the similar catchment areas
- Document, analyse, and use info to improve efficiency, quality, and coverage of PHC services at all levels
- Improve effectiveness of planning, organization, and management functions
- Develop a culture of information use

DHIS2 Characteristics

- Allows data entry of datasets for different organizational units (e.g., hospital, health centre) by health system level
- Supports use of pivot tables to customize reporting
- Generates charts and graphs to facilitate trend identification and create a data picture
- Allows data validation at data entry

- Exports pivot tables to Excel
- Generates charts to compare performance across organizational units
- Provides customizable dashboards that offer a snapshot of critical aggregate data
- GIS/mapping capability
- Provides a summary of reporting rates (actual versus. expected) by organizational unit and health system level for a given period
- Allows users to customize charts and tables using indicators, defined data elements, reporting rates, periods, or organizational units
- Accepts data from DHIS2 Mobile and DHIS2 Tracker

DHIS2 Mobile Characteristics

- Allows for data capture in online or offline mode
- Captures data usually reported on monthly reports (ie: ANC Monthly Facility Report v4)
- Uploads data directly to central repository (DHIS2) once an Internet connection is available

DHIS2 Tracker Characteristics

- Used to track entities such as commodities
- Data entry of anonymous, individual events occurring at any given point in time and location
- Ability to trace people accessing types of services across health programs

Electronic Logistics Management Information System (eLMIS or OpenLMIS)

Forecast and plan supply, allowing more accurate and timely ordering of medical commodities

Anticipate and avoid stockouts, allowing timely intervention

Identify overstocks, enabling redistribution prior to expiry

Report data to meet funding partner requirements

Compare data with other sources to validate data quality and consumption rates

Advantages

- Provides logistics data to stakeholders for decision making at all levels
- Can be accessed via database, Internet, and cell phones
- Generates feedback reports
- Enables timely monitoring of the supply chain
- Provides delivery schedules and quantities issued
- Includes prompts and alerts
- Enable redistribution
- Accessible real-time
- Ease of accessibility
- Visibility into status at all levels, including what is in transit, available on order or near expiry

Characteristics

- View stock on hand
- Request new stock based on consumption
- Create an adjustment
- Record an issue/receipt
- Print bin card or summary of stock on hand
- Manage lots centrally
- Track stock movements

Session 4.2

Session 4.2: Managing Data Using the EMR in Malawi

Time: 330 minutes

Learning Objectives

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

1. Identify points of service in a facility's workflow where staff enter data into an EMR system
2. Describe the difference between point-of-care and retrospective data entry
3. Log on to the EMR
4. Navigate within the main sections of the EMR
5. Use the EMR to capture patient data throughout the facility's workflow
6. Identify common problems that arise in data entry

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Interactive lecture	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Facilitator presentation	Review: EMR System and Data Entry Models (slides 4–6)	Flip chart, markers, tape, LCD
3	25 minutes	Interactive lecture	EMR systems and the facility workflow (slides 7–12)	Flip chart, markers, tape, LCD, Handout 4.2.1
4	30 minutes	Demonstration, individual activity	Navigating to Difference EMR Pages (Slides 13–15)	Flip chart, markers, tape, LCD, Handout 4.2.2
5	30 minutes	Interactive lecture, Demonstrations	Registering new and existing patients (slides 16–19)	Flip chart, markers, tape, LCD
6	45 minutes	Role play activity	Registering new and existing patients (slide 20)	Flip chart, markers, tape, LCD, Handout 4.2.3
7	15 minutes	Brainstorming	Handling Problems During Data Entry (slide 21)	Flip chart, markers, tape, LCD
8	40 minutes	Interactive lecture, demonstration, role play activity	Capturing data on program enrolment (slides 22–24)	Flip chart, markers, tape, LCD
9	40 minutes	Demonstration, role play activity	Capturing data on vitals (slide 25–26)	Flip chart, markers, tape, LCD, Handout 4.2.3

Step	Time	Method	Content	Resources
10	40 minutes	Interactive lecture, demonstration, role play activity	Entering clinical visit data (slides 27–29)	Flip chart, markers, tape LCD Handout 4.2.3
11	40 minutes	Demonstration, role play activity	Entering data on laboratory orders and medication (slides 30–31)	Flip chart, markers, tape LCD Handout 4.2.3
12	5 minutes	Facilitator presentation	Key points (slide 32)	Flip chart, markers, tape LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

- Handout 4.2.1: Workflows and e-HIS Data Collection
- Handout 4.2.2: EMR Treasure Hunt
- Handout 4.2.3: Chisaka Patient Cases

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper.
- Ensure that a training server is set up in the training room with a training instance of the EMR loaded. Check that the local network connection to the training server is working.
- Make sure that all usernames and passwords used during this session are working.

Trainer Instructions: Step 1 (5 minutes)

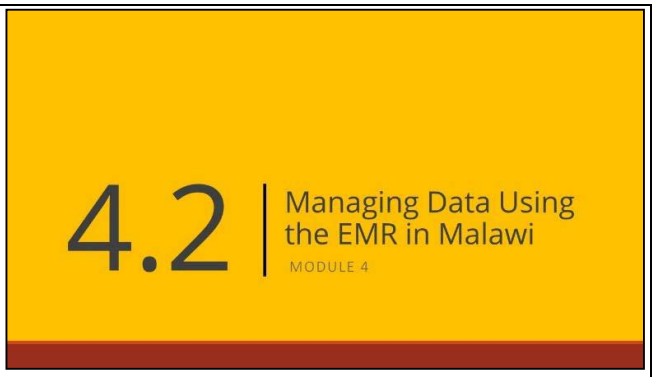
Use slides 1–3 and the facilitator notes to guide this step.

Slide 2

RECALL that different sub-systems help manage data in Malawi's HIS.

EXPLAIN that the data managed by the EMR are collected and used throughout the facility. This session will look at:

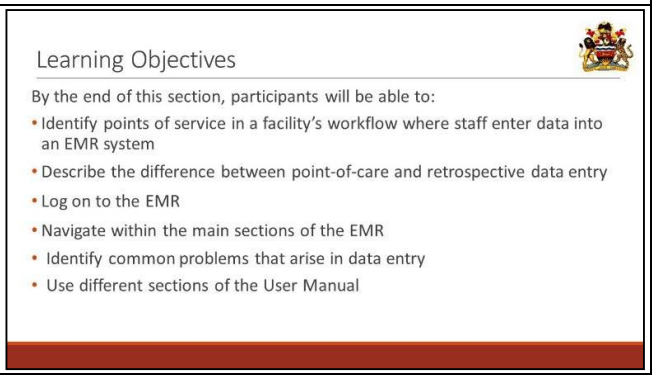
- How the EMR manages patient-level data at facilities throughout Malawi.
- How the EMR can be used within the context of your facility's workflow.



HIGHLIGHT that will be practical activities during this session where participants will have an opportunity to use the EMR.

Slide 3

REVIEW the following learning objectives for this first section.



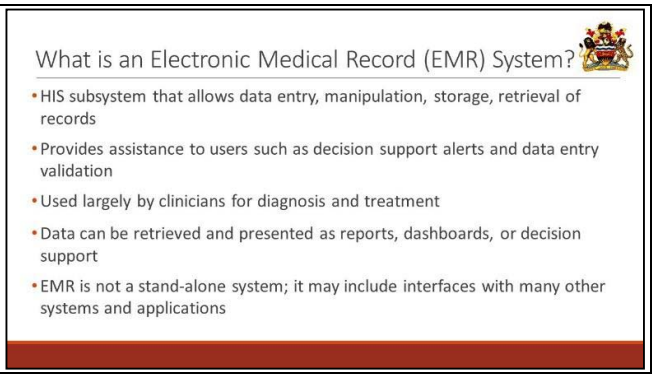
Trainer Instructions: Step 2 (10 minutes)

Use slides 4–6 and the facilitator notes to guide this step.

Slide 4

RECALL what an EMR system is: a part of the HIS that enables data management—that is, data entry, manipulation, storage, and retrieval of individual medical records.

REMEMBER that the EMR handles patient data.

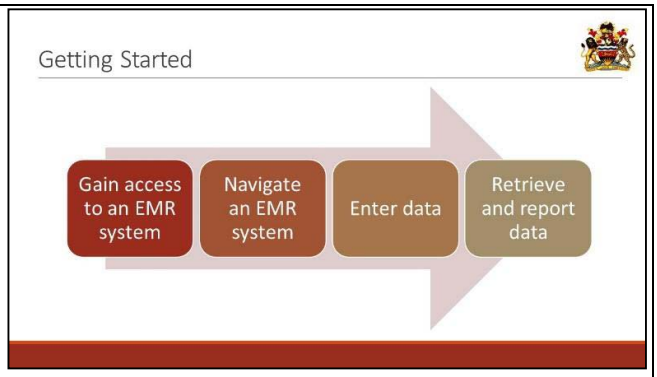


Slide 5

NOTE: This slide is animated. **CLICK** for each graphic on the screen to appear.

EXPLAIN that using the EMR can be reduced to four key actions:

(1) Gain access to an EMR system in order to (2) navigate the EMR system so that you can (3) enter and (4) retrieve and report data from the EMR system.



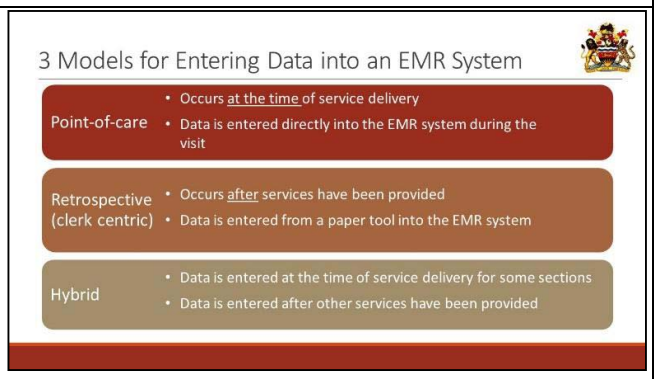
EXPLAIN that participants need to start up the EMR, gain access to it, and navigate to the different areas of the system where data is entered and retrieved.

Slide 6

RECALL the different models that facilities can adopt for entering data into an EMR system.

EXPLAIN that the demonstrations and practical activities will focus on using EMR at point of care.

EXPLAIN that even when a facility uses EMR at point of care, there may be times when data needs to be entered retrospectively. For instance, if the power goes out, you can continue to collect data using paper tools. Then, when the power comes back on, you can enter the data from the paper into the EMR.



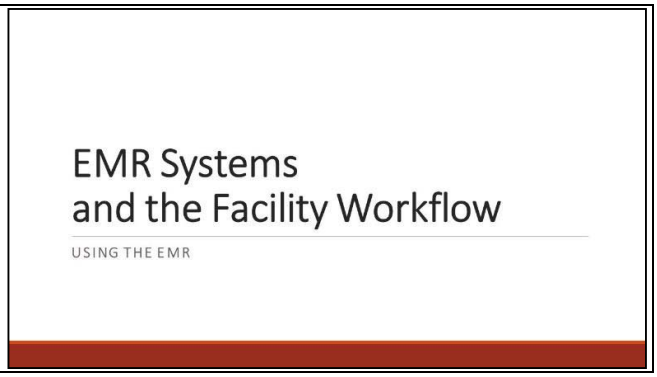
ENCOURAGE participants to consider during the demonstrations how the EMR would be used retrospectively.

Trainer Instructions: Step 3 (25 minutes)

Use slides 7–12 and the facilitator notes to guide this step.

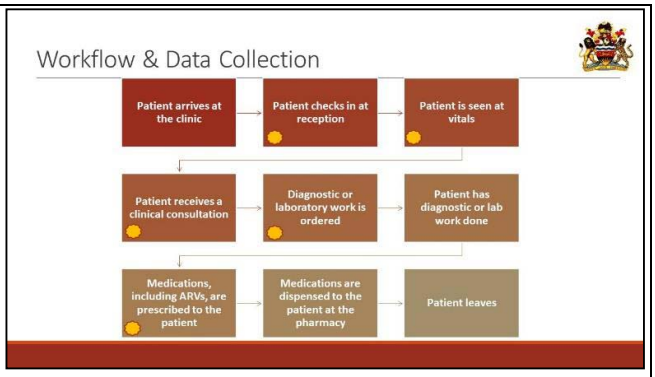
Slide 7

EXPLAIN that this first section of the session will focus on getting to know the EMR system, how to go to different pages within the EMR, and how the EMR is linked to a facility's workflow.



Slide 8

SHOW a diagram of a workflow at a health facility. **DIRECT** participants to **Handout 4.2.1: Workflows and e-HIS Data Collection.**



REMIND participants that facilities usually have a system or workflow that guides the order in which administrative, clinical, and data collection tasks are completed by different facility personnel.

CLICK on the slide to show the five points where EMRs can be used for data collection.

Briefly **REVIEW** each point in the workflow, and have participants identify the paper tool used to collect data at that particular juncture. **REMIND** participants that EMR systems collect patient data, whereas laboratory information management systems (LIMS) collect laboratory data, logistical management information systems (LMIS) collect data on commodities, and so on.

ASK: Can you identify who enters data at each of the five points in a point-of-care data entry model?

Participants should quickly respond:

- *Reception: Receptionist/data entry clerk*
- *Vitals: Nurse or other clinical officer*
- *Clinical consultation: Doctor or other clinician/clinical officer*
- *Orders for diagnostic/laboratory work: Doctor or other clinician/clinical officer*
- *Prescriptions: Doctor or other clinician/clinical officer*

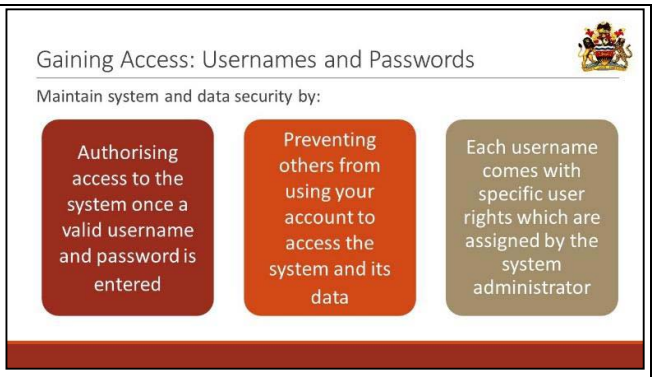
ASK participants to identify where an EMR can be used in the facility workflow. **ASK** them to explain what data is collected and how patient data in the EMR can be used during a patient's visit.

LISTEN for:

- Reception: EMRs can check patients in and collect demographic data
- Vitals: patient vital signs can be entered into the EMR
- Clinical consultation: clinicians can review a patient's vitals in the EMR, record observations and diagnoses, order lab work, see lab results, and prescribe medications.

HIGHLIGHT that data are collected using different e-HIS, depending on what is being done. For example, when the patient is having lab work done, the LIMS is used; when the patient is at the pharmacy to receive medication, the pharmacy information system (PIS) is used

Slide 9



EXPLAIN that before we can go anywhere within the EMR, we need to gain access to the system.

ASK why usernames and passwords are used to gain access to an electronic information system.

LISTEN for:

- Usernames and passwords control who can interact with a resource—in this case, the EMR system.
- They ensure that no unauthorized parties can access your profile and make any changes to the system that may be unlawful.
- They also ensure that no one other than you or the system administrator can access the user profile and amend your user details—such as your contact information.

CLICK on the slide to summarize that the purpose of usernames and passwords is to maintain EMR system and data security by limiting access to the system for authorized personnel, and preventing others from gaining unauthorized access to patient records.

EMPHASIZE that usernames and passwords contribute to ensuring that users maintain patient privacy, and that patient health records are kept confidential.

Slide 10

EXPLAIN that navigating an EMR system is like navigating a city.

EXPLAIN the analogy in more detail: *If you are just arriving in Lilongwe, for instance, you want to be able to find your way around the city and get from one place to another. For instance, I need to know how Lilongwe is laid out in order to get from my home to the office so that I can fulfil my work responsibilities*.

ASK: Where else would you need to get to within a city and why?

LISTEN for:

- To another office or a venue for a meeting
- To school to attend classes or drop children at classes
- To the market to get food
- To restaurant or meeting hall for social engagements

EXPLAIN that when we navigate an EMR system, we are moving through the menu structure in the EMR system to get where we need to go in order to enter or retrieve different administrative and clinical data at the right points in the workflow.

USE the following examples to help participants link the concepts of administrative/clinical workflow, personnel's role, and data collection:

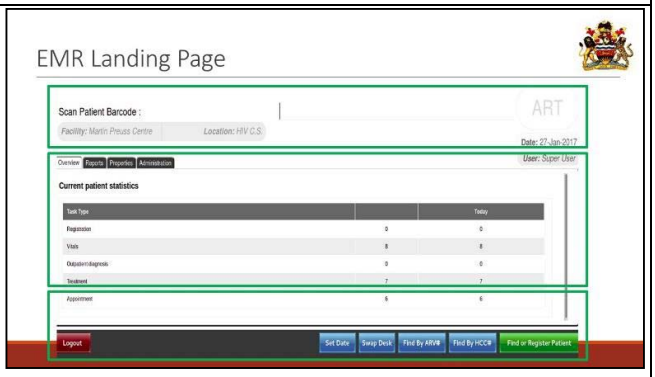
- When a patient arrives at registration, the receptionist or data entry clerk will need to know where to go in the EMR system to bring up the patient's chart and check them in.
- At vitals, the nurse will need to know where to go in the EMR system to enter the patient's vitals.

BRAINSTORM examples for other people and points in the workflow—for example, a clinician entering clinical notes, TB screening, a chief medical officer running reports.

REFOCUS the group's attention on system **navigation**. **EXPLAIN** that when we navigate an EMR system, we use the software's navigation bars and menus to take us where we need to go within the system.

Slide 11

NOTE: This slide is animated. When you click on the slide, a green box will appear around each of the three parts of the landing page.



ASK: What are we looking at here?

Answer: *The EMR landing page. This page should appear once you successfully log in.*

REVIEW the EMR homepage structure with participants:

The first box is the **header**. This is where you:

- Scan the patient barcode
- Navigate to the reports, properties, or administration modules of the EMR.

The right-hand side of the header indicates which EMR module you are using (ART or OPD), the date, and who is currently logged into the system.

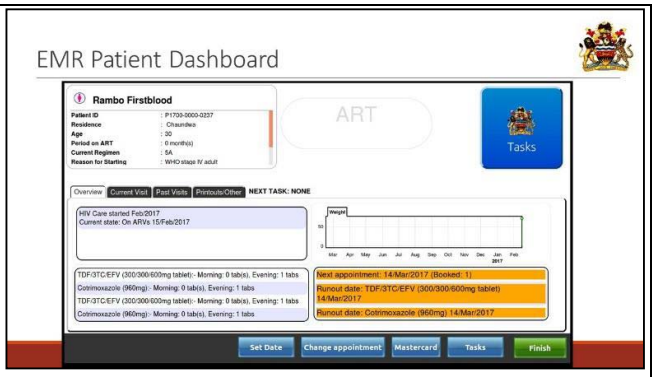
CLICK to reveal the second box. **EXPLAIN** that this provides an overview of **facility statistics**, with a focus on the number of patients who have received specific services, such as registration, vitals, outpatient diagnosis, treatment, and appointment scheduling.

CLICK to reveal the third box. **EXPLAIN** that this is a **navigation bar**, where the user can log out of the system, set the date, swap desk, search for a patient by ARV or HCC number, or register a patient.

HIGHLIGHT that the navigation bar and main menu play important roles in getting you to the page you want to see.

Slide 12

PROVIDE a brief overview of the main parts of a patient dashboard in the EMR. **EXPLAIN** that data only appear on this dashboard once they have been entered during patient's visits.



Do not go into great detail about what is found in each part of the patient record. The treasure-hunt activity in this session will provide participants with an opportunity to become familiar with the different features for themselves

Trainer Instructions: Step 4 (30 minutes)

Use slides 13–15 and the facilitator notes to guide this step.

Slide 13

NOTE: This demonstration focuses on navigating to different pages of EMR and what is found on each page. It should take no more than eight (8) minutes. Later demonstrations will show participants how to fill the different programme enrolment and clinical forms.

EXPLAIN that this is a short demonstration on how to navigate the EMR.

ASK participants to carefully observe the demonstration, and **WRITE** down on a piece of paper where:

- A data clerk will need to go to enter patient demographic data or enrol patients into programmes.
- A data clerk will check in a patient.
- A nurse or other clinical officer will need to go to enter vital signs, enter other initial notes regarding the patient's visit, or record a patient's death.
- A doctor or other clinician/clinical officer will need to go to enter data collected during the clinical consultation.
- A doctor or other clinician/clinical officer will need to go to enter laboratory orders or other diagnostic work.
- A doctor or other clinician/clinical officer will go to enter medication prescriptions (ARVs or other).

Demonstration instructions:
POINT OUT which computer components will be used during this demonstration: EMR software, the monitor to see EMR, the keyboard to log on, and the mouse to navigate different areas of EMR.

LOG ON to EMR and walk participants through the system using the example of an **existing** HIV programme patient. DO NOT ENTER ANY DATA INTO THE EMR AT THIS TIME. The purpose of this demonstration is to give participants a stronger sense where different features or forms are located from the main menu.

Gain access

- **ENTER** username and password.
- **SELECT** workstation, programme, and activities.

Registration

Register a new patient

- **ENTER** patient details (name, age and demographic details).
- Each patient detail is required. If an item is not known by the patient, an 'unknown' button can be used to skip and enter a parallel record.
- **ENTER** guardian details (name, age, and demographics).

Search for an existing patient

- **USE** the search function to search for an existing patient.
- Sometimes the EMR will show a prompt screen to indicate an existing patient name during patient registration. This serves to prevent duplicates.

Program Enrolment

HIGHLIGHT that this is where you would enrol an HIV patient into the HIV programme or a patient suspected of TB into the TB programme. Note the other programmes that are supported by EMR.

- **CLICK** on the **Tasks** button.

Vitals

- **CLICK** on **Vitals**
- **ENTER** patient vitals
- This can be entered during new patient registration or can be updated on an existing record

HIGHLIGHT the similarities between the Vitals patient record view and the Registration patient record view.

NOTE that existing Vitals forms are displayed in the Clinical Services section.

- **CLICK** on the **Tasks** button

Staging

- **CLICK** on **HIV staging**

This is where patient HIV staging is shown. After records are updated, a summary window displays a staging summary.

- **CLICK** on the **Tasks** button.

Clinic consultation

- **CLICK** on **Clinic**

NOTE that the same patient record remains open.

- **CLICK** on each one to review the data that is collected and displayed.

HIGHLIGHT that certain alerts or decision prompts will appear on the patient's banner based on data entered into some of these forms.

- **CLICK** on the **Tasks** button

Reporting

- **GO TO** system dashboard and click on reports
- **SELECT** quarter and click finish
- **VIEW** the report

EXPLAIN that a user will see only the main menu icons that are relevant to their access rights. For example, clinicians will see all icons except Admin, a data clerk will see only Registration and Vitals icons, and so on. Access and how this works will be the focus of the next session.

Slide 14

NOTE: This slide is animated to enable participants to log in successfully using pre-assigned usernames and passwords before starting on the treasure-hunt exercise.

TELL participants they will now have the opportunity to explore EMR, using its navigation bar and menus, by going on a 'treasure hunt'.

CLICK on the slide and explain that the first step is to log into the EMR system.

Once everyone is logged in, **CLICK** on the slide and **INTRODUCE** the treasure-hunt activity to participants. **EXPLAIN** that **4.2.2: EMR Treasure Hunt** will tell participants what they have to find in EMR. **NOTE** that they will need to write down the answers to each question to indicate that they actually found the treasure, and that some participants will have a chance to show the entire group how they found the answers to particular questions.

TELL participants they will have 20 minutes to complete the treasure hunt, and that the participant with the most correct answers will get the 'treasure'.

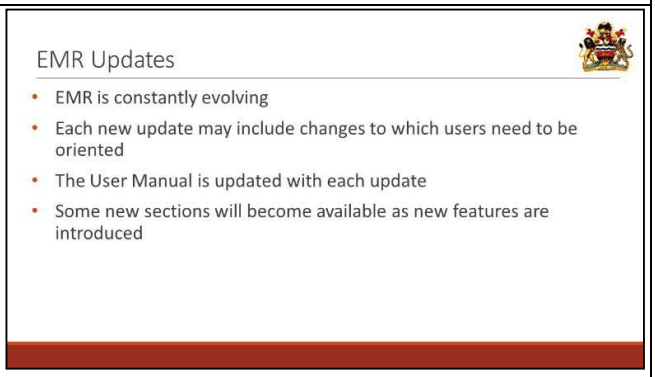
MONITOR participant progress over the course of the 20 minutes. **PROVIDE** assistance if necessary; however, do not give participants any of the answers.

After the 20 minutes are up (or sooner, if participants have finished finding all of the answers), **PROJECT** the EMR welcome page on the screen. **REVIEW** the treasure-hunt questions with participants by asking different volunteers to come forward and use the projected EMR to show everyone how they found their answers to the questions.

CHECK that participants understand how to navigate around the EMR system.

Slide 15

Briefly **REMIND** participants that the EMR system is constantly being updated by the EMR development team. As the system evolves and new features are added, or existing features enhanced, the user manual will also be updated.



EXPLAIN that new sections may be added to the user manual to reflect new features related to a specific task.

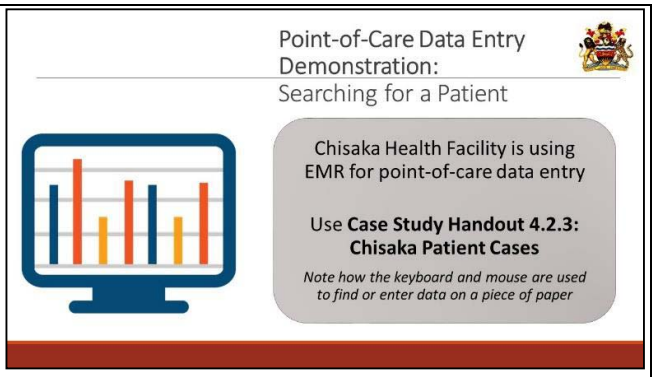
Existing sections may be updated if an existing feature has changed, or a new feature affects how a user would complete a task.

Trainer Instructions: Step 5 (30 minutes)

Use slides 16–19 and the facilitator notes to guide this step.

Slide 16

Slide 17



EXPLAIN that the purpose of this demonstration is to orient participants searching for a patient in the EMR. For this demonstration, use the training demonstration login (see Advanced Preparation notes).

EXPLAIN that all EMR demonstrations are based on patients seeking services at a fictional facility, Chisaka Health Facility, and their use of EMR for point-of-care data entry.

EXPLAIN that verifying that a patient does not already have a record in the EMR before creating one is a best clinical practice; this will be the first task that we perform.

MOVE AWAY from the PPT presentation and **DISPLAY** EMR on the screen.

LOG ON to EMR.

RECALL that all systems require each user to log on using a username and password. **HIGHLIGHT** that they should never share usernames and passwords. This will be discussed more in a later session.

REVIEW the main page from a point-of-care perspective, highlighting:

The main components that users may have access to reflect key activities that occur in the workflow: Reception, Registration, Vitals, Clinical, and Adherence**.** EMR systems used in Malawi are required to have the ability to control access to the different parts of the EMR system according to user, role, area, and chart section.

TASK participants with observing the different ways that the facilitator uses the mouse, keyboard, or touchscreen to interact with the EMR and enter the data (e.g., clicking on a radio button or hyperlink). Have them note these observations on a piece of paper.

USE the instructions below to take participants through the use of the **Search** feature:

- **ENTER** the patient's first name (Winnie) and **CLICK** 'Next' to continue.
- **ENTER** the patient's last name (Kapango) and **CLICK** 'Next' to continue.
- **ENTER** the patient's gender on the drop down list and **CLICK** 'Finish'

NOTE: if the patient was already registered, the name will pop up in the confirmation window. Clicking on 'Create a new person' when a patient is already in the system will create duplicate records.

ASK: How can duplicate records impact patient care?

ASK participants what the next step will be based on the results of their search for Winnie Kapango's record.

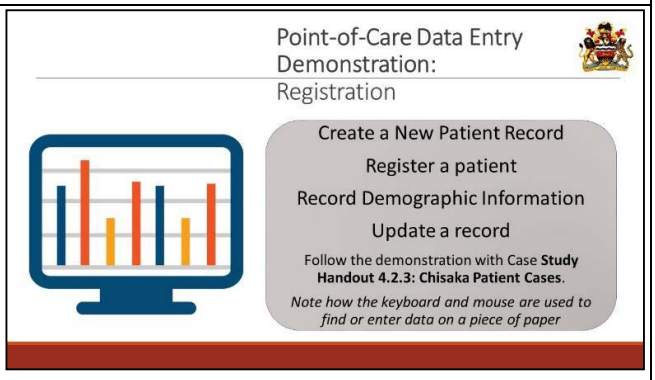
LISTEN for:

- *How to create a patient record*
- *How to check a patient in for a clinic visit*
- *How to enter a patient's demographic*
- *How to update a patient's information*
- *How to enrol a patient in a programme*

Slide 18

EXPLAIN that this demonstration will focus on four tasks:

- Creating a new patient record
- Registering (checking in) the patient
- Recording demographic information
- Updating a record



TASK participants with observing the different ways that the facilitator uses the mouse, keyboard, or touchscreen to interact with the EMR and enter the data (e.g., clicking on a radio button or hyperlink). Have them note these observations on a piece of paper.

MOVE AWAY from the PowerPoint and **DISPLAY** the EMR on the screen.

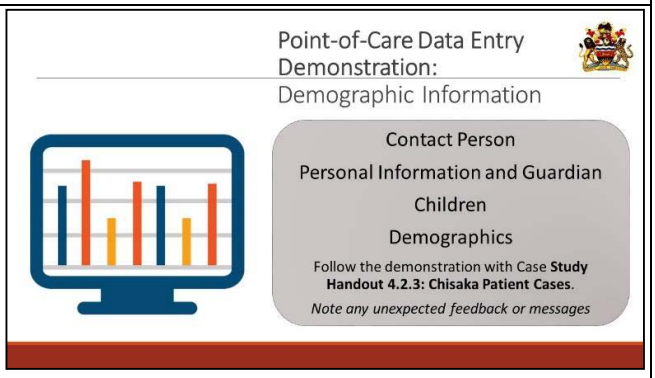
USE the guidance provided below to create a New Patient Record and check the patient in:

- After entering the patient's name and gender, **SELECT** 'Create a new person'.
- **ENTER** patient details (Each patient detail is required. If a field is not known by the patient, use the "unknown" button to skip the question. This will be done in detail on the next slide).
- **ENTER** guardian details if applicable (name, age and demographics)
- **CHECK** the patient in.
- **HIGHLIGHT** that this is where you would enrol an HIV patient into the HIV Program or a patient suspected of TB into the TB programme.

NOTE the other programmes that are supported by EMR.

Slide 19

EXPLAIN that the next demonstration will focus on how to record a patient's demographic information into the EMR.



TASK participants with observing any messages or feedback provided by the system to indicate a potential problem. Have them note these on a piece of paper.

MOVE AWAY from the PowerPoint and **DISPLAY** the EMR on the screen.

USE the guidance below to show how to record a patient's demographic information into the EMR.

- **ENTER** the patient's first name and **CLICK** 'Next' to continue.
- **ENTER** the patient's last name and **CLICK** 'Next' to continue.
- **SELECT** the patient's gender on the drop down list and **CLICK** 'Finish'.
- **SELECT** the 'Create a new person' prompt request in the confirmation window.

  NOTE: if the patient has already been registered, the name will pop up in the confirmation window. Selecting 'Create new person' when a patient is already in the system creates duplicate records.

- After that **SELECT** 'new patient' and **ENTER** the patient's middle name, if applicable
- **ENTER** the patient's year of birth and **CLICK** 'Next'

  NOTE: when you select on 'Unknown' the system skips and brings you to a screen that will allow you to estimate the age of the client.

- **ENTER** the birth month (select 'unknown' if the month is not known)
- **ENTER** the birth day (select 'unknown' if the patient doesn't know their age)
- **ENTER** region of origin (this is where the client originally comes from and not where they currently stay)
- **ENTER** the home district
- **ENTER** the traditional authority or area of residence
- **ENTER** the home village
- **ENTER** the current region (the current place of the client)
- **ENTER** any recognizable feature (closest landmark or plot number) they live near and **CLICK** 'Next'
- **ENTER** the patient's contact details and **CLICK** 'Next' (**NOTE:** this window accommodates a maximum of 10 numbers—for example, 0888317885)
- **VERIFY** guardian identity (if present, you will be required to register their demographics) and **CLICK** 'Next'
- **SCAN** or register guardian and **CLICK** 'Next'

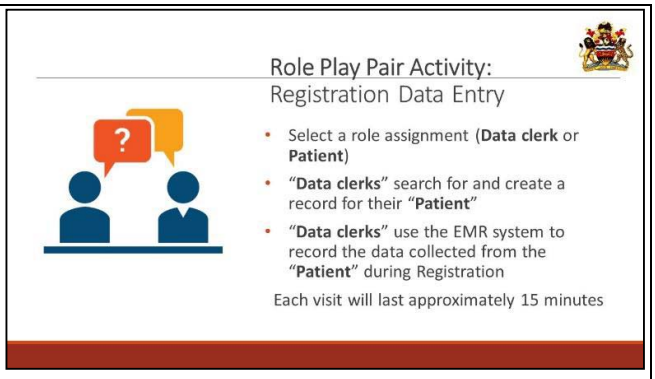
NOTE: You can only scan the guardian if they already have a bar code from the same facility, or your system is connected to a system at another facility. If the guardian bar code is not available, you will be required to register the guardian by selecting 'Find or Registering by Name'.

NOTE: Subsequent questions are to be asked of the guardian.

Trainer Instructions: Step 6 (45 minutes)

Use slide 20, the facilitator notes, and 4.2.3 to guide this step.

Slide 20



NOTE: Any special preparation for this exercise is provided in the Session Overview/Advance Preparation section of the FG.

ASK participants to form two lines facing each other. Each line should have the same number of participants in it.

INTRODUCE this activity. **EXPLAIN** to participants that they are going to be playing the roles of data clerks, providers, and patients at Chisaka Health Facility during the different data entry sessions. **EXPLAIN** that those in the line to the facilitator's right will be patients, and those on the left will be data clerks/providers. **USE** the information on the slide to explain their task:

- Data clerks are to search for their patients.
- If a clerk cannot find a record for their patient, they are to create a new patient record in EMR.
- They will enter any demographic information required when creating a new patient record.
- Once they have the patient's record open, they should check in the patient, and use EMR to record any updates to the patient's demographic data.
- Patient visits will only last 15 minutes.

STRESS that participants are only to go as far as registration; later sessions will focus on the other parts of the workflow.

ASK what they might encounter as they enter this data into the EMR system.

Answer: *They may come across alerts, error messages, or bugs as they are using the EMR*.

NOTE that they will learn in the next session about what to do when they come across a problem that they can't fix.

ASK if they have any questions or concerns about the activity; **RESPOND** as needed.

Next, **REFER** participants to **4.2.3: Chisaka Patient Cases,** and have them use the data provided (i.e., the name of the facility, symptoms that they may have, etc.) for their assigned patient during the pair activity. **ASSIGN** a patient case to each pair of participants.

CONDUCT the role play pair activity. **MONITOR** participant progress during the 15 minutes.

NOTE any common techniques used or issues experienced by participants.

After 15 minutes, **BRING** the group's attention back to the front of the room.

ASK participants who were playing patients:

- How did your registration go?
- What did the data clerk do well in terms of data collection techniques?
- What could the data clerk have done better?

Then **ASK** the participants who were data clerks:

- How did the registration go?
- What challenges did you encounter using the EMR system to enter data during the visit?
- How do you think you might address those challenges in the future?

WRITE key challenges and techniques on a piece of flip chart paper.

EXPLAIN that the participants are now going to switch roles: those who were data clerks will now be patients; those who were patients will now be data clerks. **ASSIGN** a new patient case to each pair. **GIVE** participants a few minutes to orient themselves to their new roles, then make sure that everyone is paired with a different data clerk or patient. **REMIND** participants that patient visits only last 15 minutes.

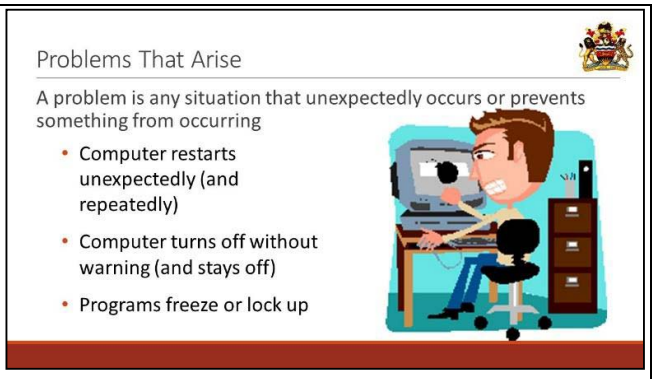
BEGIN the second round of patient visits. After 15 minutes, **STOP** the activity and debrief each role (patient, provider) using the same questions from the first round.

PUT a star next to any challenges already cited by participants on the flip chart paper. **ASK** if any second-round providers tried the techniques proposed by first-round providers; if so, **ASK** how successful they were, or if they have other suggestions to propose to the group.

Trainer Instructions: Step 7 (15 minutes)

Use slide 21 and the facilitator notes to guide this step.

Slide 21



EXPLAIN that despite our best efforts, hardware or software system failures occur. **ASK** participants if they have had any experience with computer problems—errors or bugs—and if so, what they experienced.

The following examples can be used to **PROMPT** participants or contribute to the discussion:

- The computer fails to start
- The application stops and shuts down in the middle of use, with no warning
- Data that were previously entered do not appear the next time the system is opened
- Data are not uploaded or synced as scheduled
- The software is very slow to open new pages or save data
- The program freezes and won't let you do anything

REVIEW each problem with the following points:

- The computer restarts unexpectedly and repeatedly—emphasize that this does NOT refer to situations where the computer is either turned off by the user or scheduled to restart for automatic updates.
- The computer turns off without warning and stays off—again, this does NOT refer to situations where the user turns off the computer.
- Programs freeze or lock up—when the program you are using does not respond to any of the user's actions. This can be a temporary issue, lasting anywhere from a few seconds to a minute or more, or an ongoing issue where the program freezes frequently and repeatedly.

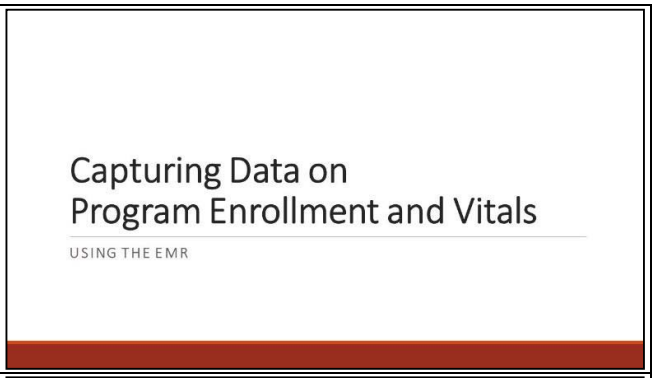
EXPLAIN that some problems may be minor and originate with users—for example, a user enters data into EMR in the wrong format, causing the software to fail to recognize the entry. Other problems may be more serious and originate with the system itself—for example, the application doesn't start because another component (such as the browser or the server) is not working properly.

Trainer Instructions: Step 8 (40 minutes)

Use slides 22–24 and the facilitator notes to guide the interactive lecture.

Slide 22

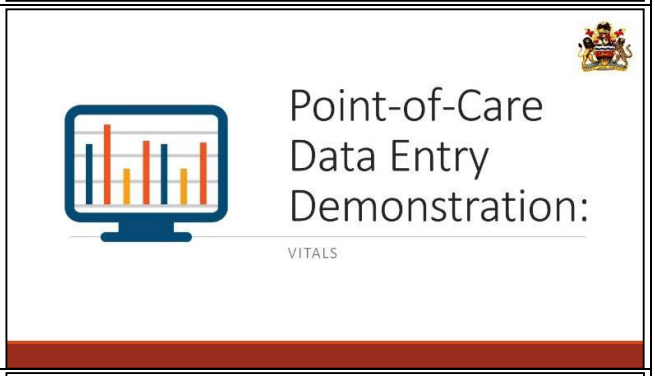
EXPLAIN that this part of the session will focus on entering more patient data into the EMR, specifically vitals and programme enrolment.



Slide 23

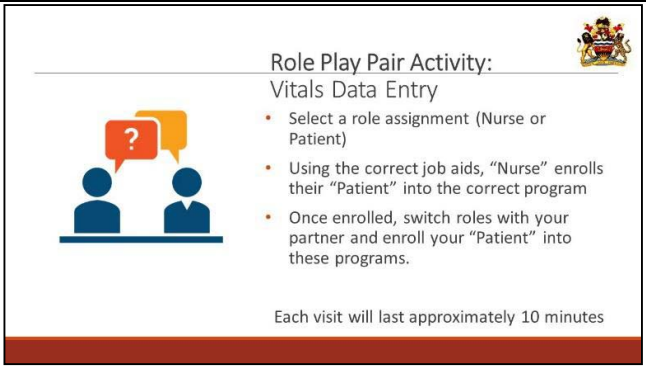
MOVE AWAY from the PPT and **DISPLAY** EMR on the screen.

REMIND participants that they also identified a need to record vital signs. This demonstration focuses on how to record this data in the EMR.



Slide 24

EXPLAIN that participants will now play the roles of nurses and patients at Chisaka Health Facility. Participants will use the Patient Information #2 data (i.e., the facility, symptoms they may have, etc.) from **4.2.3: Chisaka Patient Cases** during the pair activity.



USE the information on the slide to explain their task:

- Enter a patient's vital signs
- Patient visits will only last 10 minutes

ASK participants if they have any questions or concerns about the activity. **RESPOND** as needed.

CONDUCT the role play pair activity. **MONITOR** participant progress during the 10 minutes. Note any common techniques or issues experienced by participants.

After 10 minutes, **BRING** participants' attention back to the front of the room. **ASK** participants who were playing patients:

- How did your visit with the nurse go?
- What did the nurse do well in terms of data collection techniques?
- What could the nurse have done better?

ASK the participants who were data clerks:

- How did the visit go?
- What challenges did you encounter using EMR to enter data during the visit?
- How do you think you might address those challenges in the future?

RECORD key challenges and techniques on a piece of flip chart paper.

TELL participants that they are now going to switch roles: those who were nurses before will now be patients; those who were patients will now be nurses.

ASSIGN new patient cases to each pair. **GIVE** participants a few minutes to orient themselves to their new roles, then make sure that everyone is paired with a different data clerk/patient. Remind participants that patient visits only last 10 minutes.

HAVE participants begin the second round of patient visits. After 10 minutes, stop the action and debrief each role (patient, provider) using the same questions from the first round.

PUT a star next to any challenges already cited by participants on the flipchart paper.

ASK if any second-round providers tried the techniques proposed by first-round providers; if so, ask how successful they were or if they have other suggestions to propose to the group.

Trainer Instructions: Step 9 (40 minutes)

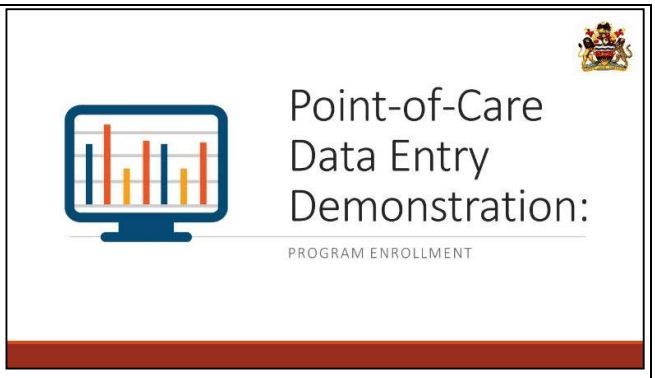
Use slides 25–26 and the facilitator notes to guide this step.

Slide 25

MOVE AWAY from the PPT and **DISPLAY** EMR on the screen.

REFER participants to **4.2.3: Chisaka Patient Cases** and continue with the patient used during the Registration demonstration.

ASK: What should the nurse do with the patient, Winnie Kapango (Patient Case #1), during vitals?



NOTE: Participants may identify a number of different tasks. Focus their attention on three that were called out at the beginning of the session: check the patient in, enrol the patient in a program, and take vital signs.

EXPLAIN to participants that this demonstration will show how to enrol and discontinue patients in one of three programs: HIV, TB, and MCH (Mother and Child Services)

Practice data entry as follows:

- **ENTER** whether the patient has ever received ARV for treatment or prophylaxis. (Press YES if the patient is a transfer in and is on treatment or prophylaxis. Note that you will be required to record the venue and status of treatment at initiation.)
- **ENTER** patient consent (whether patient agrees to be contacted by phone or visited at home).
- **ENTER** the type of confirmatory test done and **CLICK** 'Next'.
- **SELECT** the location of the confirmatory test. (If the test was done at the same health centre where the patient is being registered, the name of the facility will appear first in the list of options shown.)
- **ENTER** the year of the date of the confirmatory test and **CLICK** 'Next'.
- **ENTER** month of the date of the confirmatory test and **CLICK** 'Next'.
- **ENTER** the day of the month of the confirmatory test and **CLICK** 'Next'.

Slide 26

EXPLAIN to participants that they will now play the roles of nurses and patients at Chisaka District Hospital. Participants will be assigned one of four patients from **4.2.3: Chisaka Patient Cases** during the pair activity.

VERIFY that participants have located the program enrolment section of the User Manual.

NOTE that they will use this section during the activity. **EXPLAIN** their task:

- Enrol a patient in the relevant program
- Patient visits will only last 10 minutes

ASK if they have any questions or concerns about the activity. **RESPOND** as needed.

CONDUCT the role play pair activity. **MONITOR** participant progress during the 10 minutes. Note any common techniques used or issues experienced by participants.

After 10 minutes, **BRING** the group's attention back to the front of the room. **ASK** if they experienced any problems navigating to or entering data into these enrolment forms.

NOTE that there are other forms that are routinely filled for patients during a visit.

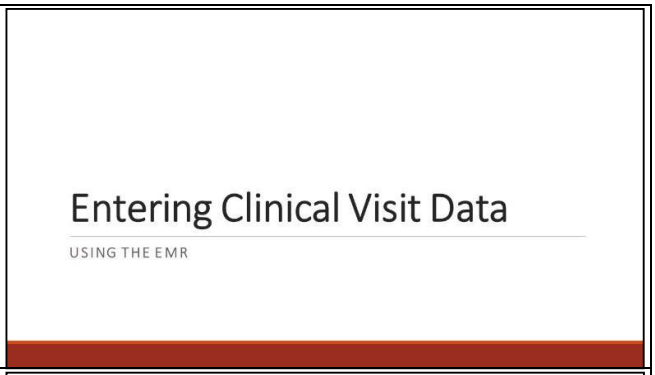
Trainer Instructions: Step 10 (40 minutes)

Use slides 27–29 and the facilitator notes to guide this step.

Slide 27

EXPLAIN that this section will focus on entering quality clinical data into the EMR.

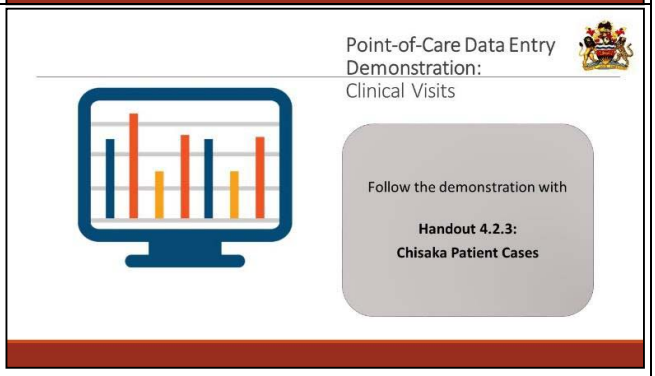
REMIND participants to keep data quality in mind as they go through this practical session.



Slide 28

MOVE AWAY from the PPT and **DISPLAY** EMR on the screen.

EXPLAIN that this next demonstration shows how clinicians would use the EMR during a variety of *clinical encounters in a point-of-care setting*.



USE the following instructions for the demonstration:

- **CLICK** on 'Clinic'.
- **NOTE** that the same patient record remains open.
- **CLICK** on each field to review the data that have been collected and displayed.
- **NOTE** that, for some of these forms, certain alerts or decision prompts will appear in the patient's banner, based on the data entered.
- **CLICK** on the **'Tasks'** button.

Slide 29

NOTE that this activity is similar to the last. The main difference is that participants are now playing clinicians conducting clinical patient visits.

- Providers conduct consultations and interviews with their patients.
- Providers will use the EMR system to record the data they collect during the clinical visit.
- Each patient visit will last only 15 minutes.

CONTINUE to work with the same patient assignments as in the previous role play exercises. During this visit, they will need to use the data from **4.2.3: Chisaka Patient Cases** to complete the following:

- Patient body exam, notes, and diagnosis
- WHO staging
- Notes on allergies or ART side effects

CONDUCT the role play pair activity. **MONITOR** participant progress during the 15 minutes. Note any common techniques or issues experienced by participants.
After 15 minutes, **BRING** participants' attention back to the front of the room.
ASK participants who were playing patients:

- How did your clinical visits go?
- What did the provider do well in terms of data collection techniques?
- What could the provider have done better?

ASK the participants who were providers:

- How did the clinical visit go?
- What, if any, alerts appeared in the patient dashboard while you were using EMR? How did you use them?
- What challenges did you encounter using EMR to enter data during the visit?
- How do you think you might address those challenges in the future?

WRITE key challenges and techniques on a piece of flip chart paper

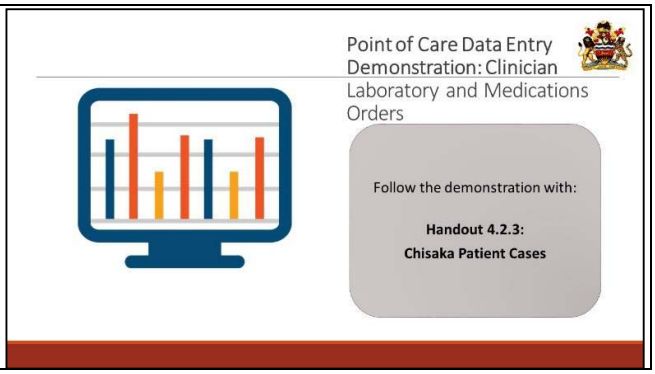
Trainer Instructions: Step 11 (40 minutes)

Use slides 30–31 and the facilitator notes to guide this step.

Slide 30

MOVE AWAY from the PPT and **DISPLAY** EMR on the screen.

EXPLAIN that this next demonstration shows how clinicians would use the EMR when collecting data about prescribing medications and ordering laboratory tests.

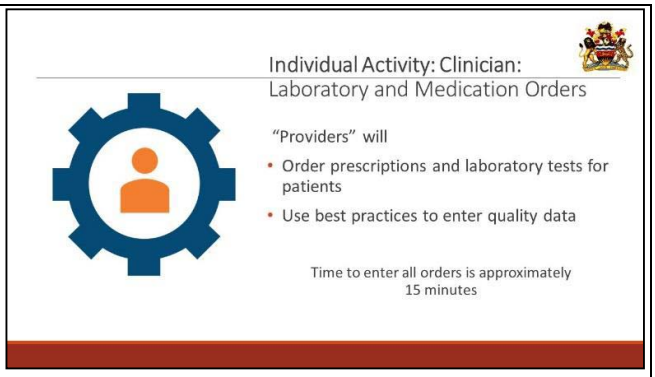


Slide 31

NOTE that this activity is similar to the last one, except that there are no patients.

EXPLAIN that participants will enter pharmacy and laboratory data from the patient cases into the EMR. During this visit, they will need to complete:

- Medication prescriptions
- Laboratory test orders



CONDUCT the individual activity. **MONITOR** participant progress during the 15 minutes. Note any issues experienced by participants.

After 15 minutes, **BRING** the group's attention back to the front of the room.

ASK participants:

- What was your experience entering prescriptions into the EMR? What about laboratory test orders?
- What challenges did you encounter?
- How did you resolve these challenges?

WRITE key challenges and solutions on a piece of flipchart paper.

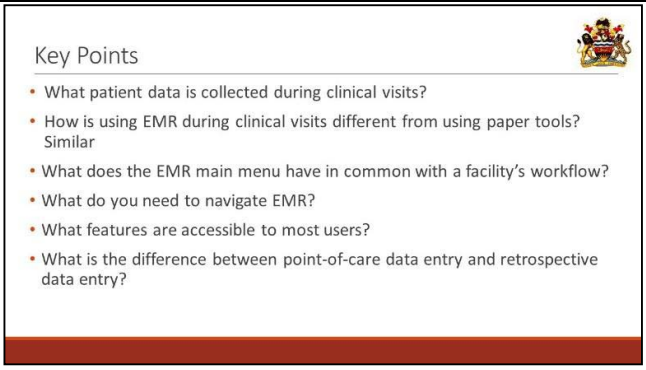
Trainer Instructions: Step 12 (5 minutes)

Use slide 32 and the facilitator notes to guide this step.

Slide 32

USE the questions on this slide to review key points from this session.

IDENTIFY what participants can do with EMR now that the session is at its end. They should identify at least four tasks: (1) search for a patient, (2) create a patient record, (3) check in a patient, and (4) enrol a patient into a programme.



NOTE that they now have some experience using an EMR system. **ACKNOWLEDGE** that participants are already familiar with how paper tools are used in their facility. **ASK** participants to share how they think an EMR system such as EMR compares to the paper tools they use.

WRITE participant responses about paper tools in a column with the heading *Paper Tools* on a piece of flip chart paper. **NOTE** their responses about EMR systems under a second column, with the heading **EMR Systems**.

Possible responses on how EMR differs from paper tools:

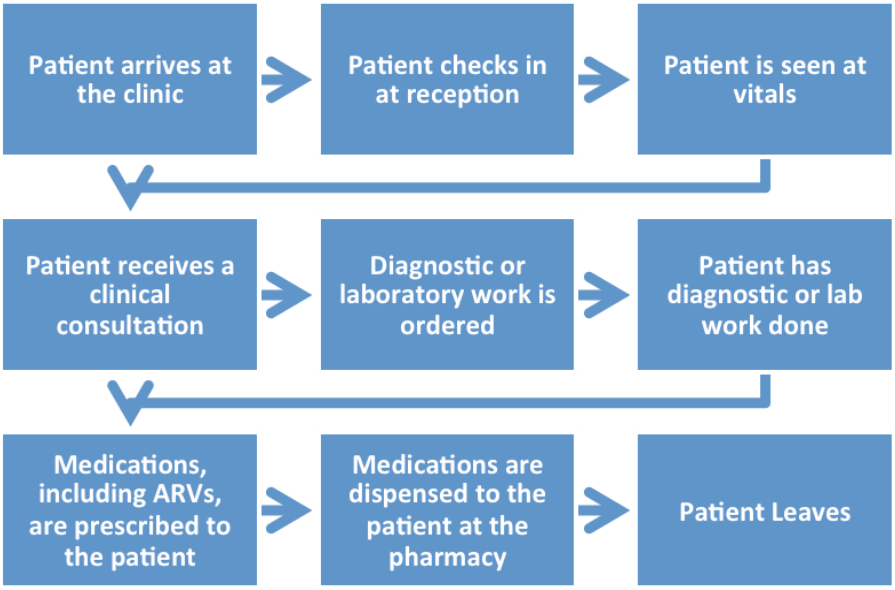
- *EMR systems have hardware and software*
- *EMR systems have buttons, text fields, etc.*
- *Paper tools are filled in by hand at each point in the workflow, whereas EMR systems might only be used at the end of the day.*
- *EMR systems may perform calculations automatically, whereas paper tools require humans to manually do the calculations.*

Possible responses about what they have in common:

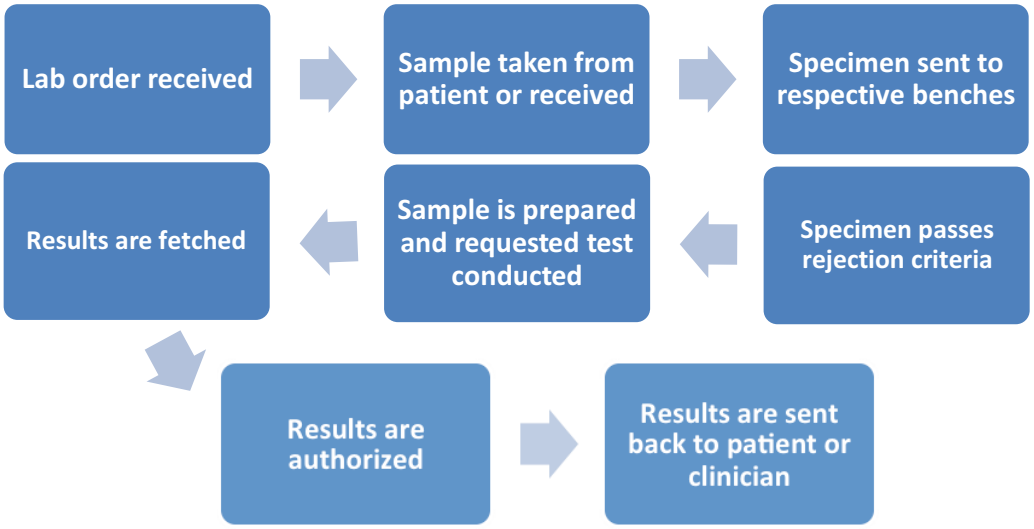
- *Both types of tools are used for the same purpose.*
- *Staff need to know how to fill in or use each tool correctly.*
- *Both types of tools collect much of the same data.*
- *Both types of tools can be used at point of care.*

Handout 4.2.1: Workflows and e-HIS Data Collection

EMR: Clinical Workflow



LIMS: Laboratory Workflow



Handout 4.2.2: EMR System Treasure Hunt

Instructions:

Log on to the EMR System with your username and password.

Look for the answers to the questions below and write them in the space provided. Be prepared to show others how you arrived at your responses!

1. What data do you enter to create a new patient record?
2. When a patient is checked in, what patient data are always shown at the top of the page?
3. Where would you enter the HIV status of a patient's father?
4. Where do you enter the name of the facility that an HIV patient transferred from?
5. Where would you see a patient's weight and CD4 count graph?
6. Where do you record a patient's vital signs?
7. Where would you find a list of all visits scheduled for today?
8. What outcomes would be entered on the Obstetric History page?
9. Where would you view or enter a patient's WHO stage?

Handout 4.2.3: Chisaka Patient Cases

Patient Information #1		
1.	• National ID Number	98765432/11/12345
2.	• Surname, first name • Other name(s) • Gender • Birthdate and age	Jane Phiri Female 32 on March 2018
3.	• Address: • Telephone contact: • Area: • TA: • Village: • District:	P.O. Box 40351 0888973146 Area 25 Chatulo Zulo Lilongwe
4.	• Name • Contact point • Telephone #1 • Telephone #2	Albert Chibwe Brother 0888317885 0888317885
Supplemental data to use		
5.	• New national ID number	44772917/18/43201
6.	• Exact birthdate	4 April 1980
Guardian Information		
Contact person		
1.	• Name	Mercy
2.	• Surname	Longwe
3.	• Contact	0888317885
Personal information and sexual partners		
4.	• Occupation	Small business owner
5.	• Formal Education	Secondary
6.	• No. of householders	3
7.	• HIV Status of partners	Unknown
Children		
8.	• No. of children	2
9.	• No. of tested children	2
10.	• No of HIV+ children	0

Programme Enrolment Information		
1.	• Program	HIV care
2.	• State	Active on programme
3.	• Admission date	23 March 2017
Vitals		
4.	• Temp • Weight • Height • Blood pressure • Pulse rate • Respiratory rate	36 49 kg 1.59 m 118/67 55 10
Consultation		
WHO Stage		
5.	• Symptoms	Persistent fever Diarrhoea
Relevant notes		
6.	• No shortness of breath or cough	
Anamnesis and body exam		
7.	Patient worrying about a cough that she's been having for 4 months, and the recent development of a sore throat. She's also noticing that she has lost some weight in the past month. When you ask her, she says she thinks it's about 7 pounds. However, she has not been trying to lose weight.	
8.	Head and neck	No lymphadenopathy
9.	Chest	Clear
10.	Abdomen	Non-tender to light and deep palpations
11.	Upper and lower limbs	No oedema
Screening		
12.	STI symptoms	No
13.	TB symptoms	No
14.	Cryptococcus symptoms	Suspect
Diagnosis		
15.	Next consultation date	25 October 2018
Prescriptions		
1.	• ARV prescription	Start first-line regimen
2.	• Drug	Paracetamol, 500 mg, twice daily with food for 10 days

Laboratory Tests		
1.	• Panel	Chemistry
2.	• Tests	Pregnancy
Patient Information #2		
3.	• National ID Number	5879468/18/85468
4.	• Surname, first name • Other name(s) • Gender • Birthdate and age	Peter Wiliford Male 16 October 1969, 49
5.	• Address: • Telephone contact: • Area: • District: • Country: • Region: • TA:	P.O. Box 45301 0888317885 Chigumula Blantyre Malawi Southern Makwasa
6.	• Name • Contact point • Telephone #1 • Telephone #2	Susanna Wife 0888317885 0888317885
Supplemental data to use		
7.	• New national ID number	5524685/18/24031
Guardian Information		
Contact person		
8.	• Name	Ellen
9.	• Surname	Tembwe
10.	• Contact	0888317885
Personal information and sexual partners		
11.	• Occupation	Schoolteacher
12.	• Formal education	Secondary
13.	• No. of householders	9
14.	• HIV status of partners	Unknown
Children		
15.	• No. of children	4
16.	• No. of tested children	3
17.	• No. of HIV+ children	1
Program Enrolment Information		
	• Program	TB

	• State	Abandoned
	• Admission date	23 November 2017
Vitals		
	• Temp • Weight • Height • Blood pressure • Pulse rate • Respiratory rate	36 72 kg 1.71 m 132/75 59 18
	Consultation	
WHO Stage		
	• Symptoms	Asymptomatic
Relevant notes		
	• Infiltrative TB of left lung with cavitation without MTB shedding	
Anamnesis and body exam		
	Older male, looks older than stated. Skin is excoriated – normal otherwise.	
	• Head and neck	Pupils equally round and reactive to light and accommodation. Supple
	• Chest	Regular rate and rhythm—no murmurs, rubs, or gallops
	• Abdomen	Slightly distended
	• Upper and lower limbs	No oedema
Screening		
	• STI symptoms	No
	• HIV symptoms	Yes
	• Cryptococcus symptoms	No
Diagnosis		
	• Next consultation date	25 October 2018
	Prescriptions	
	Prescription	Isoniazid, rifampin, pyrazinamide, and ethambutol 7 days per week for 8 weeks, followed by isoniazid and rifampin 7 days per week for 24 weeks

Laboratory Tests		
	• Panel	Chemistry
	• Tests	HIV
Patient Information #3		
	National ID number	3124657/18/09731
	• Surname, first name • Other name(s) • Gender • Birthdate and age	Chisomo, Nkhoma Female 29/06/1991
	• Address: • Telephone contact: • Area: • TA: • District: • Region:	P.O. Box 91375 0888317885 15 kwasa Lilongwe Central
	• Name • Contact point • Telephone #1 • Telephone #2	Matonse, Phiri Husband 0888317885 0888317885
Supplemental data to use		
	• New national ID number	5265137/18/94531
Guardian Information		
Contact person		
	• Name	Nora
	• Surname	Nkhoma
	• Contact	0888317885
Personal information and sexual partners		
	• Occupation	Bus driver
	• Formal education	Unknown
	• No. of householders	5
	• HIV status of partners	Unknown
Children		
	• No. of children	4
	• No. of tested children	0
	• No. of HIV+ children	0
	•	

Program Enrolment Information		
	• Program	HIV treatment
	• State	Suspended
	• Admission date	21 September 2015
Vitals		
	• Temp • Weight • Height • Blood pressure • Pulse rate • Respiratory rate	39 41 kg 1.35 m 180/100 96 24
Consultation		
WHO Stage		
	• Symptoms	Severe malnutrition, diarrhoea, oedema
Relevant notes		
	Slight woman who is complaining of weakness and fatigue. Discontinued ARV treatment sometime last year. Thinks there is no cure and it is pointless to take expensive drugs every day.	
Anamnesis and body exam		
	Developed diarrhoea several weeks ago. Complains of low-grade fever.	
	• Head and neck	Dry, brittle hair, marked alopecia; temporal muscle wasting, no thrush or oral ulcerations
	• Chest	Lungs clear to auscultation bilaterally
	• Abdomen	Decreased bowel sounds and mild abdominal distension
	• Upper and lower limbs	Trace oedema bilateral lower extremities
Screening		
	• STI Symptoms	No
	• HIV Symptoms	Yes
	• Cryptococcus symptoms	No
Diagnosis		
	• Next consultation date	2 June 2018
Prescriptions		
	Prescription	Zidovudine, lamivudine, nevirapine Ethambutol and isoniazid (completed 4 months of 8-month regimen), Trimethoprim-sulfamethoxazole, Albendazole, Amoxicillin, ORS

Laboratory Tests		
	• Panel	Chemistry
	• Tests	HIV

EMR Data Entry Controls

Delete	Removes one character at a time
Clear	Removes all characters
Next	Takes you to the next window
Back	Moves back to previous screen
FINISH	Moves you forward when you have completed a particular set of questions
Unknown	When value (e.g., date of birth) is not known
NA	Not applicable

Session 4.3

Session 4.3: Managing Data Using the Laboratory Information Management System (LIMS)

Time: 70 minutes

Learning Objectives

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

1. Identify points of service in the laboratory workflows where personnel enter data into the LIMS
2. Demonstrate how to manage new and existing patient records in the LIMS
3. Correctly navigate to the test menu to process test orders
4. Explain how to record quality assurance results using the LIMS
5. Demonstrate how to record and authorize test results

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Interactive lecture	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Facilitator presentation	LIMS overview (slides 4–6)	Flip chart, markers, tape, LCD
3	30 minutes	Interactive lecture, demonstration	Laboratory workflow and LIMS navigation (slides 7–14)	Flip chart, markers, tape, LCD, BLIS
4	35 minutes	Interactive lecture, demonstration, individual activity	Registering patients and test orders (slides 15–18)	Flip chart, markers, tape, LCD, BLIS
5	40 minutes	Interactive lecture, discussion, demonstration, individual activity	Recording laboratory quality assurance results (slides 19-23)	Flip chart, markers, tape, LCD
6	45 minutes	Interactive lecture, demonstration, pair activity	Fetching and authorizing laboratory test results (slides 24–28)	Flip chart, markers, tape, LCD, 4.2.3: Chisaka Patient Cases
7	5 minutes	Facilitator presentation	Key points (slide 29)	Flip chart, markers, tape, LCD

Resources Needed

Flip chart, paper, and markers

Handouts

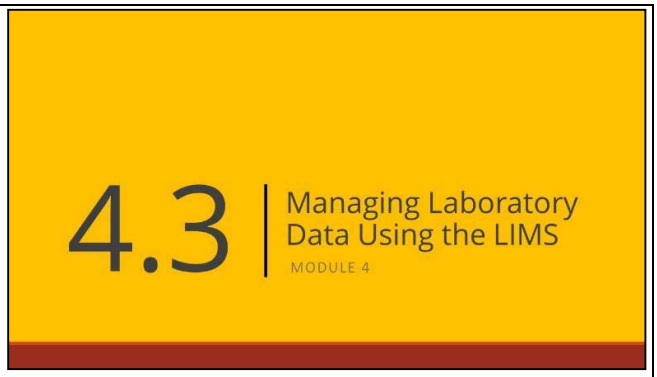
Handout 4.2.3: Chisaka Patient Cases
(Refer participants back to the previous session to locate this handout.)

Trainer Instructions: Step 1 (10 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2

ASK: How can we quickly detect an outbreak of yellow fever, cholera or typhoid? What kind of data tells providers that an HIV patient's viral load has been increasing over the past two years or that the patient is at risk of treatment failure?

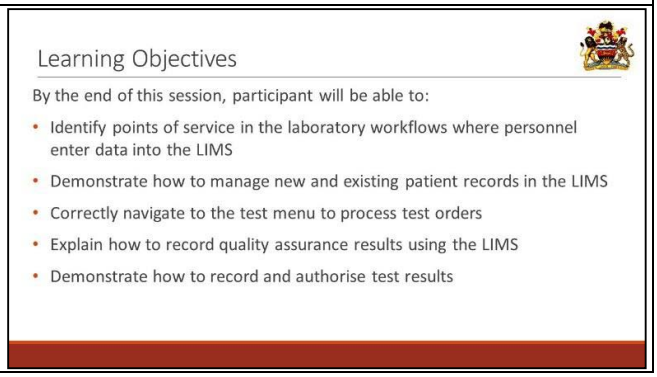


Answer: Laboratories that provide quality testing services report data that can be used for disease surveillance, diagnosis, and patient monitoring.

EXPLAIN that, beginning with this session, we will look more closely at how to use the LIMS to manage laboratory data.

Slide 3

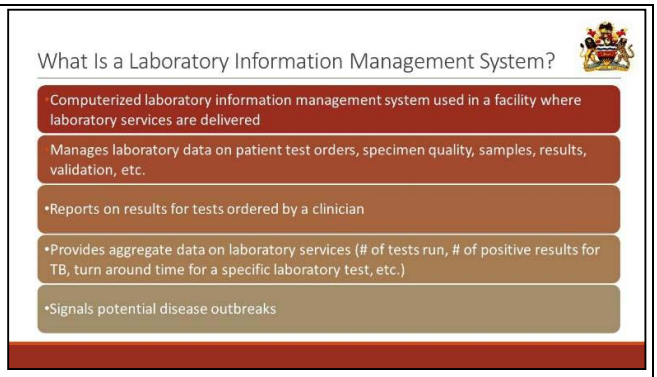
REVIEW the learning objectives for this session.



Trainer Instructions: Step 2 (10 minutes)

Use slides 4–6 and the facilitator notes to guide this step.

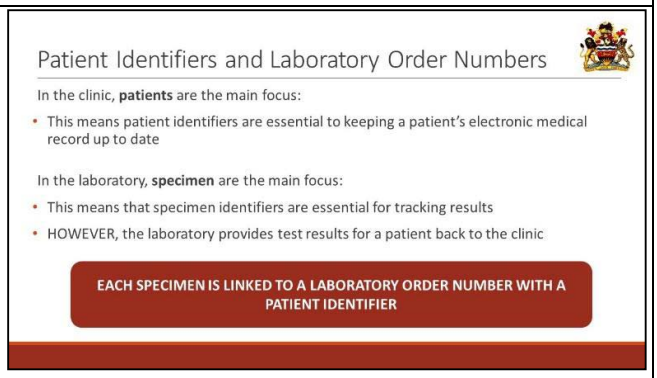
Slide 4



ASK: What is the purpose of a laboratory information management system?

REMIND participants that the laboratory is focused on providing high-quality testing services. While the patient is the focus of a clinician's attention in the clinic, the specimen or sample is the main focus of laboratory technicians. Thus, the information managed in the laboratory is mainly related to the specimen or sample, the tests performed using the sample, and the test results.

Slide 5

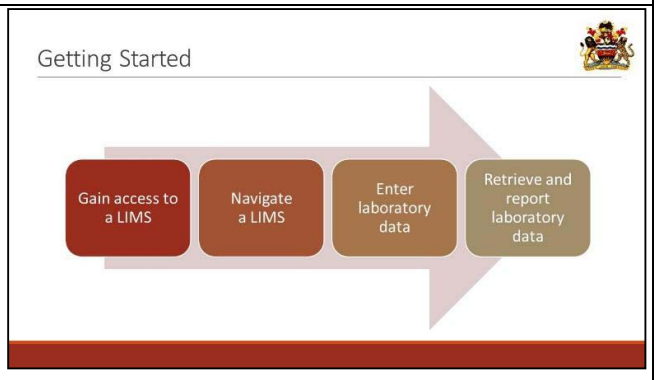


HIGHLIGHT that the purpose of the LIMS and the purpose of the EMR are different.

USE this slide to explain how the two systems differ in focus—but still use key identifying numbers for patients, laboratory orders, and specimen to share data.

EMPHASIZE that this allows the two systems to work together while still conforming to the different workflows of the clinic and the laboratory.

Slide 6



NOTE: This slide is animated. **CLICK** for each of the boxes on the screen to appear.

EXPLAIN that, like the EMR, using the LIMS can be reduced to four key actions: the EMR, use of the LIMS can be reduced to four key actions:

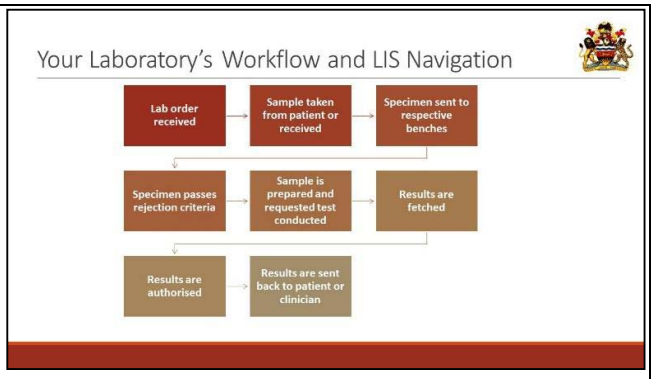
(1) **Gain access to a LIMS** in order to (2) **navigate the LIMS** so that you can (3) **enter** and (4) **retrieve and report data** from the LIMS database.

EXPLAIN that this session will focus on navigating the different parts of the LIMS, and how to navigate the system based on the laboratory's workflow.

Trainer Instructions: Step 3 (15 minutes)

Use slides 7–14 using the facilitator notes and BLIS to guide this step.

Slide 8



ASK: What are the key activities that take place in the laboratory?

LISTEN for:

- Samples are drawn
- Samples and test orders are received
- Quality assurance is performed
- Laboratory tests are performed according to the order
- Results are reviewed
- Results are sent back to the clinician

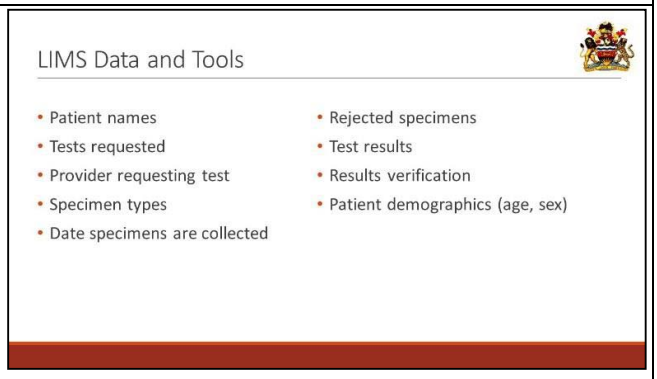
REVIEW the workflow on the slide.

BEGIN with those activities that are in the pre-analytic phase. **EXPLAIN** that patients usually come with a clinician's order for a laboratory test. Receipt of the laboratory order launches the laboratory workflow.

MOVE ON to the analytic and post-analytic phases, where samples are tested and results authorized. **HIGHLIGHT** that the workflow ends with the results being sent back to the patient or the clinician. This closes the loop between clinic and laboratory.

ASK participants if this description is accurate in their own laboratories.

Slide 9



NOTE: This slide is animated. **CLICK** for the LMIS data and tools to appear on the screen.

ASK: What information (laboratory data) is recorded in their lab, whether using a paper or electronic tool?

After receiving several responses, **CLICK** to reveal some of the data recorded in a lab. **HIGHLIGHT** any kinds of data that were not already mentioned. **ASK** if participants have any more they would like to add.

REFER back to the workflow.

ASK: When in the workflow does this data get recorded?

- Patient names are collected at reception.
- Patient demographics are usually collected at reception.
- Tests requested and the provider requesting the test are collected at the OPD or at the lab's reception desk.

- Specimen type is also at reception.
- Sometimes, the tests requested, specimen type, and provider requesting the order are given to reception on a paper form, then entered into the LIMS.
- Collection date is filled by the person taking the sample in the lab.
- Rejection happens at two points: at reception, and also at the analytical stage. (Note that a specimen can be rejected for one test and still be used for another test.)
- Test results are entered during the analytic stage.
- Results are verified at the analytic stage.

Slide 10

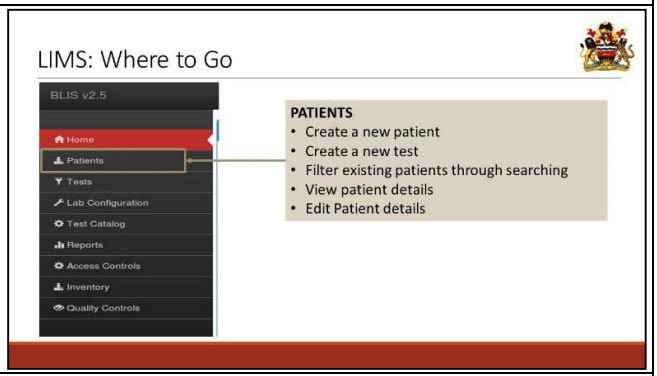
RECALL that access to the LIMS allows users to navigate the application. **HIGHLIGHT** that usernames and passwords are used in the same manner as with the EMR. (Note that usernames and passwords may be different for each application.)

REVIEW the LIMS homepage structure. **HIGHLIGHT** the role of the main menu in getting to the page the user wants to view.

DRAW attention to the laboratory section on the left-hand side of the screen. **HIGHLIGHT** that the user can change the laboratory department they are working on by using the dropdown list here.

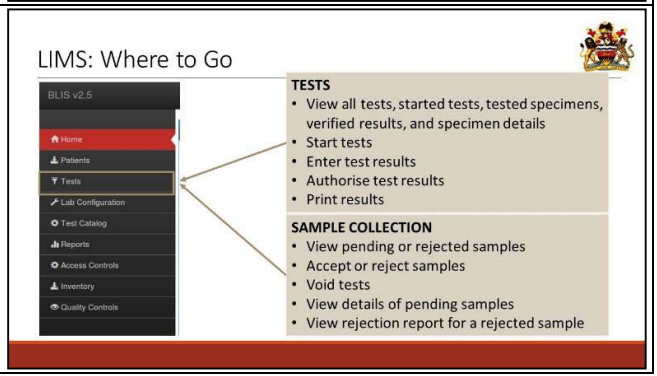
Slide 11

REVIEW the main data collection activities that can be accessed and completed by clicking on the Patient tab of the Main Menu.



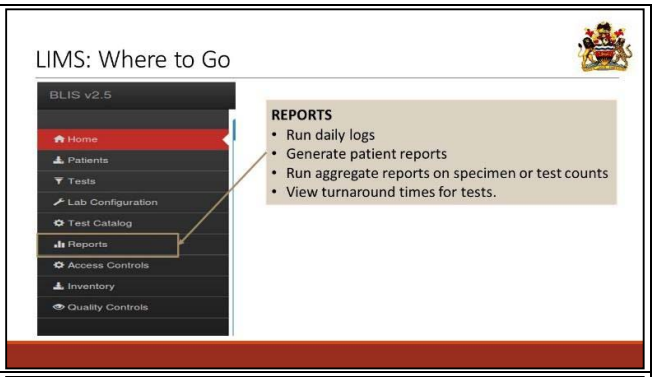
Slide 12

REVIEW the main data collection activities that can be accessed and completed by clicking on the Tests tab of the Main Menu.



Slide 13

REVIEW the main data collection activities that can be accessed and completed by clicking on the Reports tab of the Main Menu.



Slide 14

ENSURE you can move smoothly between PowerPoint and BLIS.

EXPLAIN that the demonstration will show where to go in BLIS to perform these tasks.

CONNECT the projector so that participants can see what you are doing in BLIS.

DEMONSTRATE:

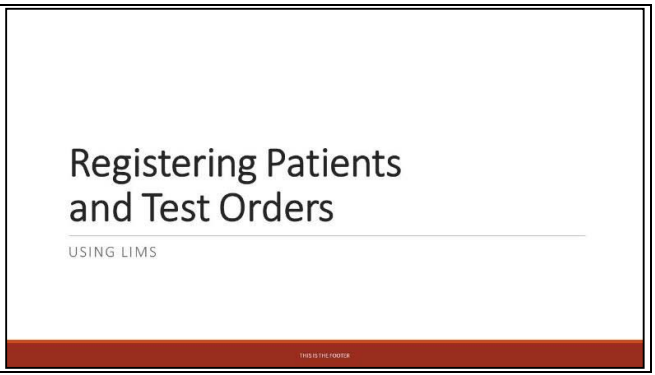
- How to log in with username and password
- The credentials in the upper right of the screen, showing who is logged in
- The elements on the main page
- The main left menu bar

HIGHLIGHT what can be done from the Patients, Tests, Reports, and Account Settings sections.

Trainer Instructions: Step 4 (35 minutes)

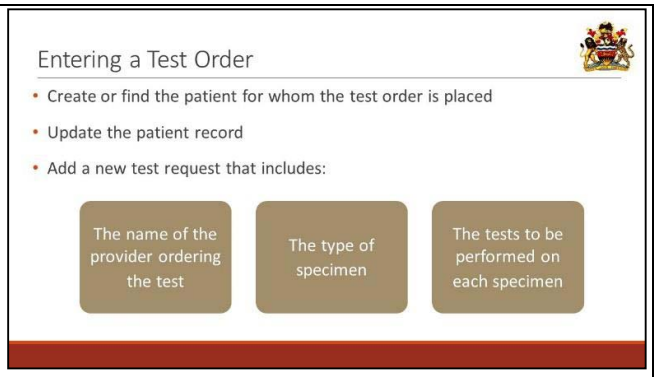
Use slides 15–18 using the facilitator notes and BLIS to guide this step.

Slide 15



Slide 16

RECALL that the first step in the laboratory workflow is to enter a test order for a specific patient. For the LIMS, this means finding or creating a patient record, and then adding a test order to the patient's LIMS record.



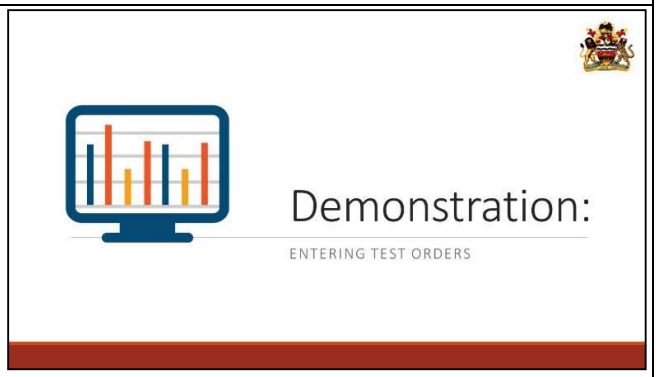
ASK participants to describe how data on test orders are currently recorded using paper tools.

ORIENT participants to the key steps to take when entering a test order in the LIMS.

Slide 17

EXPLAIN that participants will now watch a demonstration of how to enter test requests into the LIMS.

ASK participants to take out a piece of paper. **EXPLAIN** that they should note down any data that is entered into the LIMS that they do NOT currently collect on the paper tools.



NAVIGATE AWAY from PowerPoint and display the LIMS on the screen.

REFER to **Handout 4.2.3: Chisaka Patient Cases** for laboratory data to use during this demonstration or ask participants to provide data to be entered.

EXPLAIN that this demonstration focuses on how to enter a new test request into the LIMS. This means:

- Searching for the patient identified on the test request
- Creating a new patient record if one does not exist
- Updating an existing patient record
- Entering the test request data
- Printing the barcode

EXPLAIN the following processes:

<u>Create a New Patient</u>

- From the homepage, **CLICK** on Patients.
- **CLICK** on the 'Create a new patient' tab.
- A blank patient form will appear; fill in the patient's name, age, sex, and contact information.
- **CLICK** on Save.

Search for a Patient

- From the homepage, **CLICK** on Patients.
- Search for the patient either by name or using the barcode. (Note that barcodes on patient passbooks will soon enable you to pull up patient records.)
- It is good practice to type in the patient's full name.
- If you type in part of the patient's name, a list of possible matches will appear.
- If you are able to find the patient, **CLICK** on their name.

Updating a Patient Record

- **NOTE** that you can only edit a patient's record in the absence of a verified test request—once a test has been ordered, it is not possible to update the record. To avoid this, be sure to check for accuracy when you create a new patient record.
- Once you have searched for the patient record you want to update, **CLICK** on the Edit tab, and change the details that you want to update.
- **CLICK** on Save.

Create a New Test Request

- **CLICK** on New Test; a blank form will appear on the page.
- Fill in the visit type: referral (from another facility) or inpatient (select the ward the patient is coming from).
- Fill in the name of the provider and the type of specimen.
- **SELECT** the tests or panels that have been ordered for that sample.
- **CLICK** on Save—the system will automatically generate the barcode.

EXPLAIN that a window will pop up asking if you want to Accept or Reject the specimen.

ASK: When would you reject a specimen at registration?

Responses may include:

- *Wrong container*
- *Wrong test request*
- *Missing specimen*
- *Incomplete form*

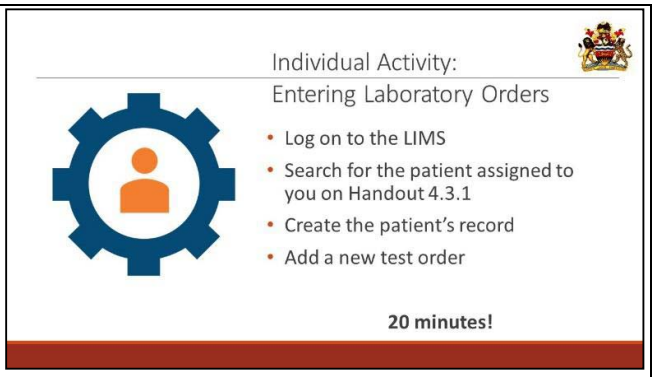
NOTE that if there are different tubes for the same patient going to the same department, create one test request with one barcode. If the patient has different tubes going to different departments, generate different test requests with unique bar codes.

Before going on to the demonstration, **ASK**: What data can the LIMS collect that are not currently collected?

Answer: *It is possible/likely that the LIMS collects the same data that they currently collect at this phase. There may be some data that the LIMS automatically fills for them (i.e., receipt date) and some new data elements. However, there should not be a significant difference overall.*

Slide 18

EXPLAIN that participants will now have an opportunity to practice entering test requests and creating new patients themselves.



REVIEW the instructions for the activity on the slide and check that participants understand the activity.

REFER participants back to **Handout 4.2.3: Chisaka Patient Cases** and assign each person a patient. **NOTE** that participants can be assigned the same patient data; however, they will need to change the patient's ID number in order to create a new patient record. This also shows whether or not participants are following best practice by searching for the correct patient before adding a new patient.

WRITE the URL on a piece of flip chart paper. Distribute usernames and logons.

After 20 minutes, **INSTRUCT** participants to exchange data sets with the person next to them. **INFORM** the participants that they will have 10 minutes to check the data entered for completeness and accuracy.

After another 10 minutes, **ASK** participants to share their observations about entering test orders and creating patients. What went well? What difficulties did they encounter?

WRITE their responses on two flip charts, one labelled 'Advantages', and the other labelled 'Difficulties'.

Trainer Instructions: Step 5 (40 minutes)

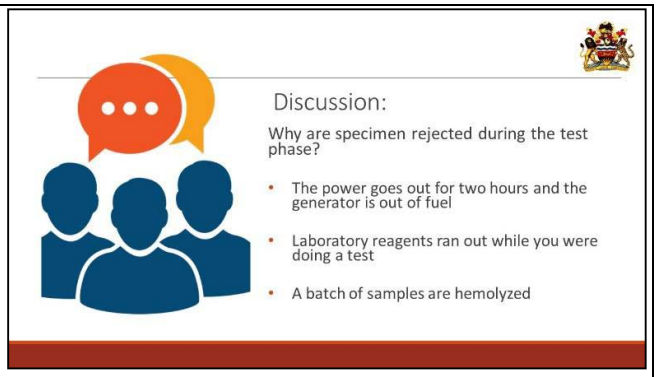
Use slides 19–23 and the facilitator notes to guide this step.

Slide 19

EXPLAIN that all laboratories conduct quality assurance activities in order to make sure that laboratory results are accurate and of high quality. This session will focus on how these activities are recorded in the LIMS.

Slide 20

NOTE: This slide is animated. **CLICK** to reveal the three scenarios after asking the initial question.



ASK participants to brainstorm reasons why they would reject a specimen during the testing phase.

Potential answer:

- *Specimen is clotted or haemolysed—the nurse or laboratory technician did not do the draw correctly.*

SHOW the three scenarios on the slide and **ASK** what participants would do in each scenario—and how would they record it in the LIMS.

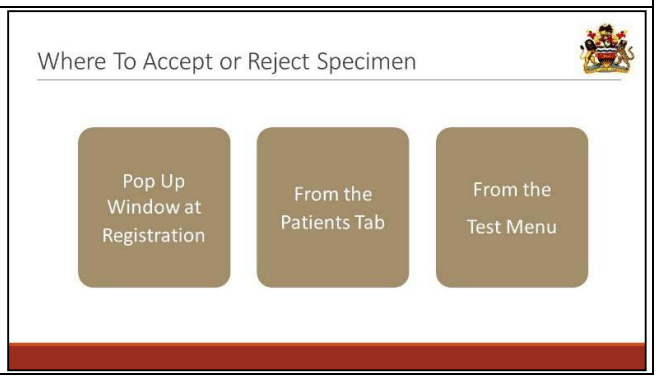
Answers:

- The power goes out for two hours and the generator is out of fuel:
  - *Record the test as 'not done' and indicate the reason.*
  - *Refer the test to another facility.*
- Laboratory reagents ran out while you were doing a test:
  - *Record the test as 'not done' and indicate the reason.*
  - *Refer the test to another facility.*
- A batch of samples is haemolysed:
  - *Reject the samples; record the reason, and the contact person for corrective action.*

EXPLAIN that this demonstration and practical activity will focus on how to record these events in the LIMS.

Slide 21

NOTE that participants have already seen how to reject a specimen at registration. This demonstration will look at how to record rejection results during the analytic phase.



Slide 22

NAVIGATE AWAY from PowerPoint and **DISPLAY** the LIMS on the screen. This demonstration focuses on how to record results from quality assurance measures into the LIMS.

USE the instructions below to guide the demonstration.

Patients Tab Demonstration Notes

- **CLICK** on the Patient tab; a list of all patients will appear.
- Search for the patient with the sample that you want to reject.
- **CLICK** on Accept or Reject.
- If you accept, the test request will move on to the testing phase.
- If you reject, a new form will appear; fill in the form with the reason for rejecting the sample. Note the name of the person to contact for re-drawing the sample or taking corrective action.
- **CLICK** on Okay.

Test Menu Demonstration Notes

- **CLICK** on the Test tab.
- A list of patients with tests for the section will appear.
- Search for the patient with the sample that you want to reject.
- **CLICK** on Accept or Reject.
- If you accept, the test request will move on to the testing phase.
- If you reject, a new form will appear. Fill in the form with the reason for rejecting the sample. Note the name of the person to contact for re-drawing the sample or taking corrective action.
- **CLICK** on Okay.

EXPLAIN that once you accept the specimen, the Accept tab will change to Start. This marks the beginning of the testing phase. You can still reject the specimen during the analytic phase, if necessary.

Slide 23

TELL participants that they will now have an opportunity to practice accepting or rejecting specimen themselves.

REVIEW the instructions for the activity on the slide and check that participants understand the activity.

SAY participants will continue to use the same patient assigned to them in **Handout 4.2.3: Chisaka Patient Cases.**

GIVE participants 10 minutes to complete the activity.

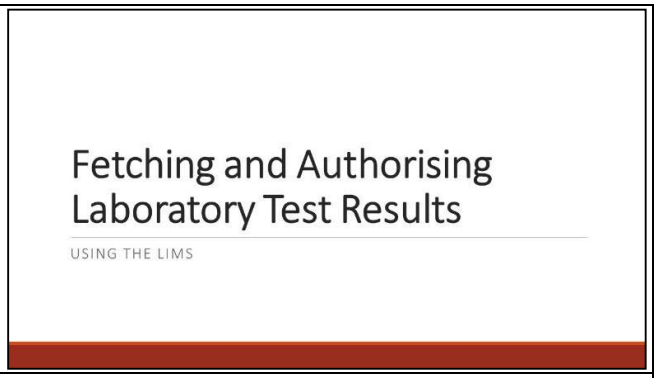
ASK participants to share their observations. **ADD** their responses to the existing flip charts.

Trainer Instructions: Step 6 (45 minutes)

Use slides 24–28 using the facilitator notes and BLIS to guide this step.

Slide 24

EXPLAIN to participants that the laboratory results need to be retrieved and authorized once the test has been performed. This session will focus on how these activities are recorded in the LIMS.



Slide 25

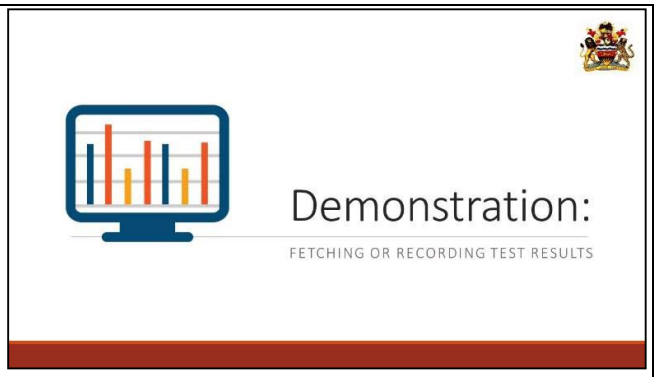
NAVIGATE to the Test Result section of the user manual.

EXPLAIN that participants will guide the demonstration by telling the facilitator where to go in BLIS and what to enter in order to record or fetch results. The facilitator can make additional points as needed.

Demonstration Instructions

- Go to the Test tab.
- Search for the patient you want to enter results for by using the barcode or entering the patient's name.
- Locate the patient.
- **CLICK** on Start.

- **CLICK** on Enter Results.
- A window pops up with a blank form where the test result details are to be entered.
- If the test has been done by an analyser, **CLICK** on the Fetch button.
- If the test has been done manually, record the results in the proper field.
- **CLICK** on Save.
- The tab will change to Authorize.

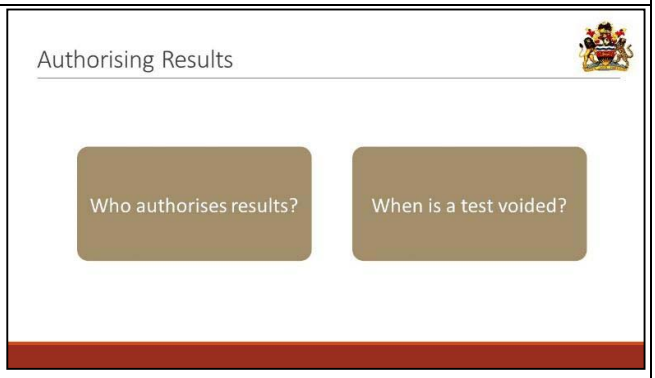


To edit the results, follow the same procedure. When you get to the patient results, you will have the option to edit.

Slide 26

Before conducting the demonstration, **ASK** participants what happens during the authorization stage.

EXPLAIN that a test is not considered complete until the results have been authorized. Even results from analysers need to be authorized.



ASK: Who authorizes the results?

Participants should respond that the same person who enters the result cannot also authorize the result.

EXPLAIN that voiding means that the result is deleted from the system and the test needs to be performed again.

ASK: When is a test voided?

Answers:
- *The result is not clinically sound—invalid or abnormal.*
- *The wrong test is performed on a sample.*
- *The analyser has not been properly serviced.*

Slide 27

TELL participants to go to the Test Result section of their user manual.

EXPLAIN that participants will guide the demonstration by telling the facilitator where to go in BLIS and what to enter in order to record or fetch results. The facilitator can make additional points as needed.

Demonstration Instructions

- **CLICK** on the Test tab.
- Search for the patient whose results need to be authorized.
- **CLICK** on the Authorize icon or button.
- A window will pop up and ask if you want to print; if you do, **CLICK** on Print.
- **CLICK** on Authorize again.
- A page will appear on the screen with the results.
- If the results are not satisfactory, and other action needs to be taken, document these in the Remarks section.
- If the results are satisfactory, **CLICK** on Authorize.
- A pop-up window will ask you if you want to print.
- You will be taken to the test results screen, which lists the other patients with results pending authorization.
- Go back to the main menu or exit.

Slide 28

INSTRUCT participants to form pairs and complete the activity following the steps on the slide.

Say participants will again work with the same patient assigned to them in **Handout 4.2.3: Chisaka Patient Cases.**

After 10 minutes, **BRING** the group back together. **ASK** participants about their experience using the system. What did they like? What difficulties did they encounter?

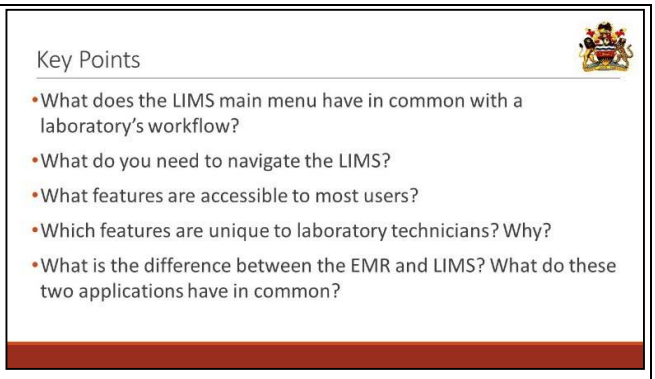
Trainer Instructions: Step 7 (20 minutes)

Use slide 29 and the facilitator notes to guide this step.

Slide 29

USE the questions on this slide to review the key points from this session and reinforce the relationship between:

- LIMS navigation, features and workflow
- EMR data and LIMS data



SUMMARIZE the main points by highlighting the following:

- The LIMS main menu corresponds to key activities within a laboratory's workflow: Registration, laboratory test order, draw samples, accept/reject specimen, perform laboratory test, authorize and report results.
- Most users have access to patient registration data, laboratory orders, and results.
- EMR collects clinical data. LIMS collects laboratory data.
- Both collect patient data for registration. Both may record laboratory orders and results.

Session 4.4

Session 4.4: Managing Data Using DHIS2 Tools

Time: 150 minutes

Learning Objectives

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

1. Identify the core building blocks of DHIS2
2. Describe the workflows and data collection supported by the DHIS2 Tracker, DHIS2 Mobile, and DHIS2
3. Identify where personnel enter data into the DHIS2 Tracker, DHIS2 Mobile, and DHIS2
4. Enter data into the DHIS2 Tracker, DHIS2 Mobile, and DHIS2

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction (slides 1–5)	Flip chart, markers, tape, LCD
2	20 minutes	Interactive lecture	Data Flow in the HIS and DHIS2, DHIS2 Mobile, and DHIS2 Tracker (slides 6–10)	Flip chart, markers, tape, LCD, Handout 4.4.1
3	50 minutes	Interactive lecture, individual activity, demonstration, practical activity	Processing and Reporting Data Using DHIS2 (slides 11–16)	Flip chart, markers, tape, LCD, Handout 4.4.2
4	70 minutes	Interactive lecture, demonstration, practical activity	Processing and Reporting Data Using DHIS2 Mobile (slides 17–21)	Flip chart, markers, tape, LCD
5	5 minutes	Facilitator presentation	Key points (slides 22–23)	Flip chart, markers, tape, LCD

Resources Needed

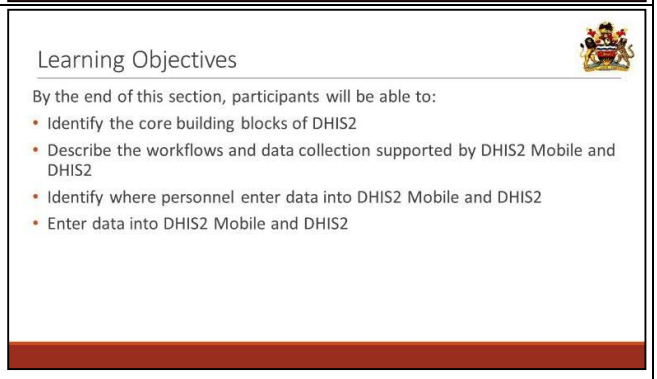
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- DHIS2 Data Entry and Data Use Manual
- Individual mobile devices
- Handout 4.4.1: DHIS2 Core Building Blocks
- Handout 4.4.2: Logging on and Navigating DHIS2

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Ensure that a training server is set up in the training room with mobile and desktop training instances of the DHIS2 and DHIS2 Mobile loaded. Check that the local network connection to the training server is working.
- Make sure that all usernames and passwords used during this session are working.

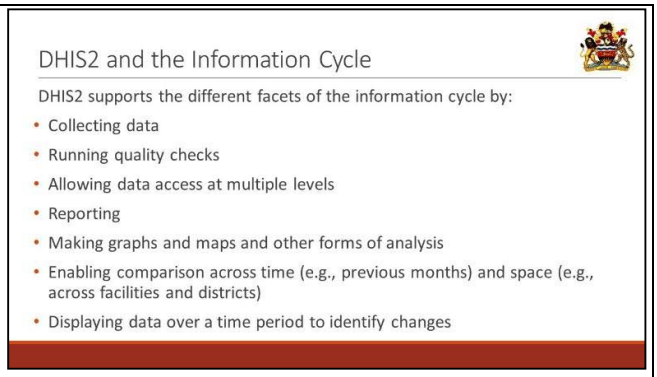
Trainer Instructions: Step 1 (5 minutes)

Use slides 1–5 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this session will look at how you can use DHIS2 to provide you with aggregate health data from facilities and districts in Malawi.	
Slide 3	**RECALL** the four steps of data management: • Collection and storage • Processing • Reporting • Analysis, interpretation, and use **REVIEW** the learning objectives for this session on Managing Data Using DHIS2 in Malawi.	

Slide 4

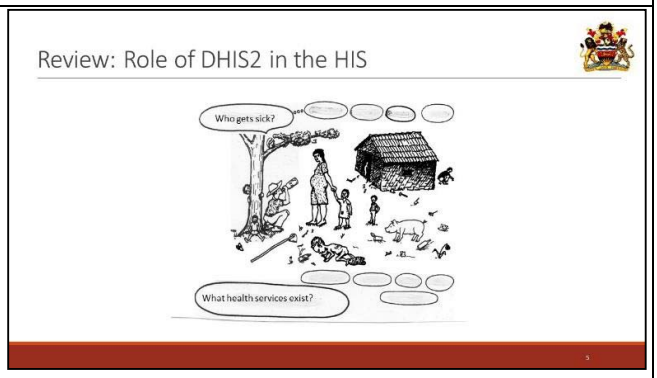
COMPARE participant responses to those listed here. **EXPLORE** anything that participants did not previously identify.



HIGHLIGHT that this section will focus on collecting data and running quality checks using DHIS2 Aggregate, DHIS2 Mobile, and DHIS2 Tracker. A later session will look in depth at accessing DHIS2 data, DHIS2 reporting, and other data visualization tools available in DHIS2 (i.e., pivot tables, dashboards, and graphs).

Slide 5

EXPLAIN DHIS2 examines health and service issues: who gets sick, and what services exist.



EXPLORE concepts of coverage and quality—brainstorm examples of each.

- Coverage: health indicators—i.e., who gets sick
- Quality: service indicators—i.e., what services exist (for the situation shown in the illustration, most likely maternal/child/women's health (MCWH))

REINFORCE that health managers need information on both coverage and quality if they plan to impact health status.

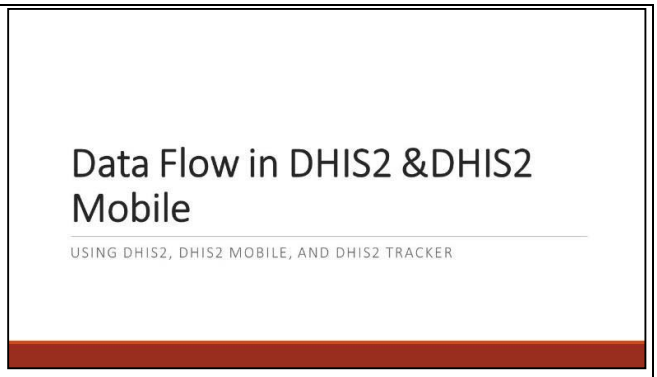
REINFORCE the importance of good, accurate information for planning resource allocation and programme prioritization.

EMPHASIZE that a DHIS must be population focused.

Trainer Instructions: Step 2 (20 minutes)

Use slides 6–10 and the facilitator notes to guide this step.

Slide 6

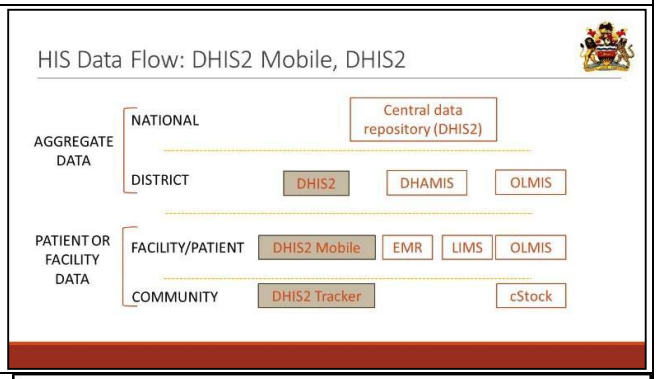


ASK what kind of data is managed by EMR and LIMS systems. **RECALL** that these systems collect patient-level data.

ASK participants to recall the relationship between patient-level data systems and aggregate data systems.

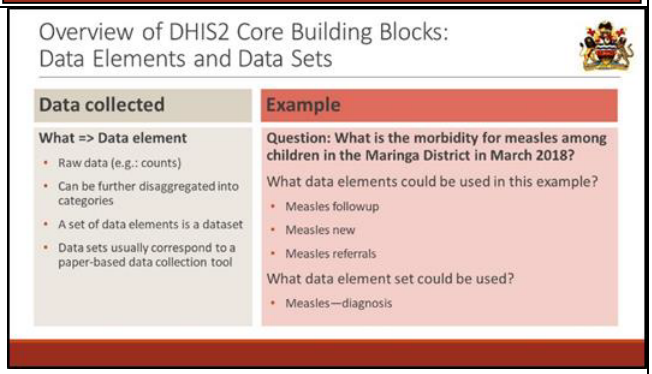
EXPLAIN that this section will focus on the role that DHIS2 plays in making aggregate data available at different levels in the Malawi HIS.

Slide 7



EXPLAIN that each of the three DHIS2 tools collects, processes, and reports data from different levels of the health system. This section will look at the common building blocks of all DHIS2 products, and examine how each of these DHIS2 tools collects data within workflows at each level.

Slide 8



Step 15 Time: 10 minutes

Method: Interactive Lecture

Content: DHIS2 Core Building Blocks (Slides 29–31)

SAY: A data value in all three DHIS2 tools (DHIS2 Tracker, DHIS2 Mobile, and DHIS2 Aggregate) is described by at least three dimensions: data element, period, and organization unit. These dimensions form the core building blocks of DHIS2.

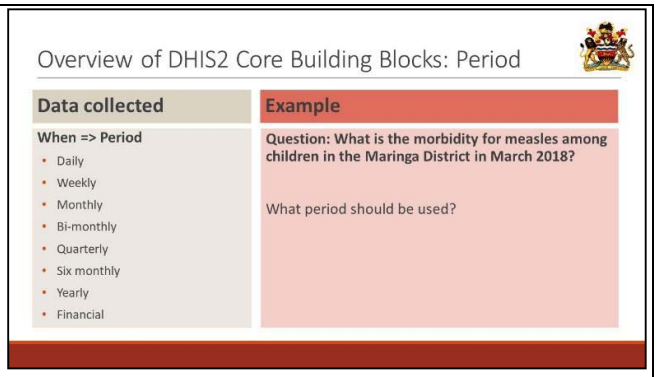
REVIEW what is meant by data element. It represents the 'what' dimension; it explains what is being collected or analysed.

Finally, **REVIEW** the example on the slide.

Slide 9

REVIEW what is meant by **period**. Note that DHIS2 organizes periods according to a set of fixed periods, such as the ones listed here.

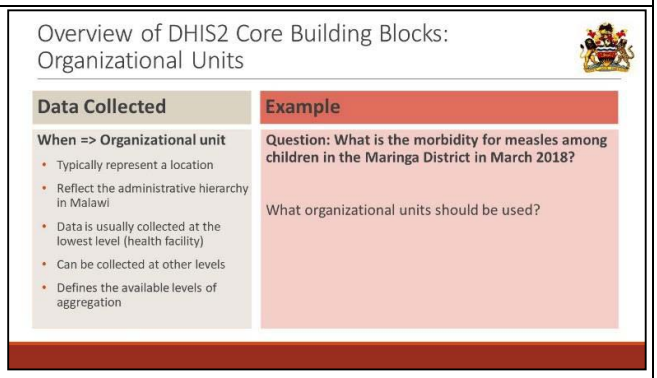
READ the example and **ASK** participants to identify the correct period to use if we wanted to know the morbidity for measles among children in the Maringa District in March 2018.



Slide 10

REVIEW what is meant by **organizational unit**. Note that the organizational units available in DHIS2 currently reflect Malawi's administrative hierarchy.

READ the example and ask participants to identify the correct organizational unit to use if we wanted to know the morbidity for measles among children in the Maringa District in March 2018?



Then **ASK** participants what organizational units they could use if they wanted to look at more than one location? **LISTEN** for: community health centre, health facility, district hospital.

EXPLAIN that in this case, they would create an organization unit, 'Type', and then add these locations as groups.

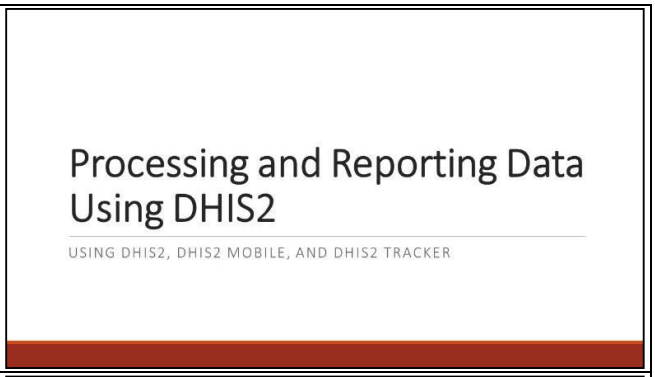
HIGHLIGHT that these units need to be exclusive: The same health facility cannot be a community health centre and a district hospital at the same time!

Trainer Instructions: Step 3 (50 minutes)

Use slides 11–16 and the facilitator notes to guide this step.

Slide 11

EXPLAIN that now that we are familiar with the overall workflow and core building blocks of DHIS2 products, let's look more closely at how DHIS2 is used to process and report aggregate data.



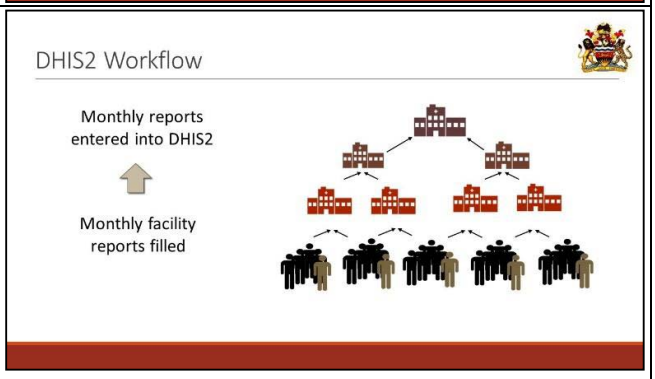
Slide 12

ASK: What monthly reports or data do you routinely enter or submit for entry into DHIS2?

Examples: *HMIS Monthly Report, HMIS Quarterly Report*

ASK: Who usually enters this data into DHIS2?

Answers: *HMIS officers, program coordinators*



RECALL that data entered into DHIS2 is aggregate data

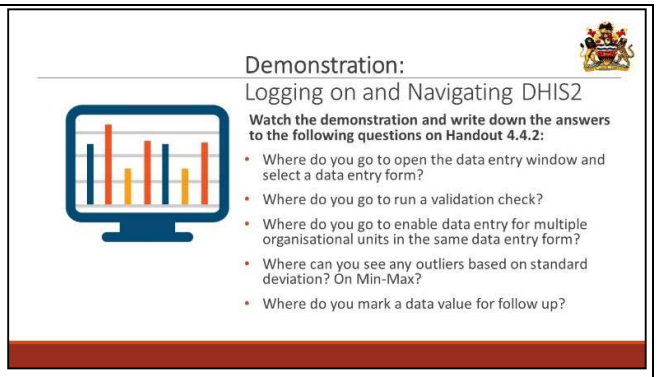
ASK: Where do the data come from? Where do the data go?

Answers:

- *Data come from facility registers and monthly reports, then flow up to the district level, where they are entered into DHIS2.*
- *From the district level, data entered into DHIS2 are submitted to the national DHIS2 repository.*

Slide 13

INSTRUCT participants to watch the demonstration and write down the answers to the questions on the slide, also found in **Handout 4.4.2. Logging on and Navigating DHIS2**



RECALL that entering data into DHIS2 requires three key pieces of information: data elements, period, and organizational units.

Logging on demonstration instructions:

- **TELL** participants how to navigate to the log in page using the URL provided.
- **ENTER** a username and password to log in .
- **SHOW** them where they can change their password and add additional information to their user profile.

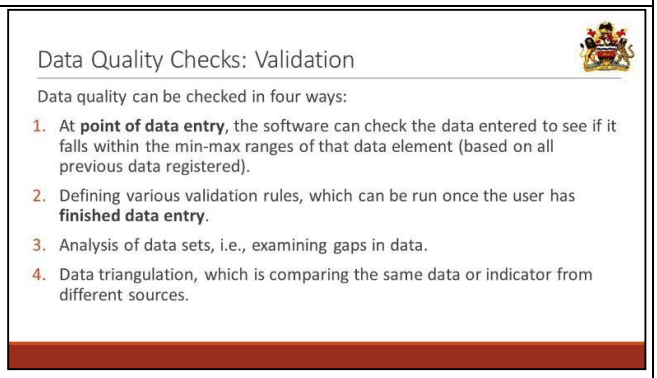
Navigation demonstration instructions:

- **EXPLAIN** that the Apps menu is the portal to the different modules in DHIS2.
- **CLICK** on Apps.
- **TELL** them how to use the search apps feature.

GO OVER each of the modules displayed under apps and explain what each one does; **HIGHLIGHT** whether the app collects data, displays data, or provides data output.

Slide 14

BRAINSTORM different ways of conducting data quality checks.



EXPLAIN that there are four ways of validating data.

REVIEW the four data quality checks listed on the slide. Do not go into great detail.

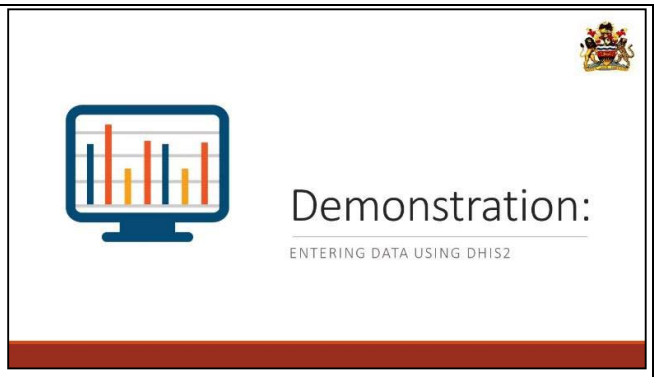
ASK participants which data quality checks can be performed by users during the data collection phase.

LISTEN for:

- *Do a min-max validation check*
- *Run a validation check against validation rules*

These are the two data quality checks that will be addressed during this session.

Slide 15



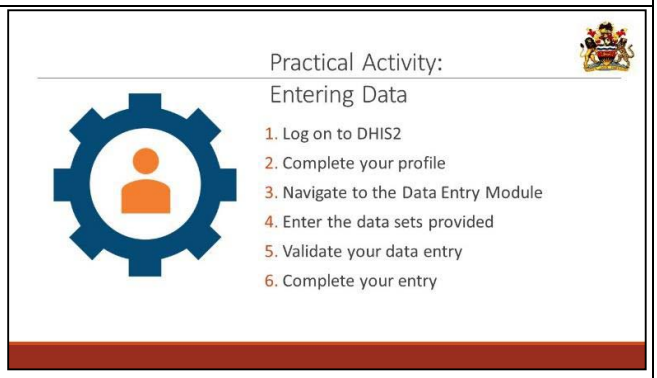
EXPLAIN that participants will now have a chance to see how to use the data entry module, organizational units, data elements, and periods to enter aggregate data into DHIS2.

ASK for a volunteer to 'drive' the demonstration. Explain that the volunteer will be the one navigating to the data entry screen and entering data from the **Case Study: Aggregate Data Set** or the monthly/quarterly reports that they brought with them.

EXPLAIN that where the participant goes and what data is entered in each field will depend on their guidance. Participants will be asked to read the instructions in the DHIS2 Data Entry and Data Use Manual, then tell the participant leading the demonstration where to go and what to do.

DIRECT participants to the Practical Exercise—Data Entry section of the DHIS2 Data Entry and Data Use Manual (p. 7). Then have participants take turns reading out each step. The 'driver' should follow their instructions.

Slide 16



EXPLAIN that participants will now have an opportunity to enter a data set into DHIS2 themselves.

ASK participants to locate the monthly or quarterly reports that they brought with them from their facility; if these are not available, provide them with a training data set.

REVIEW the instructions on the slide. **CHECK** to see if participants understand them or have questions.

GIVE participants up to 20 minutes to complete the activity.

DEBRIEF participants after the activity by asking them to share their positive or negative experiences using DHIS2. **ENCOURAGE** participants to troubleshoot issues that the group brings up.

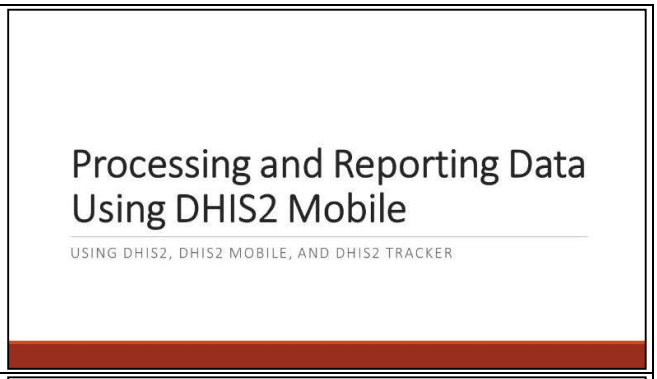
Then **GO ON** to the next section of the session.

Trainer Instructions: Step 4 (70 minutes)

Use slides 17–21 and the facilitator notes to guide this step.

Slide 17

EXPLAIN that now that you are familiar with the overall workflow and core building blocks of DHIS2 products, let's look more closely at how DHIS2 Mobile is used to process and report aggregate data from the clinics at the facility and community levels.

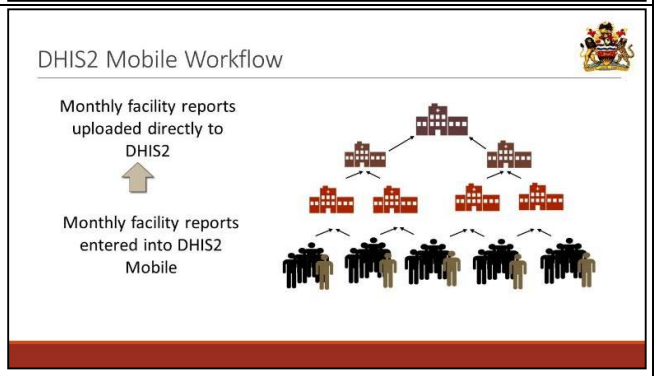


Slide 18

TELL participants that:

DHIS2 Mobile uses mobile devices, such as tablets and smartphones, to enter monthly reporting data and transmit it directly into DHIS2 at the district and central levels.

RECALL the monthly reports or data that participants routinely enter or submit for entry into DHIS2.



Slide 19

PROJECT the DHIS2 Mobile app onto the screen.

DEMONSTRATE the following steps:

1. Log in to the DHIS2 Mobile data capture application.
2. Open the data entry form.
3. Enter the data.
4. Enter the data in offline mode.
5. Import data entered in offline mode.
6. Log out.

Slide 20

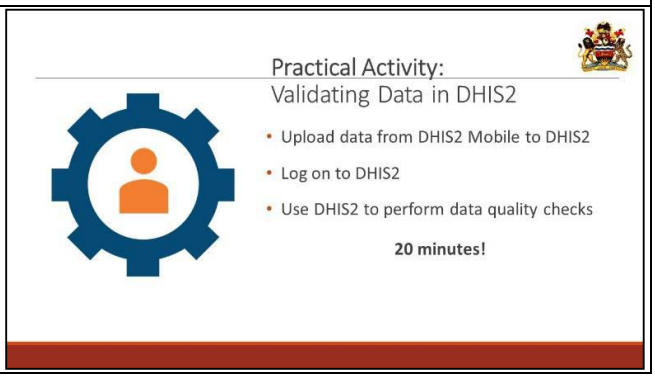
REVIEW the steps for entering data into DHIS2 Mobile if needed.

1. Log in to the DHIS2 Mobile data capture application.
2. Open the data entry form.
3. Enter the data.
4. Enter the data in offline mode.
5. Import data entered in offline mode.
6. Log out.

REVIEW the instructions for the practical activity. **ASK** if participants have any questions.

MONITOR participant progress. After 20–30 minutes, **BRING** participants back together and **DEBRIEF** them about the activity.

Slide 21

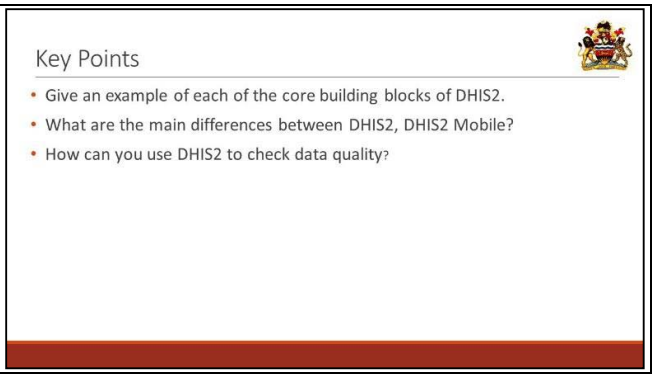


Trainer Instructions: Step 5 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22

USE the questions on this slide to review key points from this session.



Handout 4.4.1: DHIS2 Core Building Blocks

Core Building Block #1

What => Data element

- Raw data (e.g., counts: 4, 171, 399)
- Can be further disaggregated into categories
- A set of data elements is a data set
- Data sets usually correspond to a paper-based data collection tool

Core Building Block #2

When => Period

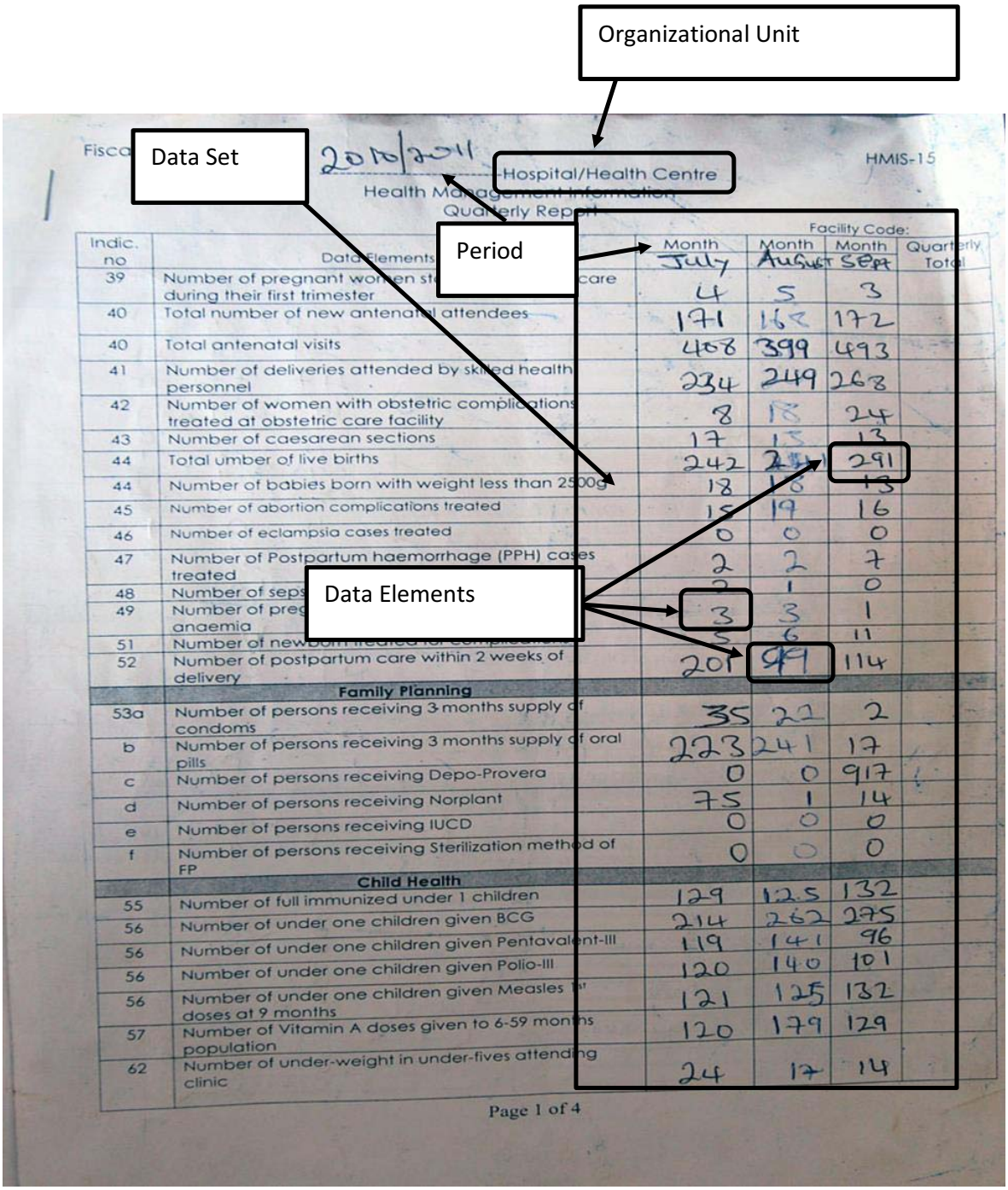
- Daily
- Weekly
- Monthly, Bi-monthly
- Quarterly
- Semi-annually
- Yearly
- Financial

Core Building Block #3

When => Organizational unit

- Typically represents a location
- Reflects the administrative hierarchy in Malawi
- Data are usually collected at the lowest level (health facility)
- Can be collected at other levels

EXAMPLE



Indic. no	Data Elements	Month July	Month August	Month Sept	Quarterly Total
39	Number of pregnant women st… care during their first trimester	4	5	3	
40	Total number of new antenatal attendees	171	162	172	
40	Total antenatal visits	408	399	493	
41	Number of deliveries attended by skilled health personnel	234	249	268	
42	Number of women with obstetric complications treated at obstetric care facility	8	18	24	
43	Number of caesarean sections	17	15	13	
44	Total umber of live births	242	241	291	
44	Number of babies born with weight less than 2500g	18	18	13	
45	Number of abortion complications treated	15	19	16	
46	Number of eclampsia cases treated	0	0	0	
47	Number of Postpartum haemorrhage (PPH) cases treated	2	2	7	
48	Number of seps…	2	1	0	
49	Number of preg… anaemia	3	3	1	
51	Number of new…	5	6	11	
52	Number of postpartum care within 2 weeks of delivery	201	99	114	
	Family Planning				
53a	Number of persons receiving 3 months supply of condoms	35	22	2	
b	Number of persons receiving 3 months supply of oral pills	223	241	17	
c	Number of persons receiving Depo-Provera	0	0	917	
d	Number of persons receiving Norplant	75	1	14	
e	Number of persons receiving IUCD	0	0	0	
f	Number of persons receiving Sterilization method of FP	0	0	0	
	Child Health				
55	Number of full immunized under 1 children	129	125	132	
56	Number of under one children given BCG	214	262	275	
56	Number of under one children given Pentavalent-III	119	141	96	
56	Number of under one children given Polio-III	120	140	101	
56	Number of under one children given Measles … doses at 9 months	121	125	132	
57	Number of Vitamin A doses given to 6-59 months population	120	179	129	
62	Number of under-weight in under-fives attending clinic	24	17	14	

Handout 4.4.2: Logging on and Navigating DHIS2

Instructions

Watch the demonstration and write down the answers to the following questions:

1. Where do you go to open the data entry window and select a data entry form?

2. Where do you go to run a validation check?

3. Where do you go to enable data entry for multiple organizational units in the same data entry form?

4. Where can you see any outliers based on standard deviation? On min-max?

5. Where do you mark a data value for follow-up?

Session 4.5: Using the Mobile Supervisory Tool (MST)

Time: 60 minutes

Learning Objectives

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

1. Describe the workflow and data collection supported by the mobile supervisory tool (MST) application
2. Identify points of service where personnel enter data into MST
3. Use MST to enter data on:
   a. Facility contacts
   b. Cohort survival analysis
   c. Stock report
   d. HIV and ART care
   e. Exposed child care
4. Upload data from MST to the Department of HIV & AIDS Management Information System (DHAMIS)

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Interactive lecture	Session introduction (slides 1–3)	Flip chart, markers, tape, LCD
2	5 minutes	Large group discussion	MST App activities, workflow and data (slide 4)	Flip chart, markers, tape, LCD
3	45 minutes	Interactive demonstration/ individual activity	Entering and uploading data into the MST App (slides 5–6)	Flip chart, markers, tape, LCD, individual mobile devices
4	5 minutes	Facilitator presentation	Key points (slide 7)	Flip chart, markers, tape, LCD

Resources Needed

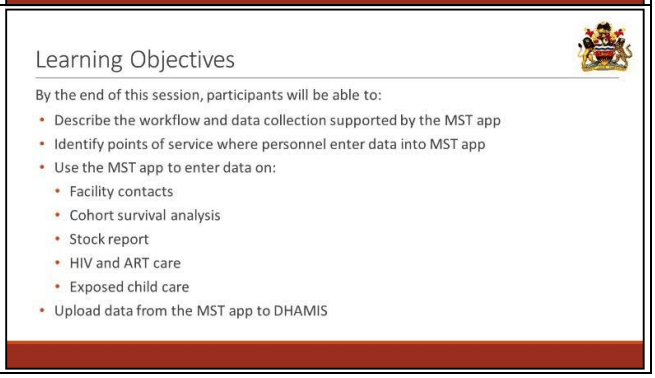
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- MST app
- Individual mobile devices

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Ensure that a training server is set up in the training room with mobile training instances of the MST App loaded. Check that the local network connection to the training server is working.
- Make sure that all usernames and passwords used during this session are working.

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

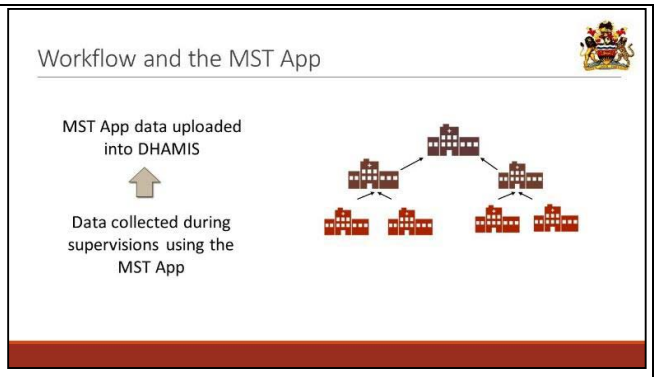
Slide 2	**RECALL** that the **Mobile Supervisory Tool (MST)** application collects the same data currently collected using the **Integrated HIV Quarterly Supervision** form. This session looks at how to enter data into the MST app during a supervisory visit.	
Slide 3	**RECALL** that this session will focus on using the MST to collect, process, and report aggregate data during a supervisory visit. **REVIEW** the learning objectives for this session	

Trainer Instructions: Step 2 (5 minutes)

Use slide 4 and the facilitator notes to guide this step.

Slide 4

BRAINSTORM the different activities that occur during a supervisory visit.



LISTEN for:

- *Review of forms and registers*
- *Counting stock*
- *Analysis and reporting of data from the reporting month for the cohorts of children aged 2 months, 12 months, and 24 months.*
- *Observation of the number of patients tested and counselled in different age groups, sex/pregnancy status, etc.*

ASK: What data are collected during these visits?

LISTEN for:

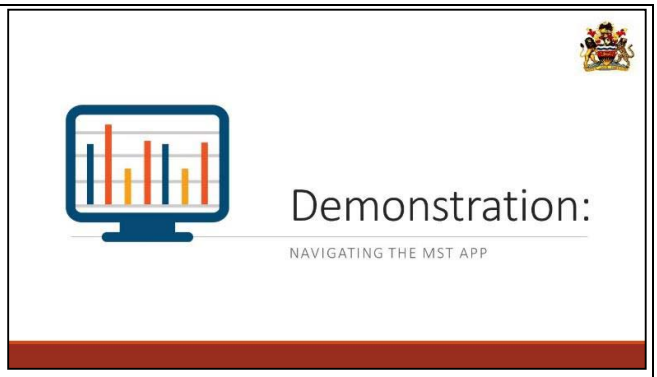
- *Facility staff contacts (additions, qualifications, phone numbers)*
- *Counting of patients within the **ART clinic registers** or **patient record master cards** and matching with the records in the database*
- *Physical counting of drugs in tins, bottles, and tabs; and non-drug items like test kits, vials, and papers (e.g., patient cards and health passports—yellow, pink, green, etc.)*
- *Review of registers in the HIV care and ART clinics*
- *Record outcome statuses for EID cohorts*
- *Reports on data from the **HIV Rapid Testing and Counselling** register, **HIV Rapid Testing Daily Activity** register, and **HIV Testing Service Provider Logbook***

USE the diagram on the slide to **REVIEW** how the MST app collects and transmits data to DHAMIS.

Trainer Instructions: Step 3 (45 minutes)

Use slides 5–6 and the facilitator notes to guide this step. For this activity participants will need a **mobile device**.

Slide 5



PROJECT the MST App onto the screen.

FOLLOW the demonstration instructions below and take participants through the app.

Demonstration instructions

- **LOCATE** the MST application.
- **LOG ON**.
- **REVIEW** the main menu.
- **TAP or CLICK ON** the icons to navigate to the different reporting sections. **FOLLOW** the supervision workflow and **DESCRIBE** the sections below using the following information:

Section: Cohort survival analysis
Retrieves historical data from the past years for that particular term and then populates the records in the Total Reg. (database) column.

Section: Stock report
Pulls historical data from the previous stock. The supervisor is required to count and indicate the total number usable tests, vials, or tabs and tins, and then indicate their expiry date, and the number of units expiring on that date.**Section: HIV care clinic**

Pulls data on patients newly registered during the quarter, and all patients registered since the start of the ART programme (cumulative number of patients). Patient demographics are further broken by sex, exposed infants, and patients registered, re-enrolled, and transferred in.

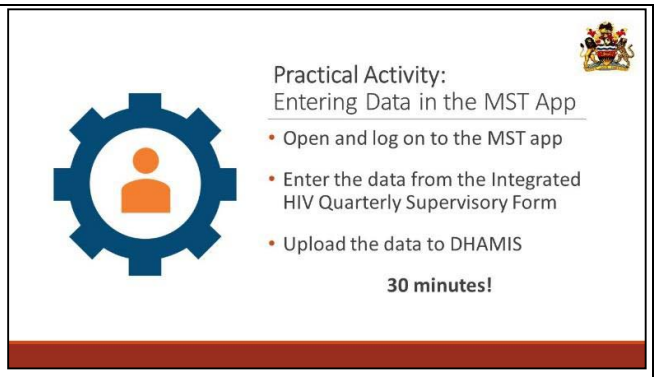
Section: ART clinic
Tracks all patients initiated on ART, patients newly registered patients during quarter, and all patients registered since the start of the ART programme (cumulative number of patients).

Section: Exposed child under 24 months monthly follow-up reporting form
Reports the number of infants born to mothers with HIV and AIDS.

Slide 6

ASK participants if they recall how to open and enter data into the MST App.

USE the demonstration instructions below to review any areas where participants have questions.



Demonstration instructions

- **LOCATE** the MST app.
- **LOG ON**.
- **REVIEW** the main menu.
- **TAP or CLICK ON** icons to navigate to different reporting sections.

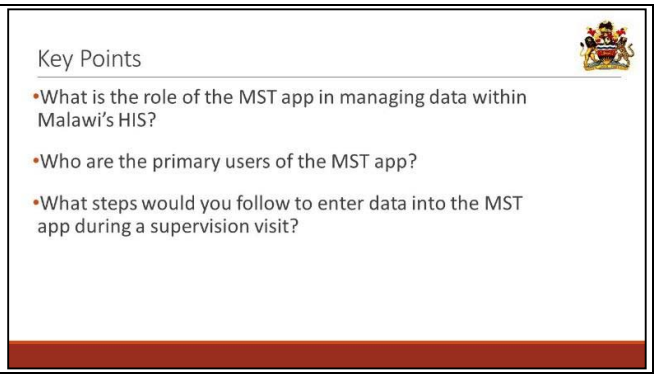
MONITOR participant progress. After 20 minutes, **BRING** participants together and **DEBRIEF** them about the activity.

Trainer Instructions: Step 4 (5 minutes)

Use slides 7 and the facilitator notes to guide this step.

Slide 7

USE the questions on this slide to review key points from this session.



MODULE 5: DATA QUALITY
Session 5.1: Introduction to Data Quality

Time: 90 minutes

Learning Objectives

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

1. Define data quality
2. Explain the importance of data quality
3. Define dimensions of data quality
4. Describe each of the five dimensions of data quality included in the National HIS Policy

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Interactive lecture, brainstorm	Data quality overview (slides 4–6)	Flip chart, markers, tape, LCD
3	45 minutes	Case study/group activity	Data of Dubious Quality (slide 7)	Flip chart, markers, tape, LCD, Handout 5.1.1
4	25 minutes	Interactive lecture	Dimensions and importance of data quality (slides 8–18)	Flip chart, markers, tape, LCD
6	5 minutes	Interactive lecture	Key points (slide 19)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

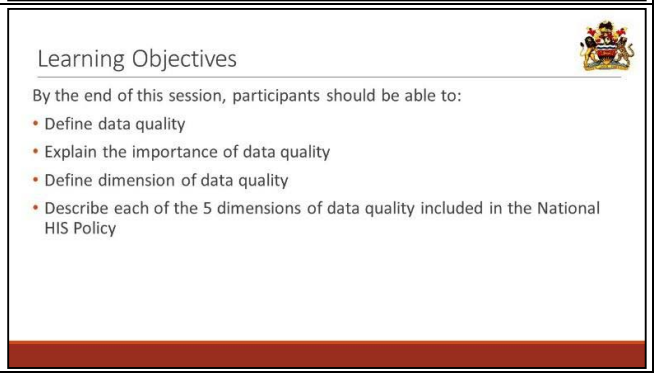
Handout 5.1.1: Data of Dubious Quality

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following eLearning Assignments:
  Module 4: Improving and Maintaining the Quality of EMR System Data

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this session will orient participants to data quality.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (10 minutes)

Use slides 4–6 and the facilitator notes to guide this step.

Slide 4

NOTE: This slide is animated. **CLICK** to reveal the answer to the question on the slide.

ASK: What is data quality?

ALLOW some discussion, then **CLICK** to share the definition.

Additional points/definitions:

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

Slide 5

EXPLAIN that, as we know, evidence-based decision making relies on data. This session will begin to consider the data that are used for evidence-based decision making, with a specific focus on the quality of data—a theme which the training has addressed and will return to several times throughout the course.

Knowing what data quality means, its importance, and the role of quality in effective use of data will make it easier to understand techniques used to assure data quality.

ASK participants to take out a piece of paper.

EXPLAIN that data quality is an important topic that they probably have some experience with already through their encounters with paper-based systems.

INSTRUCT participants to take three (3) minutes to write down what they think will be the main points made during this session. At the end of the session, they will have a chance to compare their list with the facilitator's list.

At the end of the three (3) minutes, **INSTRUCT** participants to put their names on their lists and exchange them with their neighbours. Then **CLICK** to advance to the next slide.

Slide 6

REMIND we learnt about the National HIS Policy Objective when we discussed Malawi's HIS in Module 1.

POINT TO the bolded text, and say that this session will look more closely at the words used here to describe quality data.

Trainer Instructions: Step 3 (45 minutes)

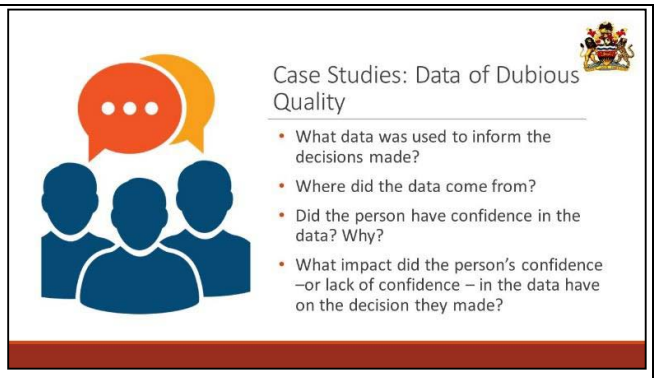
Use slide 7, the facilitator notes, and **Handout 5.1.1: Data of Dubious Quality** to guide this step.

Slide 7

Time for this activity:
45 minutes total

NOTE This slide is animated. Wait for participants to divide into their groups and read the scenarios.

REFER participants to **Handout 5.1.1: Data of Dubious Quality** and let them know that they will be looking at several issues related to the quality of data from District X.



DIVIDE participants into small groups of no more than three or four participants and **ASSIGN** each group one scenario to work with.

GIVE the groups five (5) minutes to read their scenarios.

NOTE: As you click to reveal each question on the slide, ensure that participants understand the question being asked. For example, the second question is looking at where the data comes from—was it from clinical notes? Assessments? Registration forms?

1. When the groups are done reading, **CLICK** to reveal the first question. **GIVE** them 2–3 minutes to discuss the question and record their answers.
2. **CLICK** to reveal the second question. **GIVE** the groups 2–3 minutes to discuss the question and record their answers.
3. **CLICK** to reveal the third question. **GIVE** the groups 2–3 minutes to discuss the question and record their answers.
4. **CLICK** to reveal the fourth question. **GIVE** the groups 2–3 minutes to discuss the question and record their answers.

INSTRUCT each group to provide a brief summary of their scenario and the key points of their discussions.

LIMIT each group's summary to two (2) minutes; summaries should therefore take no more than 5–10 minutes.

Key points might include:

- *The timeliness of data being available to them*
- *Completeness of other data provided to them*
- *Discoveries from the past that data was incorrectly recorded*
- *Past equipment failures that affect results*

After hearing some responses, **ASK** participants if the quantity of data makes a significant difference to their trust in the data. The quantity will likely only make a difference if the participants believe that the other elements of quality data are in place: A large quantity of data may be available to use, but effectiveness of that data will be limited if we do not have confidence that the data reflect what is really going on.

On a piece of flip chart paper, **DRAW** two columns with the following headings: 'Confidence' and 'No Confidence'. In the Confidence column, **WRITE** the reasons why people in the scenarios had confidence in the data they had access to and used. In the No Confidence column, **WRITE** the reasons why people in the scenarios did not have confidence in the data.

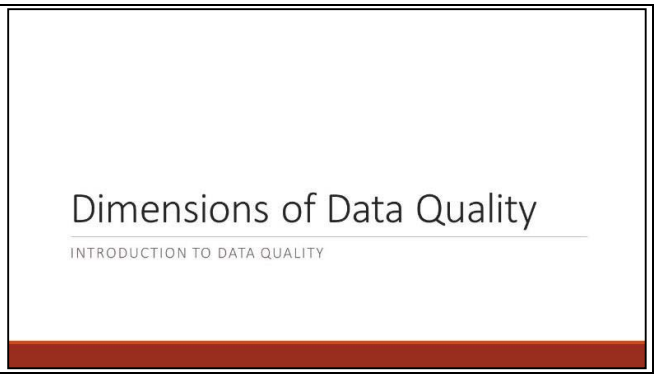
Trainer Instructions: Step 4 (25 minutes)

Use slides 8–18 and the facilitator notes to guide this step.

Slide 8

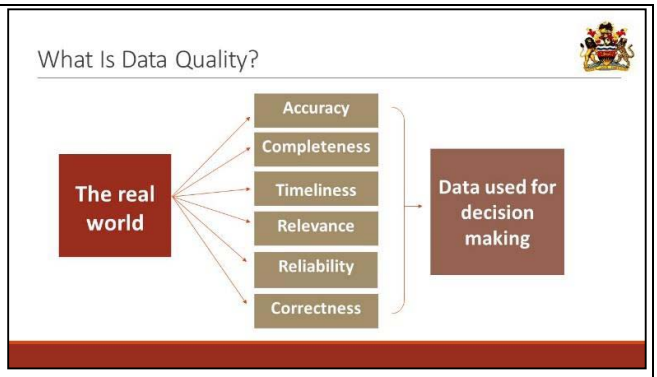
ASK participants if anyone can define 'dimensions of data quality'.

ALLOW a few responses, then **CLICK** to advance to the next slide.



Slide 9

EXPLAIN that, as we just discussed, when we talk about data quality, we refer to the degree to which the data represent reality. The quality of the data that are collected, stored, and managed by the HIS—whether paper-based or electronic—have an impact on the quality of the data reported, analysed, and used for decision making. If we put low-quality data into the system and make decisions based on that data, they will be low-quality decisions—possibly life-and-death decisions!



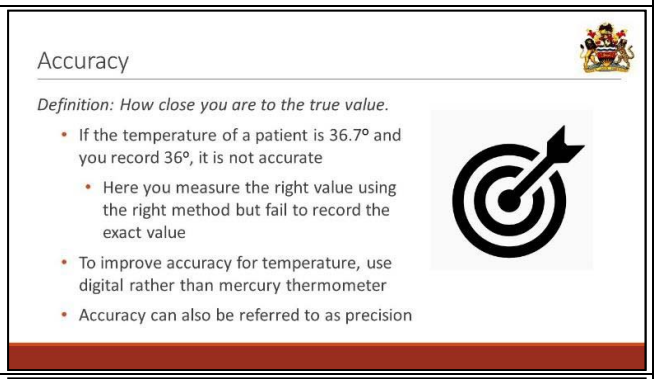
There are many dimensions to data quality, but we will focus here on the five identified by the MOHP in the National HIS Policy document: **accuracy, completeness, timeliness, relevance, and reliability.** In addition, we will also discuss correctness and consistency.

NOTE: you may hear the term 'the three Cs'. These refer to consistency, correctness, and completeness.

Slide 10

ASK a participant to read the definition for this dimension.

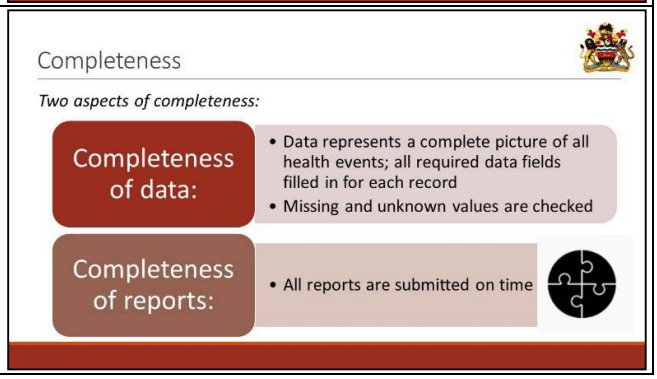
ASK participants to cite one or two examples of that dimension from the scenarios. They can refer to the flip chart or scenarios to find examples.

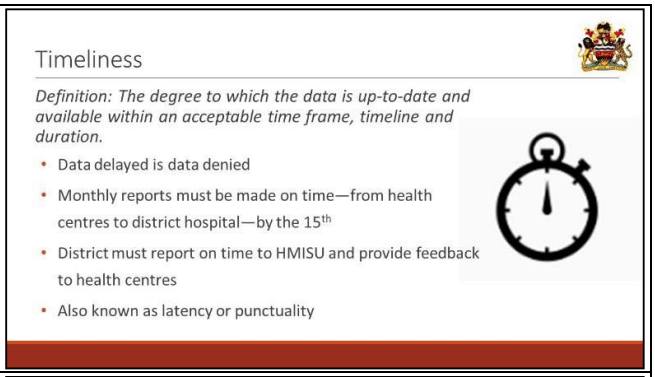
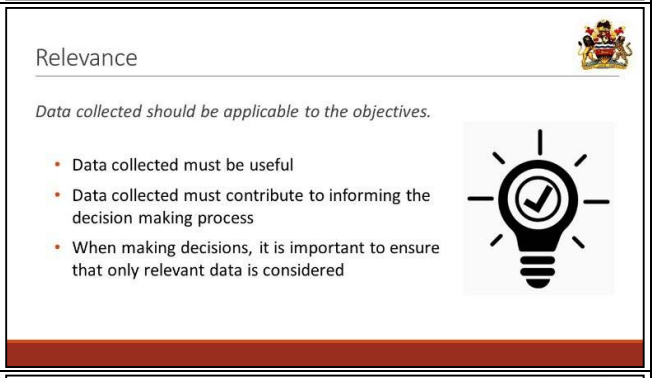
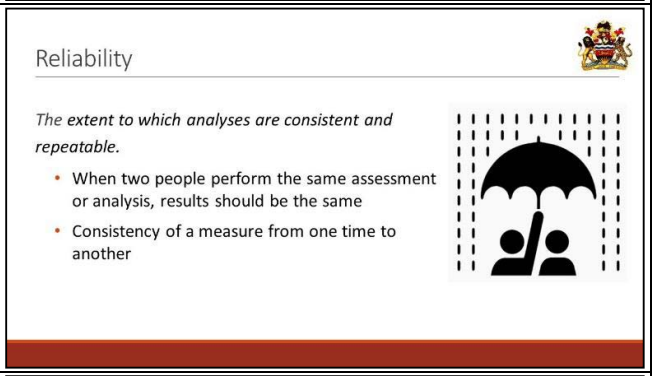
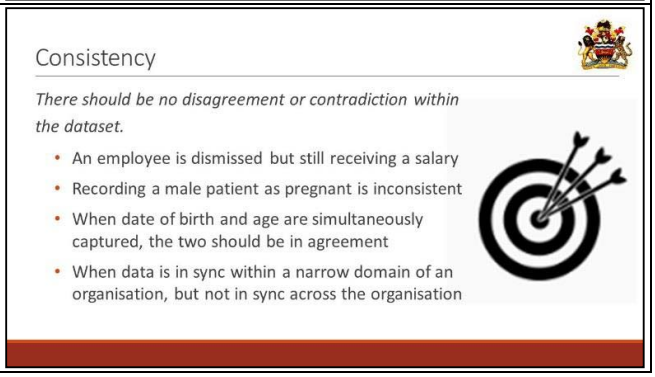


Slide 11

ASK a participant to read the points for 'completeness of data'.

ASK participants to cite two examples of this dimension from the scenarios. They can refer to the flip chart or scenarios to find examples.

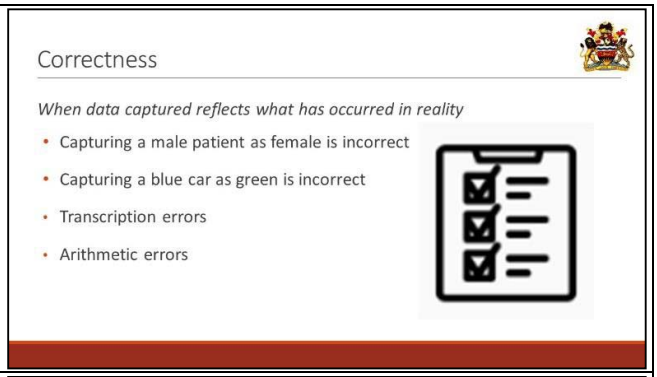


Slide 12	**ASK** a participant to read the definition in italics for this dimension. **ASK** participants to cite two examples of this dimension from the scenarios. They can refer to the flip chart or scenarios to find examples.	
Slide 13	**ASK** a participant to read the definition in italics for this dimension. **ASK** participants to cite one or two examples of this dimension from the scenarios. They can refer to the flip chart or scenarios to find examples.	
Slide 14	**ASK** a participant to read the definition in italics for this dimension. **ASK** participants to cite one or two examples of this dimension from the scenarios. They can refer to the flip chart or scenarios to find examples.	
Slide 15	**ASK** a participant to read the definition in italics for this dimension. **ASK** participants to cite one or two examples of this dimension from the scenarios. They can refer to the flip chart or scenarios to find examples.	

Slide 16

ASK a participant to read the definition in italics for this dimension.

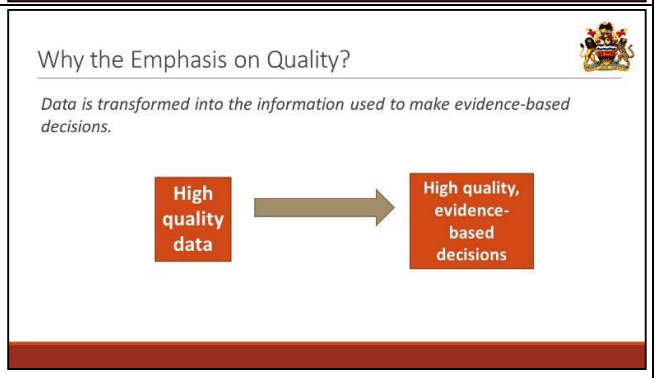
ASK participants to cite one or two examples of this dimension from the scenarios. They can refer to the flip chart or scenarios to find examples.



Slide 17

USE this slide to outline the importance of data quality to participants; **HIGHLIGHT** any reasons that participants stated earlier.

ASK participants to remind the group of some of the types of decisions made using data across the health sector. **RECORD** their answers on a flip chart and use the examples below to prompt their thinking so that you end up with a complete list.



Below are some examples that participants may present, or that can be used to prompt their thinking:

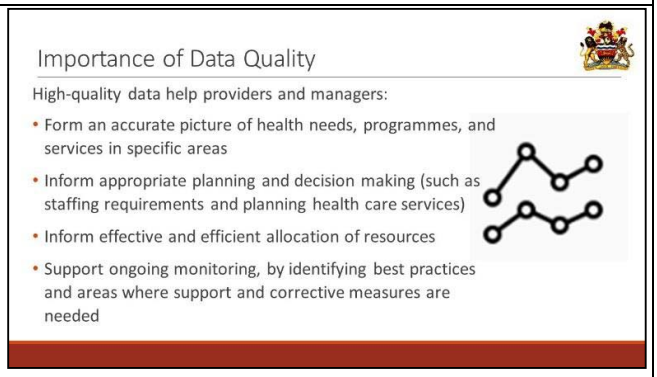
- **Patient management:** Data are used to make treatment decisions—for example, a patient may be changed from one drug regime to another, depending on their response to treatment. The patient may also be referred to a specialist or more specialized health care facility, depending on lab results.
- **Planning:** Data are used to determine the number of health workers to post in a particular facility; or, informed by the number of patients seeking treatment for diabetes, a health facility may change its diabetic clinic days from once a week to twice a week.
- **Resource allocation:** Data are used to determine necessary stocks of medicines and other consumables, based on amounts previously used over a similar period of time.
- **Policy formulation:** Data are used to guide policy-making. For example, changing the first-line ART protocol in Kenya from Stavudine and Zinovudine to Tenofovir required data to support the change. Based on data indicating improved outcomes, PMTCT guidelines for prophylaxis were changed from single-dose Nevirapin to a broader prophylactic.
- **Disease surveillance and response:** When a polio case was reported in Nyanza province in August 2011, the MOH (now MOHP) responded by dispatching emergency response teams.

- **Accountability**: Through the use of data, we are able to hold people accountable for the resources that have been entrusted to them—for example, comparing the number of test kits supplied against the number of patients tested.
- **Progress monitoring for patients:** Temperature charting is used to monitor the progress of treatment.
- **Progress monitoring for programmes:** Data reports are used as part of routine monitoring activity; the data collected can be used to show the progress (or lack thereof) that programmes or projects are making towards achieving their stated goals.

REMIND participants that data are used in all areas of the health system; when the data are of poor quality, the resultant decisions will also be poor. Therefore, it's very important for data to be of the highest quality possible.

Slide 18

SUMMARIZE the discussion using the points on the slide and those below.



EMPHASIZE the importance of high-quality data for effective decision making: Good decisions cannot be based on bad data. Data that do not reflect reality—such as data gaps and potentially gross errors— will mislead management about the true circumstances of a situation (health status). such as data gaps and potentially gross errors.

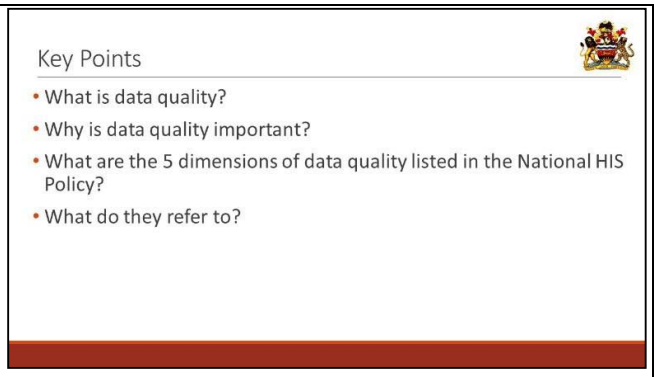
EXAMINE the importance of high-quality data from different perspectives, and how high-quality data can provide clues to health status and help identify problems.

Trainer Instructions: Step 5 (5 minutes)

Use slide 19 and the facilitator notes to guide this step.

Slide 19

NOTE: This slide is animated. Only 'Key Points' is displayed when the slide first loads. **CLICK** to reveal each question.



ASK participants to take out the note paper on which they wrote down the key points they thought would be covered during the session.

ASK: Were there any points you expected to hear about that we did not cover?

If possible, **RESPOND** to any brief questions/expectations.

ADD any others that are appropriate for the training to the parking lot; assure participants that they will be addressed before the conclusion of the training.

CLICK to reveal each question one by one.

USE the questions on this slide to review the session's key points.

Participants should provide the following responses:

What is data quality?

- *The degree to which the data reflects reality*
- *'Fit for use'*
    - *Data are fit for intended uses in operations, decision making, and planning.*
    - *Data reflect real value or true performance.*
    - *Data meet reasonable standards when checked against criteria for quality.*

Why is data quality important?

- *Data form the basis on which different decisions about patient care and treatment, facility resources and programmes, and health policy are made.*
- *Using poor data for decision making may result in a bad decision being made.*
- *Strong, quality data leads to improved evidence-based decisions.*

What are the five dimensions of data quality?

1. *Accuracy: How close you are to the true value.*
2. *Completeness: The data represent a complete picture of all health events; all fields and reports are complete.*
3. *Timeliness: The degree to which the data are up-to-date and available within an acceptable time frame, timeline, and duration*
4. *Relevance: Data collected should be applicable to the objectives.*
5. *Reliability: The extent to which analyses are consistent and repeatable.*

Handout 5.1.1: Data of Dubious Quality

Over the past three months, the new district health office (DHO) in the Chisaka District has observed that the quality of the data in the facility reports has been poor. Some reports show the number of pregnancies was greater than the number of visits to the clinic by women. Others have the number of patients on ART go up one month, and then fall well below the previous month's level—but with the difference not equal to the number of deaths or discontinuing patients reported. The old DHO was aware of similar inaccuracies, and began making programming decisions without bothering to consider the data from facilities.

After attending a training on data quality control procedures, the new DHO decided to make one person at the district level responsible for monitoring data quality at all of the different facilities using EMR systems. Each month, this data quality focal person visits four facilities in the district at random. At each facility, she requests all of the paper registers and records from the previous month, and checks the data recorded on the paper forms against the data entered into the EMR system. For each record where a field is missing or incorrectly entered, the data quality focal person flags the record for the data entry clerk to follow up. Since implementing this new process, the DHO has noticed that more of the facility reports contain complete information, and appear to have fewer inconsistencies when cross-checked.

Session 5.2

Session 5.2: Data Quality Metrics

Time: 135 minutes

Learning Objectives

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

1. Define data quality metrics
2. Explain the 3Cs: Completeness, correctness, consistency
3. Calculate and interpret data quality metrics
4. Describe data triangulation and how it can strengthen analysis and information use

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	15 minutes	Interactive lecture	Data quality metrics (slides 4–9)	Flip chart, markers, tape, LCD
3	20 minutes	Interactive lecture	Internal consistency (slides 10–17)	Flip chart, markers, tape, LCD
4	15 minutes	Interactive lecture	External consistency (slides 18–23)	Flip chart, markers, tape, LCD
5	30 minutes	Interactive lecture	Accuracy, data verification, data correctness (24–28)	Flip chart, markers, tape, LCD
6	30 minutes	Group activity	Case study on data verification and reporting performance (slide 29)	Flip chart, markers, tape, LCD, Handout 5.2.1
7	15 minutes	Group discussion	Key Points (slide 30)	Flip chart, markers, tape, LCD

Resources Needed

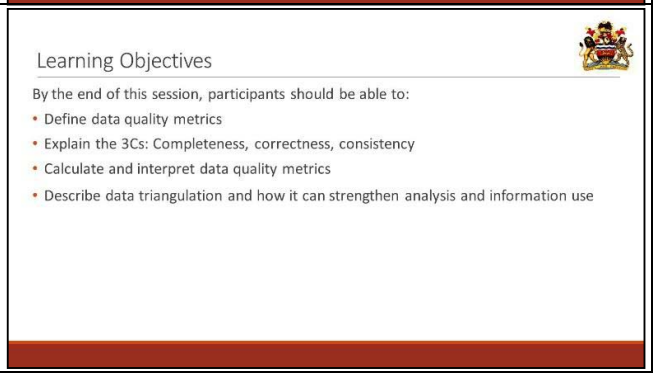
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

Handout 5.2.1: Case Study on Data Verification and Reporting Performance

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**SAY** that this session will orient participants to data quality metrics. This session applies primarily to decision makers.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (20 minutes)

Use slides 4–9 and the facilitator notes to guide this step.

Slide 4

NOTE: This slide is animated. Only the title will appear when the slide is first loaded.

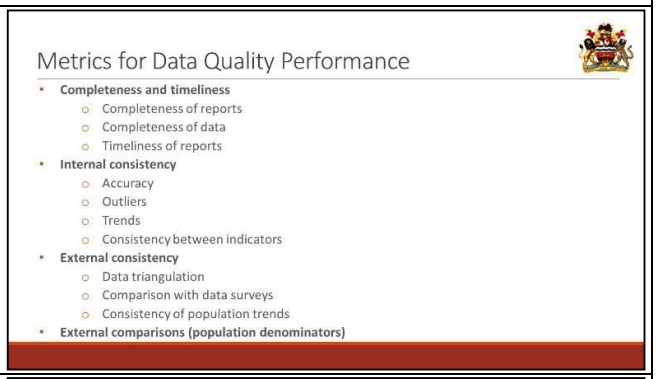
ASK: What are data quality metrics?

ALLOW some discussion, then **CLICK** to share the definition on the slide.

SAY: We went through the dimensions of data quality in session 5.1. The word **dimension** is used to identify aspects of data that can be measured, and through which data quality can be described and quantified. As high-level categories, data quality dimensions are relatively abstract, but they are important because they enable people to understand why data are being measured.

In this session, we will look at exactly how to measure the dimensions of completeness, timeliness, and internal and external consistency.

Slide 5



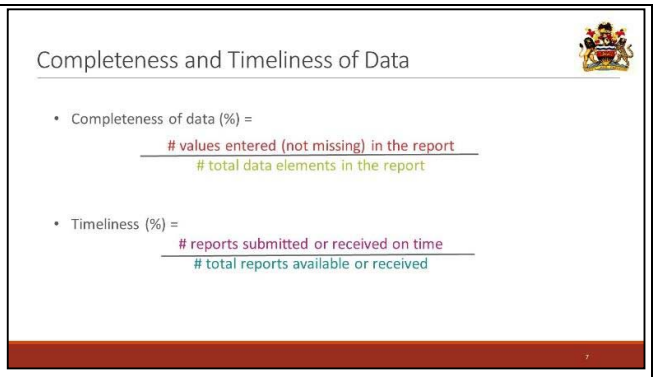
Slide 6

EXPLAIN that this slide shows how to measure reporting performance to determine the extent to which data reports are available and complete to an appropriate degree.

GUIDE participants through the calculations with an example.

Slide 7

EXPLAIN: This slide shows how to measure reporting performance to determine the extent to which data reports are complete and timely to an appropriate degree.



GUIDE participants through the calculations with an example.

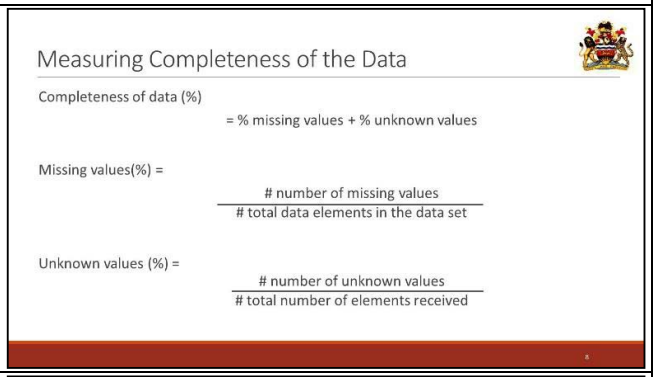
REMIND participants that timeliness refers to the extent to which reports are submitted/received on time through the levels of the information system data flow.

- Monthly reports must be transmitted from health centres to the district hospital by the 5th of the month.
- Each district must transmit its report on time to HMISU, and provide feedback to health centres.

Timeliness can also be measured using the difference between the date the report is submitted and the reporting deadline.

Slide 8

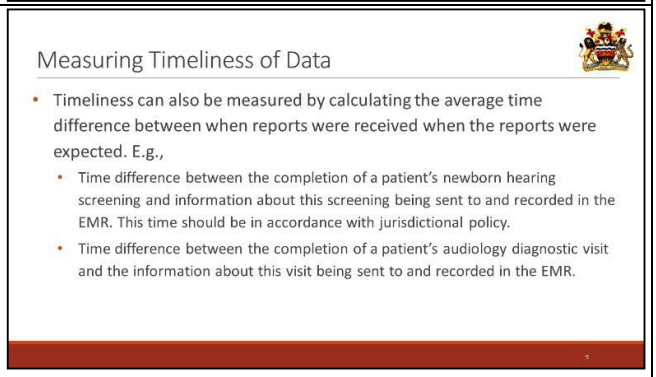
EXPLAIN that additional metrics for measuring completeness of data include the formulas shown on the slide.



GUIDE participants through the calculations with an example.

Slide 9

EXPLAIN that there is a need to differentiate between measuring the timeliness of the information system and the timeliness of care and service delivery.



- Timeliness and its related dimension (accuracy) are usually affected by the way data are collected.
- The more steps and intermediate systems involved in data collection, the greater the delay in getting the necessary information to the EMR.

Trainer Instructions: Step 3 (20 minutes)

Use slides 10–17 and the facilitator notes to guide this step.

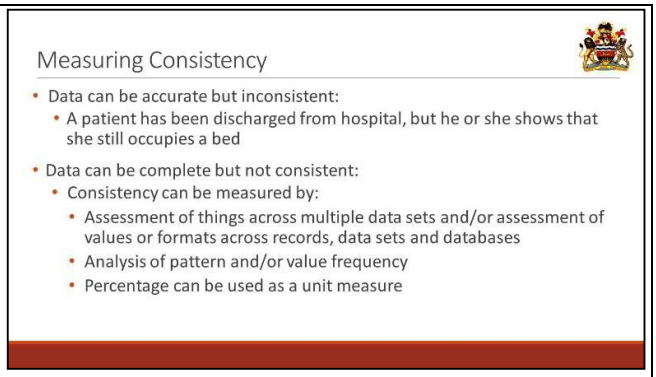
Slide 10

NOTE: This slide is animated. **CLICK** once after each question to reveal answer after participants have responded.

ASK: Can data be accurate but inconsistent?'

ALLOW a few responses and then **CLICK** to reveal the answer.

GIVE an example or ask participants to think of one.



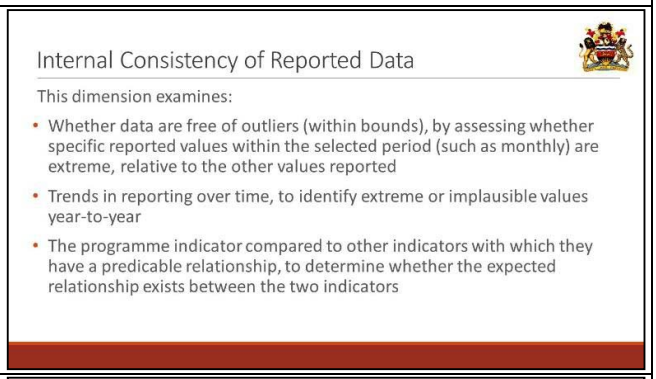
ASK: Can data be complete but inconsistent?

ALLOW a few responses and then **CLICK** to reveal the answer.

GIVE an example or ask participants to think of one.

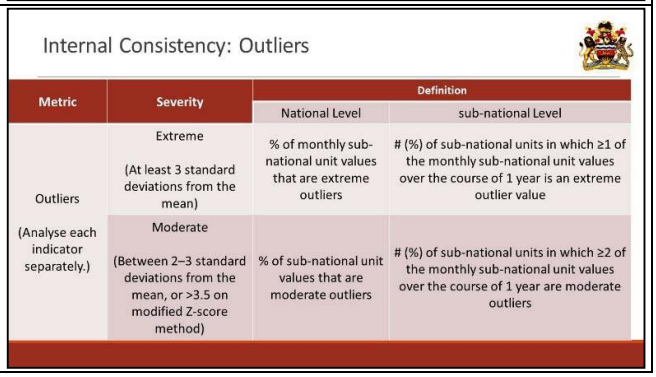
CLICK again to reveal the final points on how consistency can be measured.

Slide 11



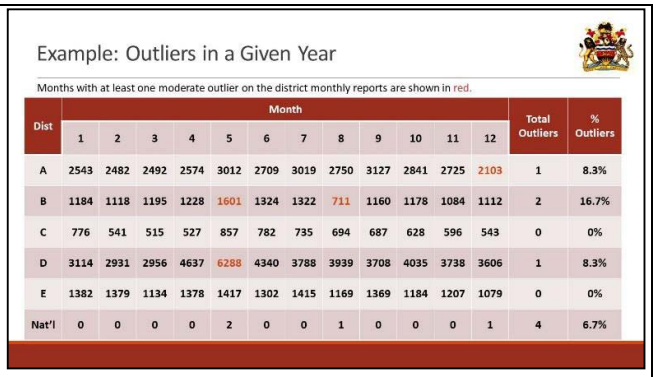
Slide 12

EXPLAIN that outliers are deviations from the mean.



Metric	Severity	Definition	
		National Level	sub-national Level
Outliers (Analyse each indicator separately.)	Extreme (At least 3 standard deviations from the mean)	% of monthly sub-national unit values that are extreme outliers	# (%) of sub-national units in which ≥1 of the monthly sub-national unit values over the course of 1 year is an extreme outlier value
	Moderate (Between 2–3 standard deviations from the mean, or >3.5 on modified Z-score method)	% of sub-national unit values that are moderate outliers	# (%) of sub-national units in which ≥2 of the monthly sub-national unit values over the course of 1 year are moderate outliers

Slide 13



Dist	Month												Total Outliers	% Outliers
	1	2	3	4	5	6	7	8	9	10	11	12		
A	2543	2482	2492	2574	3012	2709	3019	2750	3127	2841	2725	2103	1	8.3%
B	1184	1118	1195	1228	1601	1324	1322	711	1160	1178	1084	1112	2	16.7%
C	776	541	515	527	857	782	735	694	687	628	596	543	0	0%
D	3114	2931	2956	4637	6288	4340	3788	3939	3708	4035	3738	3606	1	8.3%
E	1382	1379	1134	1378	1417	1302	1415	1169	1369	1184	1207	1079	0	0%
Nat'l	0	0	0	0	2	0	0	1	0	0	0	1	4	6.7%

EXPLAIN that this table shows moderate outliers for a given indicator. There are four identified moderate outliers; these are highlighted in red. Three of the districts have at least one occurrence of a monthly value that is a moderate outlier.

Nationally, this indicator is a percentage of values that are moderate outliers for the indicator. The numerator for the equation is the number of outliers across all administrative units (in this case, 4). The denominator is the total number of expected reported values for the indicator for all the administrative units. That value is calculated by multiplying the total number of units (in the selected administrative unit level) with the expected number of reported values for one indicator for one administrative unit. In this case, we have 5 districts and 12 expected monthly reported values per district for one indicator, so the denominator is 60 [5 × 12]. Thus, about 6.7% are moderate outliers [4/60 = 0.0666 × 100 = 6.7 %].

Sub-nationally, see if you can calculate the number of outliers for each district. Count the districts where there are two or more outliers (for moderate outliers) among the monthly values for the district (1). Divide by the total number of administrative units [1/5 = 0.25 × 100 = 25%].

ENSURE that participants have understood the table and the points made before moving on to the next slide.

Slide 14

Metric	Definition	
	National level	Sub-national level
Trends/ consistency over time (Analyse each indicator separately.)	Conduct one of the following, based on indicator's expected trend: • Indicators or programmes with expected growth: Compare current year to the value predicted from the trend in the 3 preceding years • Indicators or programmes expected to remain constant: Compare current year to the average of 3 preceding years	# (%) of districts whose ratio of current year to predicted value (or current year to average of preceding 3 years) is at least ± 33% of national ratio
	Graphic depiction of trend to determine plausibility based on programmatic knowledge	

Slide 15

EXPLAIN that the mean for the preceding three years (2010, 2011, and 2012) is 93,774 [(98,450 + 93,578 + 89,294)/3].

The ratio for the current year to the mean for the past three years is 1.16 [108,459/93,774 = 1.16].

Example: Trends over Time

Consistency trend: Comparison of district ratios to national ratios
Any difference between district and national ratio that is ≥33% is highlighted in red.

District	Year				Mean of preceding 3 years (2010-2012)	Ratio of 2013 to mean of 2010-2012	% difference between national and district ratios
	2010	2011	2012	2013			
A	30242	29543	26848	32377	28878	1.12	0.03
B	19343	17322	16232	18819	17632	1.07	0.08
C	7512	7701	7403	7881	7539	1.05	0.09
D	15355	15047	14788	25123	15063	1.67	0.44
E	25998	23965	24023	24259	24662	0.98	0.16
National	98450	93578	89294	108459	93774	1.16	

The average ratio of 1.16 shows that there is an overall 16% increase in service outputs for 2013 when compared to the average service outputs for the preceding three years of the indicator.

Sub-nationally, try to evaluate each district by calculating the ratio for the current year (2013) to the average for the previous three years (2010, 2011, and 2012). For example, the ratio for District 1 is 1.12 [32,377/28,878].

Then calculate the difference (in percentage) between the national and district ratios for each district. For example, for district A:

$$\left|\frac{\text{District 1 Ratio} - \text{National Ratio}}{\text{National Ratio}}\right| = \left|\frac{1.121 - 16}{1.16}\right| = 0.03 = 3.0\%$$

The difference between district and national ratios for District A is less than 33%. However, there is a difference of approximately 44% for District D between the deliveries ratio and the national ratio.

To calculate this indicator sub-nationally, all administrative units whose ratios are different from the country's ratio by ±33%, or more are counted. In this example, only District D has a difference greater than ±33%. Therefore, one out of five districts (20%) has a ratio that is more than 33% different from the national ratio.

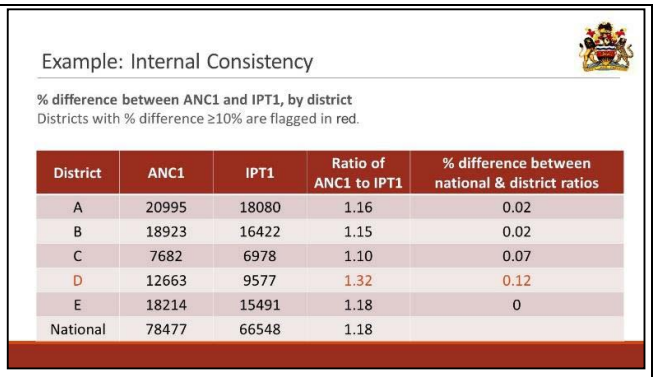
Slide 16

Internal Consistency: Comparing Related Indicators

Metric	Definition	
	National level	Sub-national Level
Consistency among related indicators	Maternal health: ANC1 - IPT1 or TT1 (should be roughly equal)	# (%) of sub-national units where there is an extreme difference (≥ ± 10%)
	Immunisation: DTP3 dropout rate = (DTP1 - DTP3)/DTP1 (should not be negative)	# (%) of sub-national units with # of DTP3 immunisations > DTP1 immunisations (negative dropout)
	HIV/AIDS: ART coverage - HIV coverage (should be <1)	# (%) of sub-national units where there is an extreme difference (≥ ± 10%)
	TB: TB cases notified - TB cases on treatment (should be roughly equal)	# (%) of sub-national units where there is an extreme difference (≥ ± 10%)
	Malaria: # confirmed malaria cases reported - cases testing positive (should be roughly equal)	# (%) of sub-national units where there is an extreme difference (≥ ± 10%)

Slide 17

EXPLAIN: The annual number of pregnant women started on antenatal care (ANC) each year (ANC1) should be roughly equal to the number of pregnant women who receive intermittent preventive therapy for malaria (IPT1) in ANC, because all pregnant women should receive this prophylaxis. First, we will calculate the ratio of ANC1 to IPT1 for the national level, and then for each district. At the national level, the ratio of ANC1 to IPT1 is about 1.18 [78,477/66,548].



District	ANC1	IPT1	Ratio of ANC1 to IPT1	% difference between national & district ratios
A	20995	18080	1.16	0.02
B	18923	16422	1.15	0.02
C	7682	6978	1.10	0.07
D	12663	9577	1.32	0.12
E	18214	15491	1.18	0
National	78477	66548	1.18	

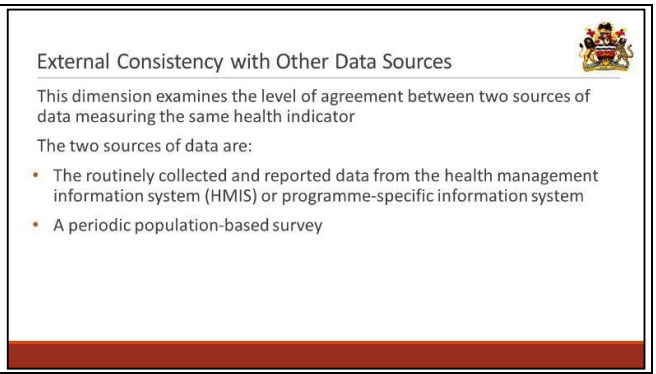
At the sub-national level, we can calculate the ratio of ANC1 to IPT1 and the percentage difference between the national and district ratios.

We see that there is one district (D) with a ratio of ANC1 to IPT1 greater than 20%. We also see that the difference between the national and district ratios for district D is more than 10 percentage points.

Trainer Instructions: Step 4 (15 minutes)

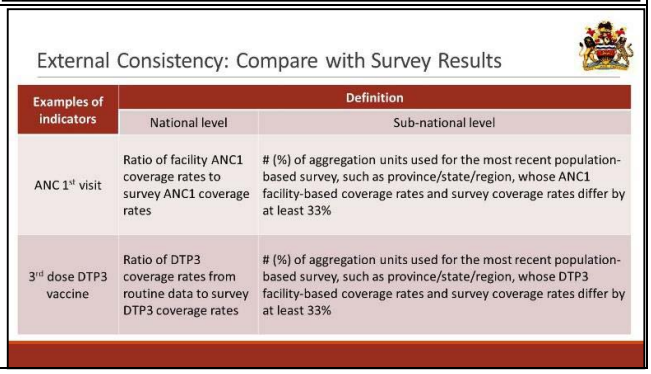
Use slides 18–23 and the facilitator notes to guide this step.

Slide 18



Slide 19

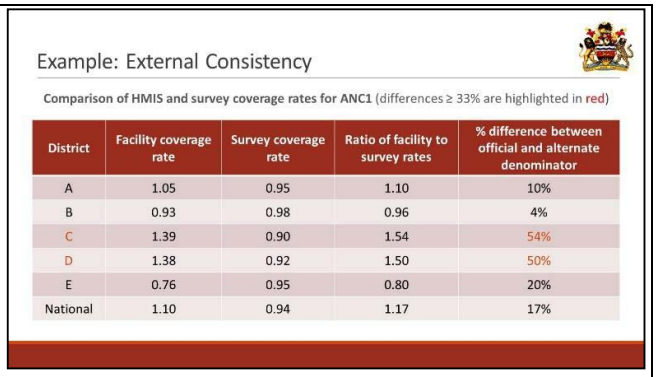
- Population-based surveys: DHS, MICS, etc.
- Indicator values are based on recall, referring to the period before the survey (e.g., 5 years).
- Sampling error: Confidence intervals.



Examples of indicators	Definition	
	National level	Sub-national level
ANC 1st visit	Ratio of facility ANC1 coverage rates to survey ANC1 coverage rates	# (%) of aggregation units used for the most recent population-based survey, such as province/state/region, whose ANC1 facility-based coverage rates and survey coverage rates differ by at least 33%
3rd dose DTP3 vaccine	Ratio of DTP3 coverage rates from routine data to survey DTP3 coverage rates	# (%) of aggregation units used for the most recent population-based survey, such as province/state/region, whose DTP3 facility-based coverage rates and survey coverage rates differ by at least 33%

Slide 20

EXPLAIN: If the HMIS is accurately detecting all ANC visits in the country (not just those in the public sector), and the denominators are accurate, the coverage rate for ANC1 derived from the HMIS should be very similar to the ANC1 coverage rate derived from population surveys. However, HMIS coverage rates are often different from survey coverage rates for the same indicator.



District	Facility coverage rate	Survey coverage rate	Ratio of facility to survey rates	% difference between official and alternate denominator
A	1.05	0.95	1.10	10%
B	0.93	0.98	0.96	4%
C	1.39	0.90	1.54	54%
D	1.38	0.92	1.50	50%
E	0.76	0.95	0.80	20%
National	1.10	0.94	1.17	17%

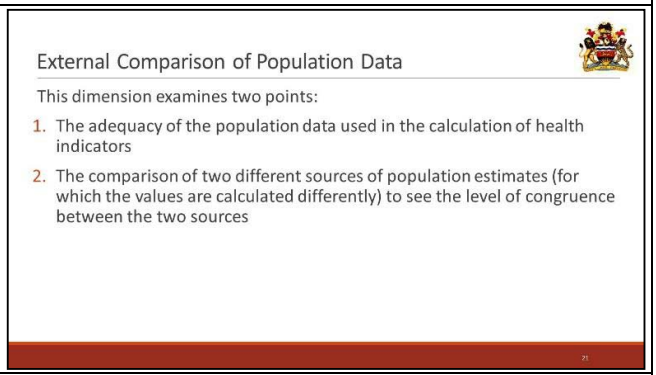
At the national level:

- The coverage rate from HMIS is 110%.
- The coverage rate from the most recent population-based survey is 94%.
- The ratio of the two coverage rates is: 1.17 [110%/94%].
- If the ratio is 1, it means that the two coverage rates are exactly the same.
- If the ratio is >1, it means that the HMIS coverage is higher than the survey coverage rate.
- If the ratio is <1, it means that the survey coverage rate is higher than the HMIS coverage rate.

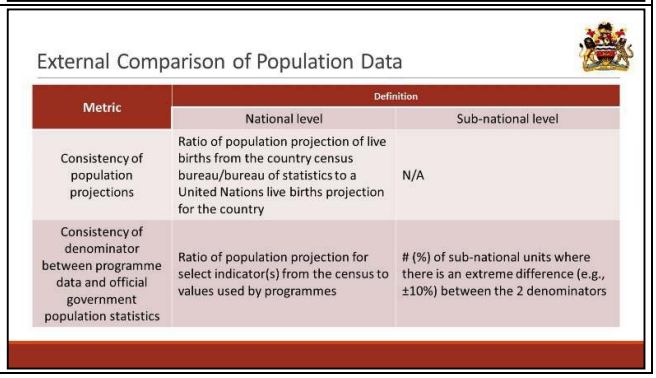
The ratio of 1.17 shows that the two denominator values are fairly different, and there is about a 17% difference between the two values.

At the sub-national level, the ratio of denominators is calculated for each administrative unit. Districts with at least a 33% difference between their two denominators are flagged. Districts C and D have more than a 33% difference between their two ratios.

Slide 21



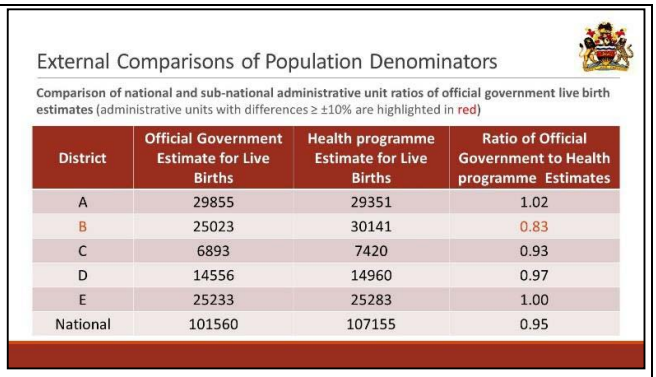
Slide 22



Metric	Definition	
	National level	Sub-national level
Consistency of population projections	Ratio of population projection of live births from the country census bureau/bureau of statistics to a United Nations live births projection for the country	N/A
Consistency of denominator between programme data and official government population statistics	Ratio of population projection for select indicator(s) from the census to values used by programmes	# (%) of sub-national units where there is an extreme difference (e.g., ±10%) between the 2 denominators

Slide 23

SAY: This slide shows the ratio of the estimated number of live births nationally from official government statistics for the year of analysis to the value used by the selected health programme.



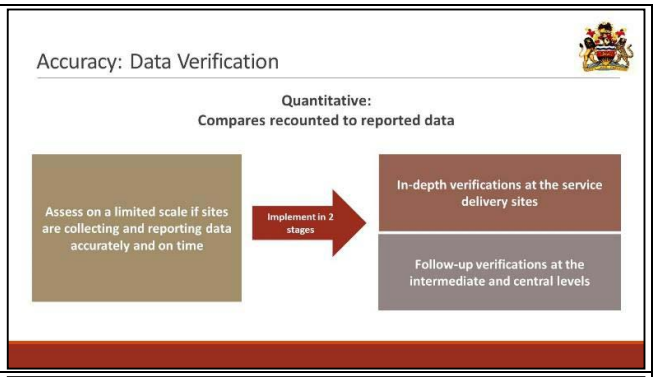
District	Official Government Estimate for Live Births	Health programme Estimate for Live Births	Ratio of Official Government to Health programme Estimates
A	29855	29351	1.02
B	25023	30141	0.83
C	6893	7420	0.93
D	14556	14960	0.97
E	25233	25283	1.00
National	101560	107155	0.95

HAVE participants calculate the ratio of sub-national administrative unit 2014 live births to the value used by the selected health programme; district B has a difference of 0.17 or 17%.

Trainer Instructions: Step 5 (30 minutes)

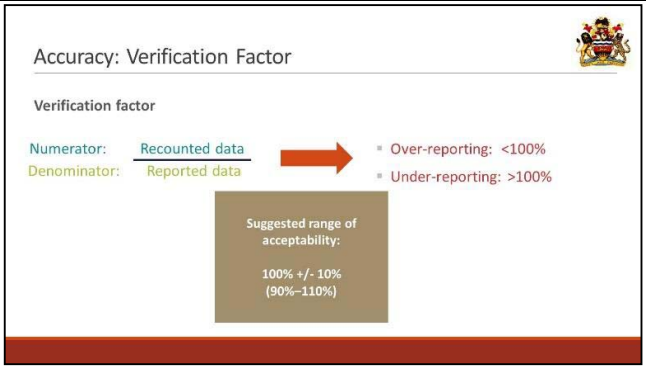
Use slides 24–28 and the facilitator notes to guide this step.

Slide 24



Slide 25

EXPLAIN: At the heart of the data quality process are two important components: Data verification and report performance.



Data verification is achieved through quantitative comparison of recounted and reported data.

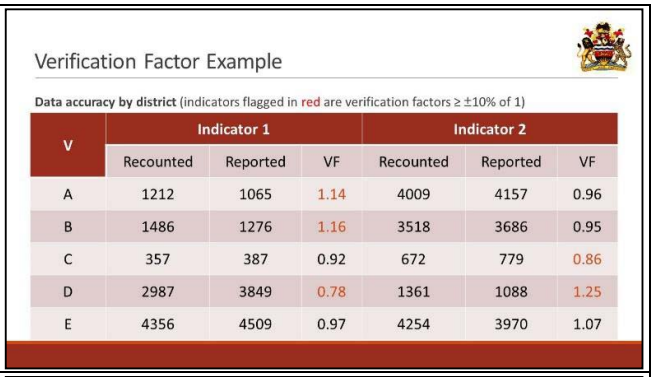
The verification factor (VF) is calculated by dividing the recounted number by the reported number, giving a percentage.

ASK: What would 85% mean? How about 125%?

Slide 26

EXPLAIN that recounted data/reported data = VF

When VF is ≥ ±10%, data are considered inaccurate.



Verification Factor Example

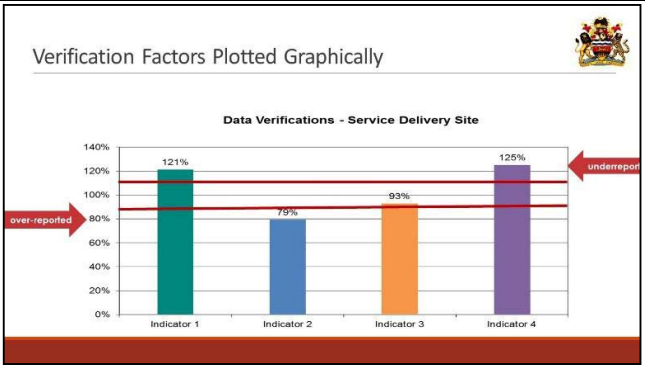
Data accuracy by district (indicators flagged in red are verification factors ≥ ±10% of 1)

V	Indicator 1			Indicator 2		
	Recounted	Reported	VF	Recounted	Reported	VF
A	1212	1065	1.14	4009	4157	0.96
B	1486	1276	1.16	3518	3686	0.95
C	357	387	0.92	672	779	0.86
D	2987	3849	0.78	1361	1088	1.25
E	4356	4509	0.97	4254	3970	1.07

Slide 27

NOTE: This slide is animated.

EXPLAIN: This graph shows the verification factors for four indicators at a service delivery site.



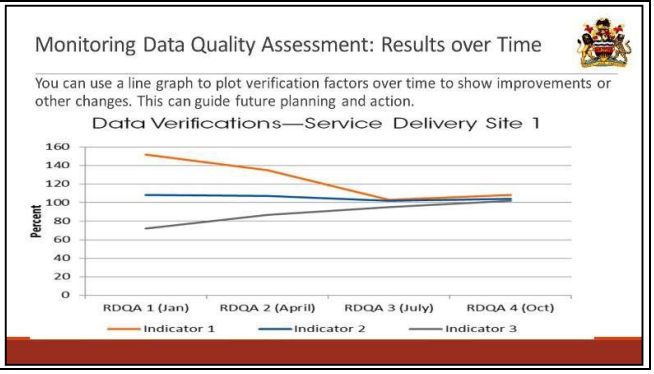
First, we can see that there is wide variation in the accuracy of these indicators. [**CLICK**] The area marked with red horizontal lines shows the margin of acceptability: plus or minus 10% of 100%, the global standard. However, individual programmes can select their own ranges of acceptability, as they deem appropriate.

We also can see that three of the four indicators are outside acceptable margins.
ASK: What would you say about indicators 1 and 4? [After someone answers, **CLICK**]

ASK: What about indicator 2? [After someone answers, **CLICK**]

Ideally, we would see no under- or over-reporting of data, with all indicators as close to 100% as possible. [**CLICK**]

Slide 28



Trainer Instructions: Step 6 (30 minutes)

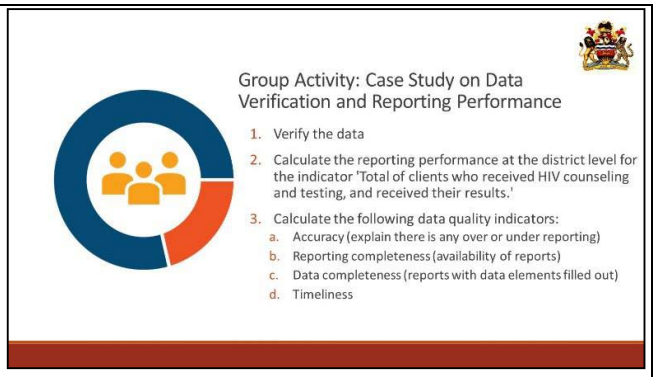
Use slide 29, the facilitator notes, and **Handout 5.2.1: Case Study on Data Verification and Reporting Performance** to guide this step.

Slide 29

REFER participants to **Handout 5.2.1: Case Study on Data Verification and Reporting Performance.**

DIVIDE participants into groups of three; let them know they have 20 minutes to complete the exercise.

MONITOR their progress. After 20 minutes, bring the participants back to discuss how they arrived at their answers.



Answers:

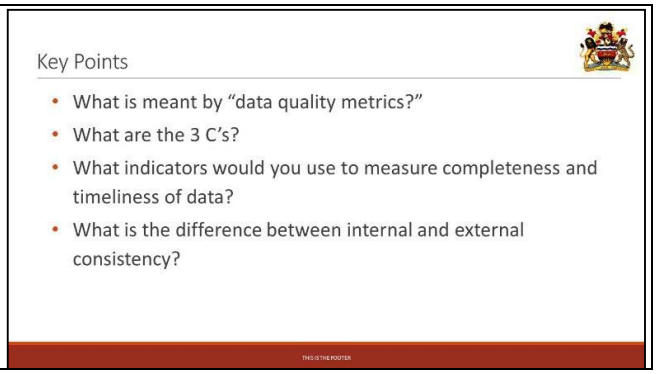
- *The number consolidated in the district report is 1,199.*
- *For the exercise, we have 20 reports (1 of TANA RIVER District and 19 reports available among the 22 health facilities of the district).*
- *VF= 1153/1199 = 96% Over-reporting (= acceptable)*
- *Availability of reports = 19/22 = 86%*
- *Completeness (complete data) = 18/19 = 95%*
- *Timeliness of reports = 6/19 = 32% (= very low)*

Trainer Instructions: Step 7 (15 minutes)

Use slide 30 and the facilitator notes to guide this step.

Slide 30

USE the questions on the slide to review key points from the session.



Handout 5.2.1: Case Study on Data Verification and Reporting Performance

As part of the PRISM Assessment in Country Z, that country's health ministry would like to verify the data accuracy and reporting performance of the PMTCT programme. The indicator selected was 'Total # of clients who received HIV counselling and testing, and received their results'.

The districts and health facilities selected for inclusion in the PRISM assessment were assigned across several assessment teams. Team #5 was responsible for conducting the assessment at the Tana River District Office.

Tana River District is expected to receive reports from 22 health facilities on a monthly basis. The reports should arrive by the fifth day of the following month. The reporting period selected for verification is November 2007.

Using the reports received (see below), verify the data and calculate the reporting performance at the district level for the indicator 'Total of clients who received HIV counselling and testing, and received their results'.

Specifically, calculate the following data quality indicators:

- Accuracy (explain if there is any under- or over-reporting)
- Reporting completeness (availability of reports)
- Data completeness (reports with all data elements filled out)
- Timeliness

DISTRICT REPORT

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received: [redacted]

District: Tana River Planning Agency(e.g. GOK,Mission,Private) Month Nov. Year 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	1481	345	0	2204
		Re-Visits	2336			2265
B	No. of Women	Counseled	1587	207	0	1794
		Tested	1254	163	0	1417
		Received test results	1024	150	0	1199
		HIV+	45	10	0	55
C	No. of women counseled and tested at first visit		763			763
D	No. of women issued with preventive ARVs		23	5		28
E	No. of infant Nevirapine	Issued	7	25	0	32
		Administered		25	0	25
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	1	16	0	17
		Tested	1	16	0	17
		Hiv+	1	0	0	1
H	HIV+ Referred for follow up	Mothers	19	5	0	24
		Infants		25	0	25
		Partners	1	0	0	1
I	No.of mothers counseled on infant feeding options		35	25	0	60
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				29

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	105	172	253	269	803	882	2484
	HIV+	8	12	14	34	68	103	239
No. of couples	Counseled							3
	Tested							3
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	364

General

Remarks: _____

Report compiled by: Wycliffe Ondieki **Design.** **Date** 07-Dec-07 **Sign** Wycliffe Ondieki

N/B This form should be completed and send to the DMOH to reach by 10th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

2

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 04-Dec-07

District: Tana River **Site Name:** BAGALI DISP **Month** NOV. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	46	1	0	47
		Re-Visits	56			56
B	No. of Women	Counseled	38	1	0	39
		Tested	21	1	0	22
		Received test results	17	1	0	18
		HIV+	0	0	0	0
C	No. of women counseled and tested at first visit		17			17
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for followup	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	1	2	3	2	8	9	25
	HIV+	0	0	0	0	0	1	1
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by: Kelly Williams **Design.** **Date.** 02-Dec-07 **Sign.** Kelly Williams

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

3

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 04-Dec-07

District: Tana River **Site Name:** Emmaus Dispensary **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	101	178	0	299
		Re-Visits	166			188
B	No. of Women	Counseled	115	42	0	157
		Tested	98	37	0	135
		Received test results	81	31	0	112
		HIV+	3	1	0	4
C	No. of women counseled and tested at first visit		118			118
D	No. of women issued with preventive ARVs		0	1		1
E	No. of infant Nevirapine	Issued	0	6	0	6
		Administered		6	0	6
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	4	0	4
		Tested	0	4	0	4
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	3	1	0	4
		Infants		6	0	6
		Partners	0	0	0	0
I	No. of mothers counseled on infant feeding options		3	6	0	9
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				7

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	8	9	19	18	54	59	167
	HIV+	0	0	0	2	2	14	18
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	54

General Remarks: _____

Report compiled by. Francis Ayuka **Design.** _____ **Date.** 02-Dec-07 **Sign.** Francis Ayuka

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

4

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 05-Dec-07

District: Tana River **Site Name:** Garsen Health Center **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	46	0	0	46
		Re-Visits	103			103
B	No. of Women	Counseled	48	21	0	69
		Tested	35	17	0	52
		Received test results	29	15	0	44
		HIV+	0	0	0	0
C	No. of women counseled and tested at first visit		0			0
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	1	0	0	1
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for followup	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No.of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	4	5	12	7	28	31	87
	HIV+	0	0	0	0	0	0	0
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Center	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by. Peter Nasokho **Design.** _____ **Date.** 03-Dec-07 **Sign.** Peter Nasokho

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

5

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 06-Dec-07

District: Tana River **Site Name:** Hola DH **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	30	0	0	30
		Re-Visits	55			55
B	No. of Women	Counseled	32	9	0	41
		Tested	27	8	0	35
		Received test results	22	8	0	30
		HIV+	4	1	0	5
C	No. of women counseled and tested at first visit		30			30
D	No. of women issued with preventive ARVs		4	0		4
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		4	0	0	4
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				0

VCT:

		<15yrs M	<15yrs F	15-24 yrs M	15-24 yrs F	≥ 25yrs M	≥ 25yrs F	Total
VCT clients	Tested	4	5	12	7	28	31	87
	HIV+	0	0	0	0	0	0	0
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by. John Mansoer **Design.** _____ **Date.** 04-Dec-07 **Sign.** John Mansoer

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received

District: Tana River **Site Name:** Idsowe Dispensary **Month** Nov. **Year** 2007 07-Dec-07

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

		Measure	ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1 Visits	121	0	0	121
		Re-Visits	185			185
B	No. of Women	Counseled	124	0	0	124
		Tested	99	0	0	99
		Received test results	78	0	0	78
		HIV+	1	0	0	1
C	No. of women counseled and tested at first visit		0			0
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for followup	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	8	9	19	18	54	59	167
	HIV+	0	0	0	2	2	14	18
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by. Dr. Kawango Agot **Design.....Date.** 05-Dec-07 **Sign.** Dr. Kawango Agot

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

7

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 04-Dec-07

District: Tana River **Site Name:** Karugu Dispensary **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	115	45	0	350
		Re-Visits	201			167
B	No. of Women	Counseled	111	35	0	146
		Tested	101	29	0	130
		Received test results	84	22	0	106
		HIV+	3	2	0	5
C	No. of women counseled and tested at first visit		118			118
D	No. of women issued with preventive ARVs		0	1		1
E	No. of infant Nevirapine	Issued	0	6	0	6
		Administered		6	0	6
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	4	0	4
		Tested	0	4	0	4
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	3	1	0	4
		Infants		6	0	6
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		3	6	0	9
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				7

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	4	11	17	25	57	63	177
	HIV+	0	0	1	3	4	5	13
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	98

General Remarks: _____

Report compiled by: Dominic Karanja **Design.....** **Date:** 02-Dec-07 **Sign** Dominic Karanja

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

8

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 06-Dec-07

District: Tana River **Site Name:** Kitchwe Tembo **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	84	74	0	310
		Re-Visits	188			188
B	No. of Women	Counseled	115	31	0	146
		Tested	90	19	0	109
		Received test results	79	17	0	96
		HIV+	3	2	0	5
C	No. of women counseled and tested at first visit		118			118
D	No. of women issued with preventive ARVs		0	1		1
E	No. of infant Nevirapine	Issued	0	6	0	6
		Administered		6	0	6
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	4	0	4
		Tested	0	4	0	4
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	3	1	0	4
		Infants		6	0	6
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		3	6	0	9
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				7

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	12	9	12	19	52	57	161
	HIV+	6	7	3	4	20	4	44
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	34

General Remarks: _____

Report compiled by: Allan Ragi **Design:** _____ **Date:** 04-Dec-07 **Sign:** Allan Ragi

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 05-Dec-07

District: Tana River **Site Name:** Maara Dispensary **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	30	0	0	30
		Re-Visits	55			55
B	No. of Women	Counseled	32	0	0	32
		Tested	32	0	0	32
		Received test results	32	0	0	32
		HIV+	4	0	0	4
C	No. of women counseled and tested at first visit		30			30
D	No. of women issued with preventive ARVs		4	0		4
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		4	0	0	4
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	15	21	16	21	75	82	230
	HIV+	0	1	1	3	5	10	20
No. of couples	Counseled							1
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General
Remarks: _____

Report compiled by: Agnes Waudo **Design.....Date:** 03-Dec-07 **Sign:** Agnes Waudo

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 06-Dec-07

District: Tana River **Site Name:** Madogo Health Center **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Mate rnity	Postn atal clinic	Totals
A	No. Of Visits	1st Visits	115	45	0	276
		Re-Visits	154			101
B	No. of Women	Counseled	115	29	0	144
		Tested	99	21	0	120
		Received test results	84	29	0	113
		HIV+	3	1	0	4
C	No. of women counseled and tested at first visit		118			118
D	No. of women issued with preventive ARVs		0	1		1
E	No. of infant Nevirapine	Issued	0	6	0	6
		Administered		6	0	6
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	4	0	4
		Tested	0	4	0	4
		Hiv+	0	0	0	0
H	HIV+ Referred for followup	Mothers	3	1	0	4
		Infants		6	0	6
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		3	6	0	9
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				7

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	4	11	17	25	57	63	177
	HIV+	0	0	1	3	4	5	13
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	104

General Remarks: _____

Report compiled by: Lucy Robinson **Design:** _____ **Date:** 04-Dec-07 **Sign:** Lucy Robinson

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received

District: Tana River **Site Name:** Majengo Dispensary **Month** Nov. **Year** 2007 07-Dec-07

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	109	0	0	9
		Re-Visits	171			165
B	No. of Women	Counseled	103	0	0	103
		Tested	61	0	0	61
		Received test results	43	0	0	43
		HIV+	1	0	0	1
C	No. of women counseled and tested at first visit		0			0
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	1	2	1	0	4	4	12
	HIV+	1	0	0	0	1	0	2
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General

Remarks: _____

Report compiled by. Peter Omondi Design..... Date. 05-Dec-07 Sign. Peter Omondi

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received

District: Tana River **Site Name:** Mnazini Dispensary Month Nov. Year 2007 07-Dec-07

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

		Measure	ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	121	0	0	121
		Re-Visits	185			185
B	No. of Women	Counseled	67	0	0	67
		Tested	54	0	0	54
		Received test results	44	0	0	44
		HIV+	1	0	0	1
C	No. of women counseled and tested at first visit		0			0
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No. of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				0

VCT:

		<1Yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	15	21	16	21	75	82	230
	HIV+	0	1	1	3	5	10	20
No. of couples	Counseled							1
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by. Dr. Sumathi Sivapalan **Design.** **Date.** 05-Dec-07 Sumathi Sivapalan

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received

District: Tana River **Site Name:** NANYUKI Month Nov. Year 2007 09-Dec-07

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	30	0	0	30
		Re-Visits	55			55
B	No. of Women	Counseled	32	0	0	32
		Tested	27	0	0	27
		Received test results				
		HIV+	3	0	0	3
C	No. of women counseled and tested at first visit		30			30
D	No. of women issued with preventive ARVs		4	0		4
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for followup	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		4	0	0	4
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				0

VCT:

		<1Yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	4	5	12	7	28	31	87
	HIV+	0	0	0	0	0	0	0
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by. Dr. Ernest Nyamato Design. Date. 07-Dec-07 Sign. Dr. Ernest Nyamato

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MCH 726
NASCOP

Date Received 06-Dec-07

District: Tana River **Site Name:** Oda dispensary **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	109	0	0	109
		Re-Visits	136			136
B	No. of Women	Counseled	110	21	0	131
		Tested	93	16	0	109
		Received test results	81	15	0	96
		HIV+	1	0	0	1
C	No. of women counseled and tested at first visit		0			0
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	2	5	9	8	24	26	74
	HIV+	0	0	0	2	2	4	8
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	21

General Remarks: _____

Report compiled by. Prof. Ruth Nduati **Design.** **Date** 04-Dec-07 **Sign.** Prof. Ruth Nduati

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 05-Dec-07

District: Tana River **Site Name:** Oldavai Health Center **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits		0	0	30
		Re-Visits	55			55
B	No. of Women	Counseled	32	0	0	32
		Tested	23	0	0	23
		Received test results	19	0	0	19
		HIV+	7	1	0	8
C	No. of women counseled and tested at first visit		30			30
D	No. of women issued with preventive ARVs		4	0		4
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No. of mothers counseled on infant feeding options		4	0	0	4
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				0

VCT:

		<15yrs M	<15yrs F	15-24 yrs M	15-24 yrs F	≥ 25yrs M	≥ 25yrs F	Total
VCT clients	Tested	2	5	9	8	24	26	74
	HIV+	0	0	0	2	2	4	8
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	31

General Remarks: _____

Report compiled by: Godfrey Baltazar **Design.....** **Date** 03-Dec-07 **Sign** Godfrey Baltazar

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 06-Dec-07

District: Tana River **Site Name:** Samburu Dispensary **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	66	0	0	66
		Re-Visits	112			112
B	No. of Women	Counseled	178	4	0	182
		Tested	121	4	0	125
		Received test results	88	3	0	91
		HIV+	1	0	0	1
C	No. of women counseled and tested at first visit		60			60
D	No. of women issued with preventive ARVs		1	0		1
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	1	0	0	1
		Tested	1	0	0	1
		Hiv+	1	0	0	1
H	HIV+ Referred for follow-up	Mothers	1	0	0	1
		Infants		0	0	0
		Partners	1	0	0	1
I	No.of mothers counseled on infant feeding options		1	0	0	1
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				1

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	4	11	17	25	57	63	177
	HIV+	0	0	1	3	4	5	13
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by. Wilfred Owuor **Design.** _____ **Date.** 04-Dec-07 **Sign.** Wilfred Owuor

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received

District: Tana River **Site Name:** Tana River Month Nov. Year 2007 09-Dec-07

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1° Visits	46	1	0	47
		Re-Visits	56			56
B	No. of Women	Counseled	38	11	0	49
		Tested	33	9	0	42
		Received test results	31	8	0	39
		HIV+	0	0	0	0
C	No. of women counseled and tested at first visit		17			17
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	1	2	2	2	7	8	22
	HIV+	0	0	0	1	1	0	2
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by. Dr. Jack Nyamongo **Design.** **Date.** 07-Dec-07 Dr. Jack Nyamongo

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 06-Dec-07

District: Tana River **Site Name:** Tarasaa Dispensary **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

		Measure	ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	106	0	0	106
		Re-Visits	136			136
B	No. of Women	Counseled	110	0	0	110
		Tested	86	0	0	86
		Received test results	69	0	0	69
		HIV+	2	0	0	2
C	No. of women counseled and tested at first visit		0			0
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for followup	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6 wks				0
		After 3 Months				0

VCT:

		<15yrs M	<15yrs F	15-24 yrs M	15-24 yrs F	≥ 25yrs M	≥ 25yrs F	Total
VCT clients	Tested	13	34	47	41	135	148	418
	HIV+	1	3	5	5	14	18	46
No. of couples	Counseled							1
	Tested							2
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	22

General
Remarks: _____

Report compiled by. Hilde Vandenhoudt **Design.** **Date.** 04-Dec-07 **Sign.** Hilde Vandenhoudt

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

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MINISTRY OF HEALTH
INTEGRATED MONITORING AND EVALUATION REPORT FORM MOH 726
NASCOP

Date Received 07-Dec-07

District: Tana River **Site Name:** Wenje Dispensary **Month** Nov. **Year** 2007

N/B: Indicate N/S where there is no service and N/D where there is service but no data

PMCT

	Measure		ANC	Maternity	Postnatal clinic	Totals
A	No. Of Visits	1st Visits	99	0	0	99
		Re-Visits	136			136
B	No. of Women	Counseled	110	0	0	110
		Tested	85	0	0	85
		Received test results	61	0	0	61
		HIV+	2	0	0	2
C	No. of women counseled and tested at first visit		0			0
D	No. of women issued with preventive ARVs		0	0		0
E	No. of infant Nevirapine	Issued	0	0	0	0
		Administered		0	0	0
F	No initiated cotrimoxazole	Women		0	0	0
		Infants		0	0	0
G	No. of partners	Counselled	0	0	0	0
		Tested	0	0	0	0
		Hiv+	0	0	0	0
H	HIV+ Referred for follow-up	Mothers	0	0	0	0
		Infants		0	0	0
		Partners	0	0	0	0
I	No of mothers counseled on infant feeding options		0	0	0	0
J	No. of infants tested for HIV	At 6wks				0
		After 3 Months				0

VCT:

		<15yrs		15-24 yrs		≥ 25yrs		Total
		M	F	M	F	M	F	
VCT clients	Tested	1	2	3	2	8	9	25
	HIV+	0	0	0	0	0	1	1
No. of couples	Counseled							0
	Tested							0
	Both HIV+							0
	With discordant results							0

BLOOD SAFETY:

	Measure	Number
A	Blood units collected from Regional Blood Transfusion Centers	0
B	Blood units collected from other sources and screened at health facility	0
C	Blood units screened at health facility that are HIV+	0
D	Blood Units transfused	0

General Remarks: _____

Report compiled by: Christine Nyukuri **Design.....** **Date.....** 05-Dec-07 **Sign** Christine Nyukuri

N/B This form should be completed and send to the DMOH to reach by 5th of the following Month. e.g Report of January 2006 should reach the DMOH by 5th of February, 2006 etc. (ATT: DASCO)

Session 5.3

Session 5.3: Data Quality Assurance

Time: 90 minutes

Learning Objectives

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

1. Describe causes and effects of poor data quality
2. Define data quality assurance
3. Describe data quality assurance methods and tools
4. Discuss the timing of quality assurance activities
5. Describe roles and responsibilities of assuring data quality at different levels of the health system
6. Discuss the importance of data quality assurance

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	30 minutes	Interactive lecture	Poor data quality overview, data quality assurance, audits (slides 4–12)	Flip chart, markers, tape, LCD, Handout 5.1.1, prepared flip chart paper: Causes of Poor Data Quality, Handout 5.2.1
3	50 minutes	Interactive lecture, discussion	Data quality improvement (slides 13–22)	Flip chart, markers, tape, LCD, Handout 5.1.1
4	5 minutes	Facilitator presentation	Key points (slide 23)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- Sticky notes or highlighters
- E-learning Module 4: Improving and Maintaining the Quality of EMR System Data

Handouts

- Handout 5.1.1: Data of Dubious Quality (refer back to Session 5.1 for this handout)
- Handout 5.3.1: Sample Data Quality Review Checklist

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following eLearning Assignments:
  Module 4: Improving and Maintaining the Quality of EMR System Data
- Prepare a piece of flip chart paper with the header 'Causes of Poor Data Quality' and draw four columns—one for each step of the data management process
- Prepare a piece of flip chart paper with the header 'Data Quality Check Results'

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that this is the third session on data quality.	
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (30 minutes)

Use slides 4–12 and the facilitator notes to guide this step.

Slide 4

USE the following points to explain data quality assurance.

- Data quality assurance (data QA) refers to the regular activities we carry out to ensure that our data reflect reality as much as possible.
- All health workers have a role in data quality assurance. No one person's role is more important than another, because quality is a **team effort**.
- Data QA looks not only at individual performance, but also at the system that produces the data (such as design and availability of collection forms, equipment, software, training). So it often involves assessing data at multiple sites and administrative levels in order to identify system-related issues or problems.
- Actions are then taken to correct data quality issues once they are identified.
- It is easier to determine the appropriate actions to take when we understand the causes of poor data quality.

ASK:

- How do you know when data quality is poor?
- How do you detect the causes of poor data quality?

ENCOURAGE participants to think back on their experiences and to consider the different data quality dimensions as well.

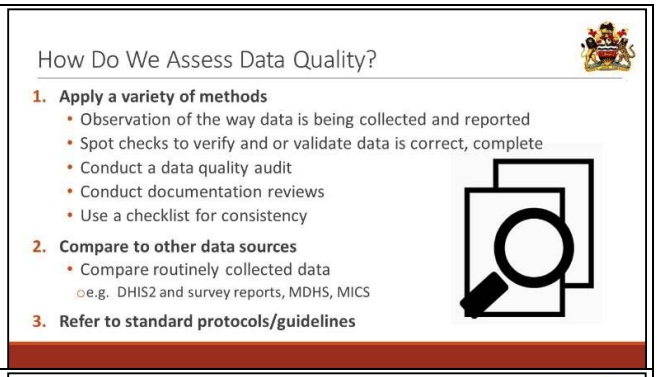
LISTEN for the following responses:

- *Incomplete fields can be seen*
- *Incorrect entries can be seen*
- *Observation that the dates on the paper tool are well passed*
- *Unable to obtain the data you are seeking*
- *Compare what is collected on the paper tool to what you enter into the EMR system*
- *Check that data have been entered correctly before saving*

Slide 5

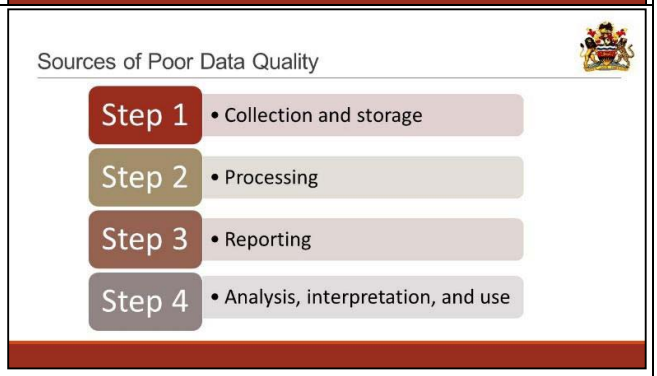
EXPLAIN that when we identify issues with the data, we must take action.

REFER to the responses participants just came up with as you go through the points on the slide.



Slide 6

EXPLAIN: To have effective practices for ensuring data quality, we need to understand what causes poor data quality. Let's take a closer look at the steps of data management to see when and where errors and problems occur.



ASK participants to turn back to **Worksheet 5.1.1: Data of Dubious Quality** in their manual. What were some of the issues that caused poor data quality…

- before data collection?
- during data collection?
- during data processing?
- when reporting?

RECORD their responses on flip chart paper, labelled 'Causes of Poor Data Quality', which has been divided into four columns—one for each step of the data management process as shown in the slide. If the response is relevant to more than one step, write it in each column to which it applies.

When the responses to the scenarios begin to slow, **ASK** participants to think of other causes that may occur at the different steps.

Some possible responses include (**do not read these out loud—**they are here for your reference to prompt discussion):

- *Quality of the data collection tools may be affected by frequent changes, lack of supplies, and illegible content*
- *Particular pieces of data (age, sex, weight, drugs dispensed, lab results) are assumed to have been collected at other points in the process, and so are omitted or left blank*
- *Records or registers do not collect all of the data needed for reporting or decision making*
- *Software bugs*
- *Connectivity problems*
- *Poor understanding of medical terminology and/or programme indicators*
- *Keystroke errors*

- *The workload of the person recording or reporting data is so great that they either do not have the time to gather all of the data or they forget to fill in all the fields*
- *The person recording or entering data accidentally transposes numbers*
- *The importance of a particular piece of data is not known or well understood, and therefore is not collected*
- *No follow-up with missing data on registers or records when compiling reports*
- *Handwriting in registers or records is illegible*
- *Data are not collected in a standardized way or objectively measured*
- *Different groups use different tools to collect the same data*
- *There are parallel data systems to collect the same indicator*
- *Data management operational processes are not documented*
- *Staff suspect that the information is unreliable and don't use it*
- *Staff underestimate the importance of their role in ensuring the health system is run on high-quality data*

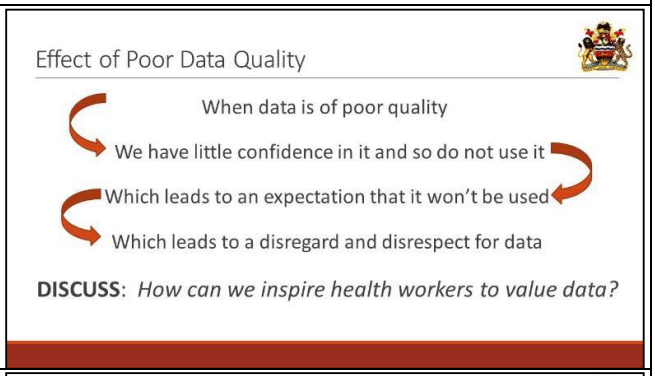
EXPLAIN that at each step of the data management process there are processes and activities in place to catch errors before they move on to the next step. Let's discuss these in more detail.

Slide 7

ASK a participant to read the slide.

ASK: How do you think we can inspire health workers to value data?

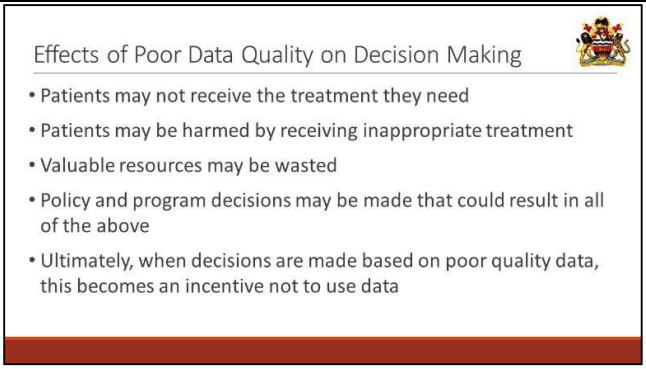
ALLOW 10 minutes for this discussion.



Slide 8

NOTE: This slide is animated. After receiving responses to the questions below, **CLICK** to reveal points on the slide.

EXPLAIN: At the end of the last session, we discussed the importance of data quality on the health system as a whole. Of course, the ultimate goal of the health system is to improve the health of the men, women, and children in our country.



ASK: How do poor-quality data affect the services and care patients receive? How does it affect other decisions being made in the health system?

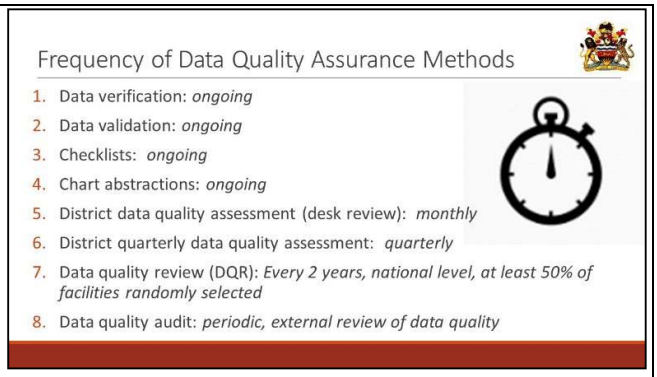
ALLOW a few responses, and then **CLICK** to reveal the answers on the slide.

EMPHASIZE that when decisions made based on poor-quality data become incentives not to use data, and stimulate disregard and disrespect for the potential of data.

Slide 9

EXPLAIN: Some of these quality assurance methods are ongoing, routine actions we can take when we identify issues with data—or even better, before we identify issues with data, so that we can prevent them in the first place.

DESCRIBE the methods listed here to give participants an idea of who uses them, how often, and for what purposes.



NOTE that we have already discussed verification and validation in module 2 on data management; routine data QA (RDQA) will be covered in detail during the next session, so we will not cover these topics in this session.

ASK if there any questions about validation and verification before moving on to the next slide.

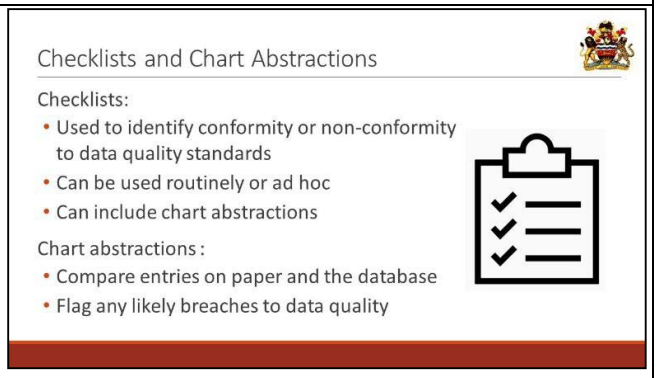
Source: Data Quality Assessment SOP.

Slide 10

USE the points on this slide to review the main characteristics of checklists and chart abstractions.

ASK participants whether checklists or chart abstractions are data quality assurance or data quality control methods.

NOTE: Participants may say that they are both.



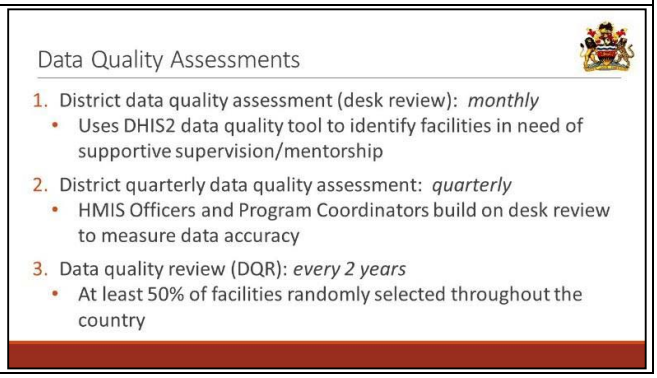
EXPLAIN: These methods of checking data quality can be used for overall data QA. They can also be used during data quality spot checks within a facility.

REFER participants to **Handout 5.3.1: Sample Data Quality Review Checklist** for a sample checklist that can be used by anyone conducting data QA—an individual, a supervisor, or an external team.

Slide 11

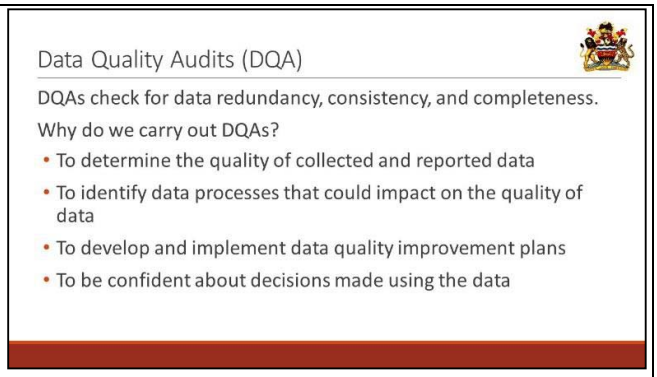
DESCRIBE briefly the different data quality review (DQR) methods on the slide.

NOTE that DQRs use tools developed by the WHO.



Slide 12

EXPLAIN: Data quality audits (DQA) check for data redundancy, consistency, and completeness. They are conducted periodically, and usually involve an external team looking at several facilities throughout the system. Many of the methods for assessing data quality that we just discussed may be used in a DQA.



EMPHASIZE that DQAs look at what is happening at particular facilities—whether an individual facility or several facilities—in order to identify system processes that impact data quality.

TELL participants that a DQA is an example of a routine data quality activity that may be scheduled for a facility once the EMR system has been implemented on site.

Trainer Instructions: Step 3 (50 minutes)

Use slides 13–22 and the facilitator notes to guide this step.

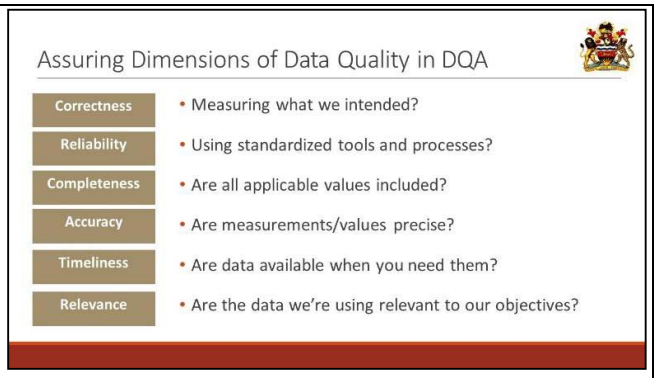
Slide 13

NOTE: This slide is animated. **CLICK** to reveal each dimension.

ASK: What is the question we are asking when we want to assure data correctness?

ALLOW a few responses and then **CLICK** to reveal the question.

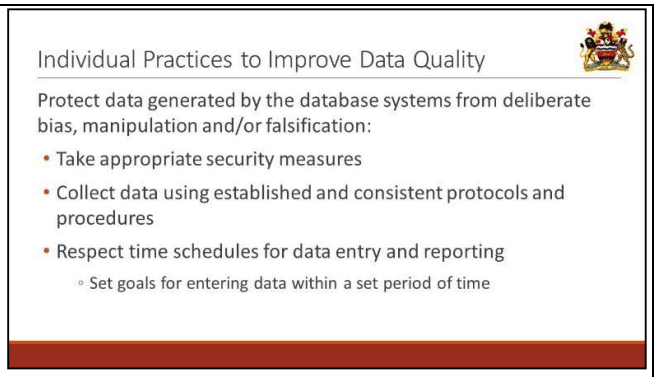
REPEAT the question for each dimension; **CLICK** to reveal each corresponding question once participants have come up with a few responses on their own.



Slide 14

LEAD an interactive discussion by **ASKING**: How do you promote data quality as an individual in your position?

ENCOURAGE participants to imagine themselves in the position of the staff described in the scenarios in **Handout 5.1.1.**



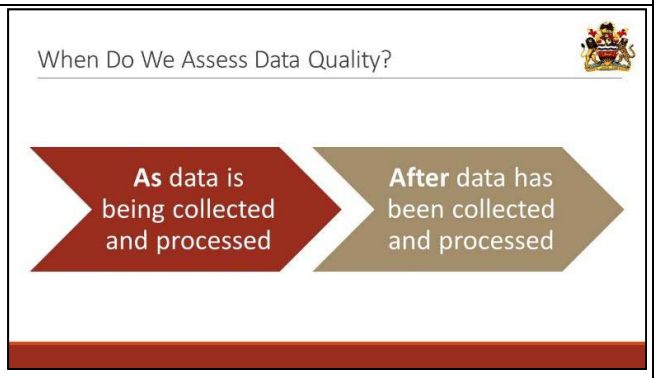
LISTEN for:

- *Maintaining alertness during data collection*
- *Ensuring that all tools are properly and completely filled out*
- *Using a checklist to check one's data entry*
- *By asking specific, clear questions*
- *Probing*

Slide 15

ASK participants to think of methods to assess data quality *AS* data is being collected versus *AFTER* data has been collected.

LEAD a brief brainstorming of different data quality assessment methods.



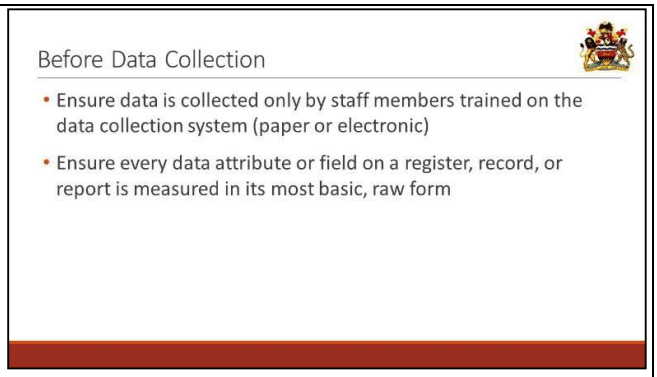
LISTEN for mention of the following methods:

- *Observation*
- *Data quality audit*
- *Documentation review/chart abstractions*
- *Trace and verification*
- *Cross-checks*
- *Spot checks*
- *Data validation*
- *Use of checklists*

Then **CLICK** to the next slides to reveal the answers.

Slide 16

NOTE: This slide is animated. Wait for participants to answer the question before clicking to reveal the answers.



REFER participants to the data quality scenarios provided on **Handout 5.1.1: Data of Dubious Quality**.

ASK: What steps were taken in the scenarios to address data quality problems, or to prevent potential data quality problems before data collection began*?*

ALLOW a few responses and then **CLICK** to reveal the answers on the slide.

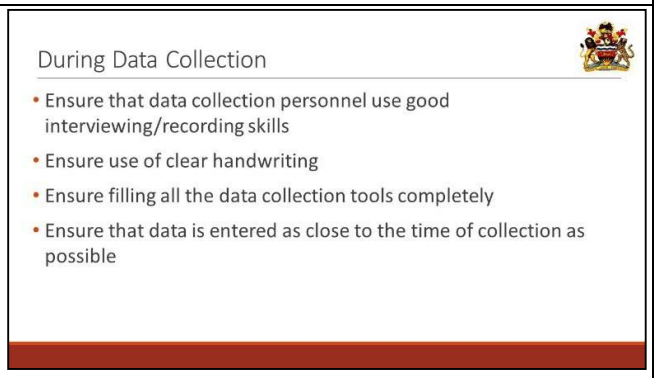
USE the following points to conclude the discussion:

- Ensuring that those who are responsible for collecting data are well trained addresses problems related to accuracy. Common training means that all health workers know what data to collect and how to use the forms properly to do so. Common training can disseminate standards related to data collection, e.g., indicator training.
- Having registers, records, and reports that collect data in its most raw or basic form will increase the precision of the data being collected and reported.
- Well-designed data collection forms can:
    - Reduce the number of errors and omissions in completing the forms.
    - Minimize ambiguity.
    - Aid in accurate data entry.

POINT OUT that these are examples of practices that affect all facilities at all levels, but that a single facility cannot change; for instance, a facility cannot change the fields on an MOHP form on its own. This must come as a policy and procedural change at the national level.

Slide 17

NOTE This slide is animated. Wait for participants to answer the question before clicking to reveal the answers.



REFER back to the data quality scenarios again.

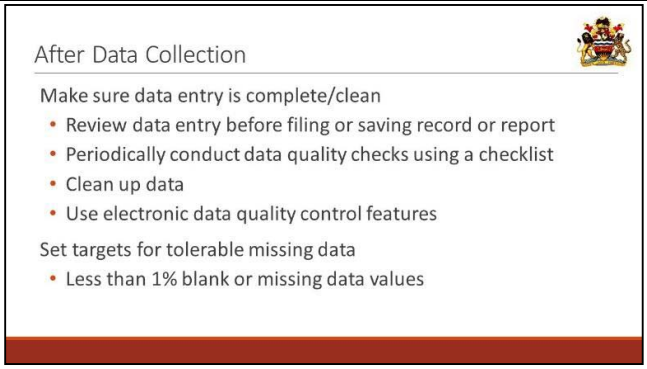
ASK participants what steps were taken in the scenarios to address data quality problems, or to prevent potential data quality problems during data collection.

ALLOW a few responses and then **CLICK** to reveal the answers on the slide.

REMIND participants of the points coming from the discussion about causes of poor data quality, especially those that are human. These tend to play a big contributing role to prevention of data quality problems during data collection.

Slide 18

NOTE: This slide is animated. Wait for participants to answer the question before clicking to reveal the answers.



REFER back to the data quality scenarios again.

ASK participants what steps were taken in the scenarios to address data quality problems or prevent potential data quality problems after data collection.

REVIEW the techniques listed here and **USE** the notes below to provide additional explanation as needed.

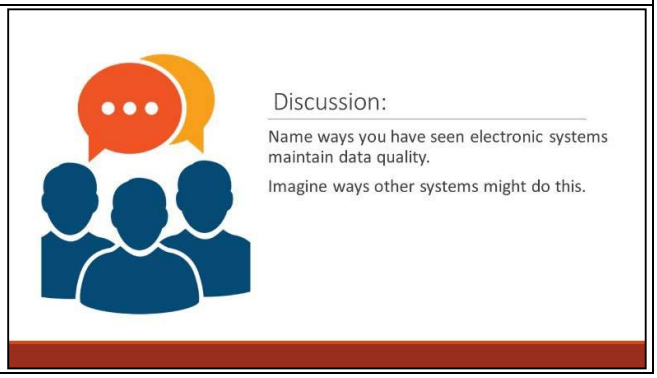
HIGHLIGHT those areas where an EMR system may call for additional data quality techniques or enhance existing ones.

- Make sure data entry is complete:
  - Review records, registers, and reports for missing or incomplete date before the patient leaves, and before the record or report is filed or sent for data entry.
  - Review records and registers before entering the data into an EMR system.
  - Periodically check random records for completeness. In an electronic system, check the electronic record against the paper record; this is also known as data validation or verification.
  - Electronic data quality control features include alerts to warn of missing data, and the use of required fields or active/inactive save buttons to prevent entry of a form that is missing key variables.
  - Set targets for tolerable missing data.
  - Generally, less than 1% blank or missing data values is considered tolerable.

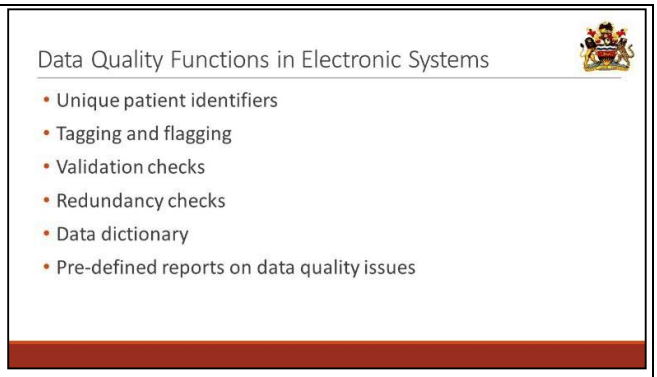
Slide 19

ASK participants to name several ways that they have seen the EMR or DHIS2 system software maintain or contribute to data quality.

ALLOW a few responses, then **CLICK** to the next slide to reveal the ways in which they do so.



Slide 20



GO THROUGH each feature listed on the slide.

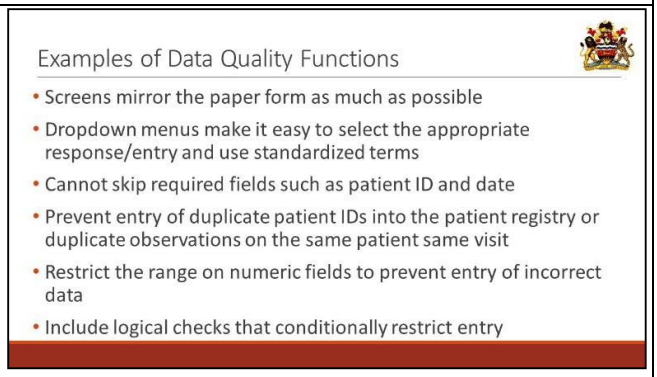
ASK participants if they know what each feature is. **ALLOW** a few responses, and then **EXPLAIN** using the notes below:

- **Unique patient identifiers** give each person in the country a permanently assigned unique number to be used across the entire health system, to ensure that all health workers are working with complete information, and to improve interoperability among systems. Each person would have the same number regardless of the system (EMR, lab, pharmacy)—like a bar code for a human being!
- **Tagging**: highlighting questionable data.
- **Flagging**: similar to tagging, you can flag questionable data to ensure that it is reviewed.
- **Validation checks** ensure data is in the appropriate format.
- **Redundancy checks** ensure duplicate data is not entered.
- **Data dictionaries** ensure that standard concepts and measures are used throughout the system.
- You can run reports that provide information on data quality issues.

ASK if participants can think of any others that are not listed here.

EMPHASIZE that the implementation of the above functions varies from system to system.

Slide 21



EXPLAIN: Here are some examples of how electronic systems contribute to data quality.

For the last point, there are two types of logical checks that can be used:

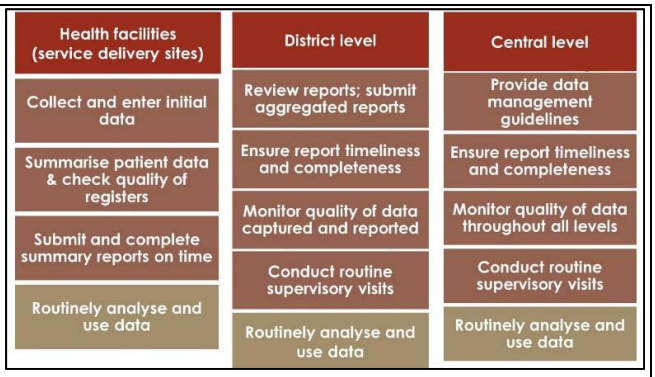
- One that prevents entry—for example, marking a male patient as pregnant, or entering a height less than a certain amount for an adult patient.
- One that allows entry, but displays a warning message if the user tries to enter invalid data (e.g., SAO2 < 60). There is often a trade-off between use of real-time logical checks and system performance. Some of these logical checks will probably have to be done post-entry. Additional examples can be seen in data cleanup procedures.

ASK participants what data assurance policies and procedures are used by MOHP.

Slide 22

EXPLAIN that what we are looking at in this slide are roles and responsibilities of health workers at each level of the health system related to data quality.

ASK a participant to read the list of roles and responsibilities for maintaining data quality at health facilities.



ASK if any are missing from this list. **RECORD** the responses on a flip chart.

CONTINUE by asking other participants to read the lists for the district and national levels, and **ASK** if any are missing.

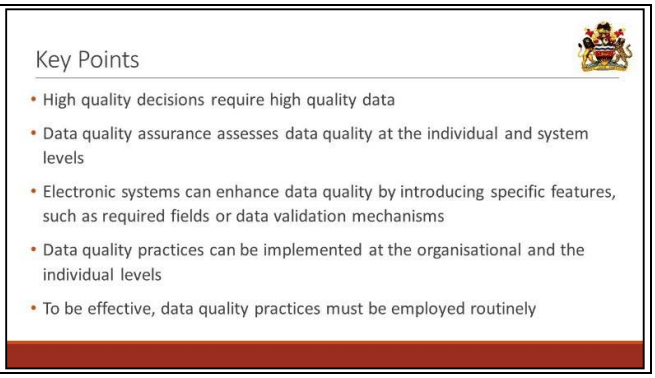
ENSURE the list is complete before moving on to the next slide.

Trainer Instructions: Step 4 (5 minutes)

Use slide 23 and the facilitator notes to guide this step.

Slide 23

REVIEW key points on the slide.



Handout 5.3.1: Sample Data Quality Review Checklist

Unique patient number:

Form reviewed:

Review data:

Name of reviewer:

Criteria	**Yes**		**No**		**Comments**
1. Data entry completed within the past 24 hours					
2. Data entry completed within the past week					
3. The encounter date occurs before the date that the data is entered					
4. Is there a duplicate patient record?					
5. Are any data or dates transposed? (If yes, indicate which ones)					
6. Are decimals correctly entered?					
7. Essential data for collection	Entered?		Entered correctly?		Not applicable/ Comments
	Yes	No	Yes	No	
a. Date of encounter					
b. Unique patient number					
c. Sex					
d. Birth date					
e. Weight					
f. Height					
g. Pregnancy status (if female)					
h. CD4 count (not done/unknown)					
i. CD4 count (cmm^3)					
j. Resulting TB status					
k. WHO staging					
l. Clinical encounter – HIV addendum: Impressions and Diagnoses					
m. Clinical encounter – HIV addendum: Decision points/clinical notes					
8. Other remarks:					

Session 5.4

Session 5.4: Routine Data Quality Assessment

Time: 120 minutes

Learning Objectives

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

1. Define routine data quality assessment (RDQA)
2. Describe the purpose of RDQA
3. Outline the six steps of the RDQA process
4. Review RDQA tool
5. Describe data quality/RDQA responsibilities at each level of the health system
6. Discuss the importance of RDQA

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Interactive lecture	RDQA overview, RDQA tool (slides 4–7)	Flip chart, markers, tape, LCD
3	20 minutes	Facilitator presentation	Steps in conduction RDQA (slides 8–14)	Flip chart, markers, tape, LCD
4	40 minutes	Group activity or interactive demonstration	Using the RDQA tool (slide 15)	Flip chart, markers, tape, LCD, Handout 5.3.1: RDQA Tool, Local Register**, Local Report** (These handouts will be developed at the ToT for use in rollout)
5	10 minutes	Interactive lecture	DQA roles, responsibilities and team (slides 16–17)	Flip chart, markers, tape, LCD
6	30 minutes	Small group discussion, interactive lecture	Why is RDQA important? (slide 18–19)	Flip chart, markers, tape, LCD
7	5 minutes	Facilitator presentation	Key points (slide 20)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- MEASURE Evaluation. *User Manual Routine Data Quality Assessment*. Access at: https://www.measureevaluation.org/resources/tools/health-information-systems/data-quality-assurance-tools/rdqa-guidelines-2015
- MEASURE Evaluation. *Data Quality Assurance Tools.* Access at: https://www.measureevaluation.org/resources/tools/health-information-systems/data-quality-assurance-tools

Handouts

Handout 5.4.1: RDQA Tool

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Review the following eLearning Assignments:
- Module 4: Improving and Maintaining the Quality of EMR System Data
- ***Local Register(s) and Report(s) should be obtained in advance of the training and anonymized for use in this session. Please contact training organizers for more information.***

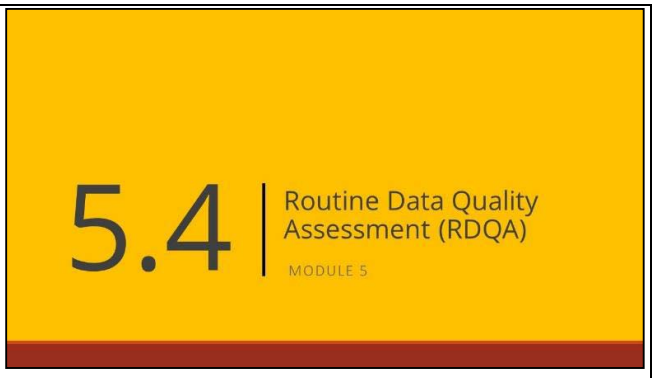
Trainer Instructions: Step 1 (5 minutes)

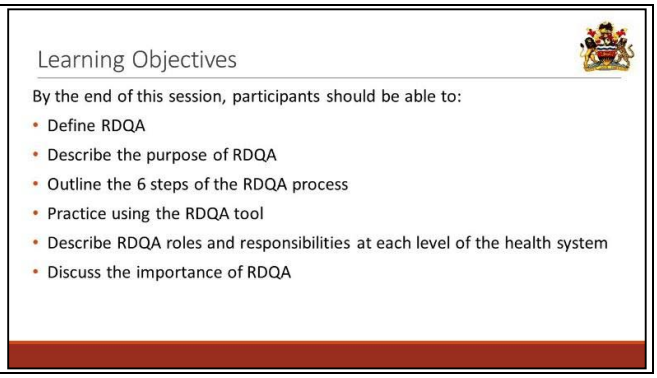
Use slides 1–3 and the facilitator notes to guide this step.

Slide 2

EXPLAIN: This session is intended for those health workers who may play a role in RDQA, or who need to understand the process because of their position—that is, facility-level decision makers and district-level data handlers.

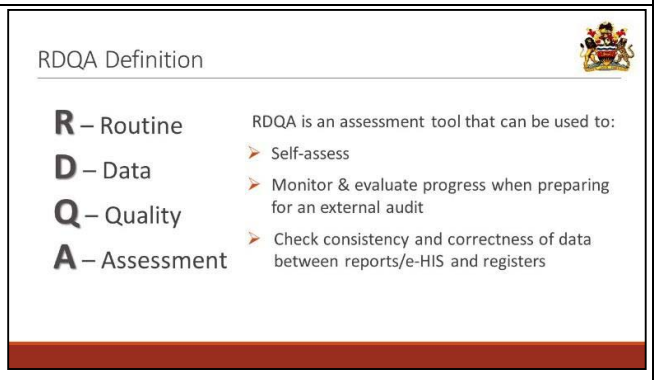
ENCOURAGE participants to ask questions at any time during the presentation.



Slide 3	**REVIEW** the learning objectives for this session.	

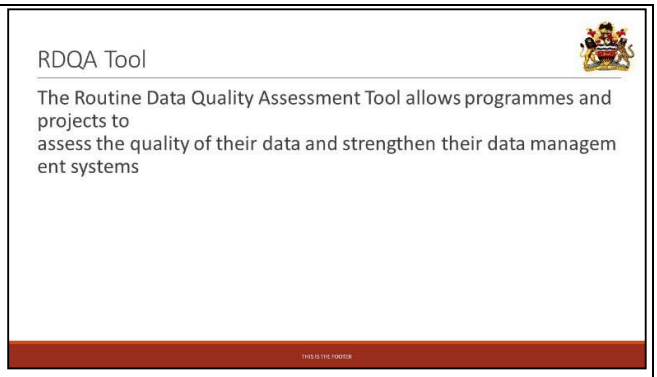
Trainer Instructions: Step 2 (10 minutes)

Use slides 4–7 and the facilitator notes to guide this step.

Slide 4	**ASK** a participant to read the slide. **REMIND** participants that we just discussed the different types of data QA in the previous session. **ASK** if they have participated in data QA, and if so, what their role was.	
Slide 5	**REVIEW** the terms and definitions on the slide. **EXPLAIN** that data QA and RDQA tools are both designed to: • Verify the quality of the data. • Assess the system that produces that data. • Develop action plans for improve both.	
	RDQA is performed *internally* and *routinely*, and includes both quantitative and qualitative assessments.	

Slide 6

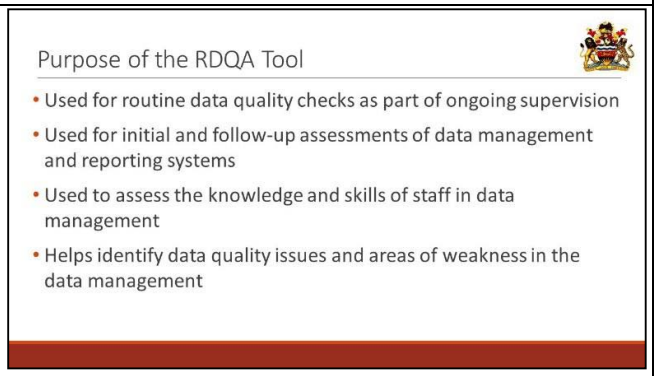
EXPLAIN the following:



- The RDQA tool is a simplified version of the Data QA tool.
- The RDQA tool is generic with regard to indicators and programmes, and can be used with or without rigorous sampling methods.
- The RDQA tool is used at each level to compile data collected during the assessment, and to generate reports that inform recommendations and action planning.
- The RDQA tool should be applied regularly to monitor trends in data quality. It is recommended to be implemented quarterly.

Slide 7

EXPLAIN the following:



- Routine data quality checks can be included in already planned supervisory visits at service delivery sites.
- Regular assessments of a system's ability to collect and report quality data at all levels can be used to identify gaps and monitor necessary improvements.
- MOHP staff, partners, and data clerks can be trained on the RDQA tool, and sensitized to the need to strengthen the key functional areas linked to data management and reporting in order to produce quality data.
- The RDQA tool can help identify data quality issues, and areas of weakness in the data management and reporting system that would require strengthening to increase readiness for a formal data quality audit.

Trainer Instructions: Step 3 (20 minutes)

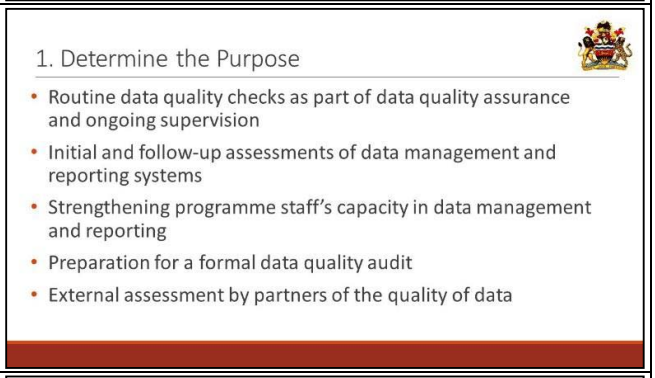
Use slides 8–14 and the facilitator notes to guide this step.

Slide 8

READ the points on the slide.

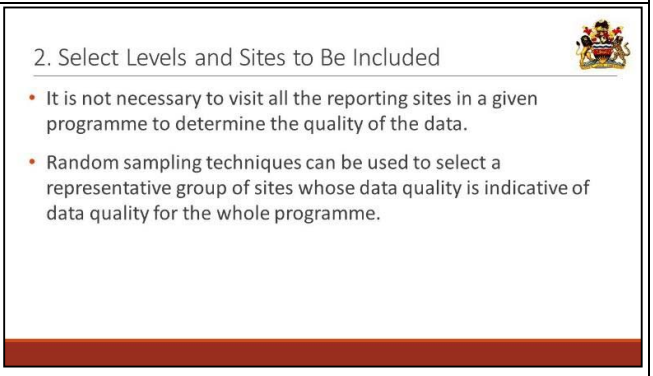
Slide 9

EXPLAIN: The primary purpose of the assessment may vary; it is important to clarify the purpose in advance.



Slide 10

EXPLAIN that levels should be determined once the appropriate reporting levels have been identified and 'mapped'.

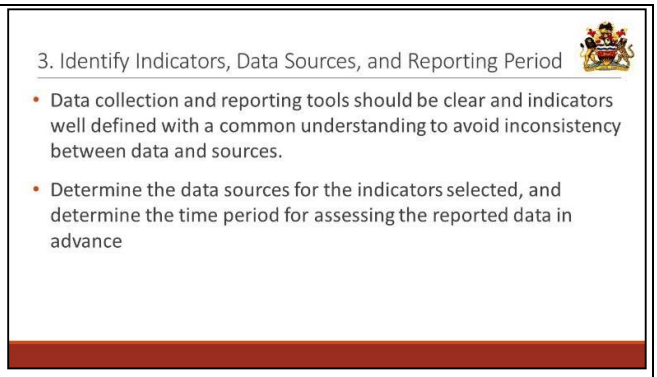


For example, there are 100 sites providing services to 10 districts. Reports are sent from the sites to their districts, which then send aggregated reports to the monitoring and evaluation (M&E) unit. In some cases, the data flow will include more than one intermediate level (region/zone, province/state, levels within a programme/organization).

Slide 11

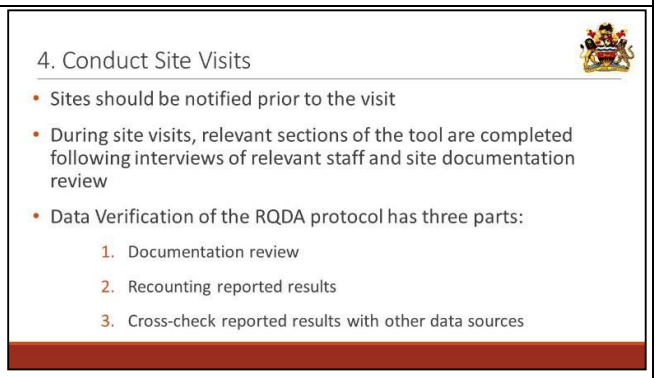
ASK participants to give examples of the indicators and their respective data elements.

EXPLAIN that if data are reported every six months, the reporting period for the RDQA could be January through June 2007. Using a specified reporting period gives a reference from which to compare the 'recounted' data.



Slide 12

MENTION that at each site, you'll need to collect data using the RDQA tool. If you have a team that is visiting several sites simultaneously, you can use multiple workbooks to collect your data, and compile the data in one workbook when the site visits are complete.



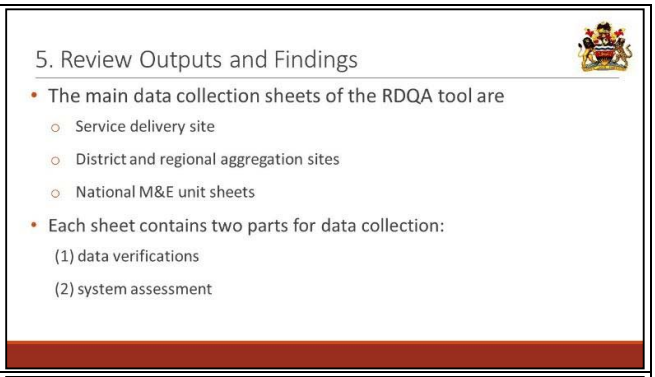
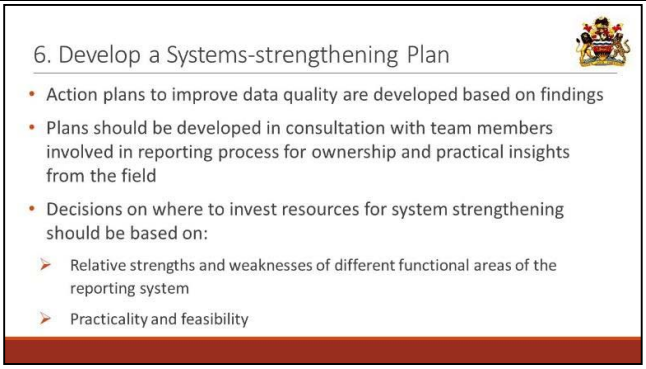
EXPLAIN:
Documentation review: For each of the indicators selected, team members will review the availability and completeness of indicator source documents for the selected reporting period. They will select Yes (available and complete) or No (not available and/or complete) for each indicator on the data collection form. Where data are not available and/or complete, they will note this in their comments.

EXPLAIN:
Recounting reported results: Results will be recounted from source documents, and verified numbers compared to reported numbers. Any discrepancies will be explained.

Cross-checking of reported results with other data sources: When collecting site-level data, team members will be asked to cross-check their results with other available data. This process is called **triangulation**, and should include the following three cross-checks:

- Primary source against secondary source
- Secondary source against primary source (or a different primary to secondary)
- Commodities (inventory) management systems

Each of these cross-checks can be captured on the data collection form for individual service delivery sites. Cross-checks can be performed by examining separate inventory records documenting the quantities of treatment drugs, test kits, or insecticide-treated nets purchased and delivered during the reporting period to see if these numbers corroborate the reported results.

Slide 13	**EXPLAIN:** When you're conducting an RDQA, you may be completing the full tool—OR, if the tool is being used for routine monitoring of data quality, only the data verifications.	
Slide 14	**EXPLAIN** that at each site, and after reviewing the overall results, you will create action plans to improve data quality. These recommendations should be created based on the findings of the assessment, in consultation with the team members who are involved in the reporting process. By engaging the team members, you create ownership of the plan and get direct insights from people in the field. Decisions on where to invest resources for system strengthening should be based on the relative strengths and weakness of the different functional areas of the reporting system identified via the RDQA, as well as on considerations of practicality and feasibility.	

Trainer Instructions: Step 4 (40 minutes)

Use slide 15 using the facilitator notes, **Handout 5.3.1: RDQA Tool Excerpts**, **Handout 5.3.2, Handout 5.3.3,** and **Excel document/electronic Handout 5.4.1a: RDQA Tool** to guide this step.

Slide 15	*40 minutes total* **REFER** participants to **Handout 5.3.1: RDQA Tool**. **DIVIDE** participants into groups of four. **REFER** participants to either the real registers and reports that were arranged to be provided for this exercise or the copies available in **Handout 5.3.1**.	

DEMONSTRATE how to use the RDQA tool to compare data from the register to the data in the DHIS2 report.

ALLOW 10–15 minutes for the groups to have hands-on practice with the RDQA tool, using either the retrospective data from the nearest health facility as planned or **Handouts 5.3.2** and **5.3.3**.

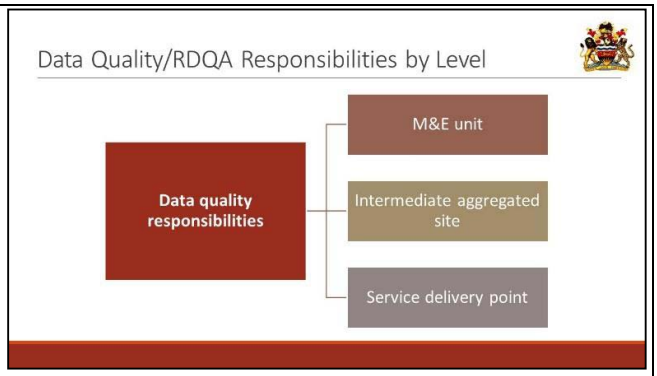
After the hands-on practice, **ALLOW** each group 3–5 minutes to share their findings and reflections on the process with the rest of the participants.

Trainer Instructions: Step 5 (10 minutes)

Use slides 16–17 and the facilitator notes to guide this step.

Slide 16

EXPLAIN that RDQA can be done at all levels of the system.



M&E unit

- Provides lower reporting levels with clear guidelines on data collection and reporting
- Disseminates national policies related to data quality
- Conducts routine supervisory visits to lower-level facilities
- Provides organogram of positions and data management responsibilities

For RDQAs:

- Initiates RDQAs in conjunction with other national programme units
- Follows up on late, incomplete, inaccurate, or missing reports
- Captures all data quality checks not yet captured in an electronic format, including spot and cross-checks, validations, and updates to error logs

Intermediate aggregation site

- Follows appropriate procedures to compile service delivery site forms each month; sends reports to the national M&E unit
- Ensures budget includes funds for data quality activities
- Follows up on late, incomplete or missing information
- Conducts routine supervisory visits to service delivery sites

For RDQAs:

- Initiates RDQAs for service delivery sites
- Conducts follow-up data verification checks as part of supervisory visits
- Documents how discrepancies have been resolved

Service delivery point

- Summarizes patient data and checks data quality of patient registers
- Submits monthly summary reports to the health district
- Routinely analyses and uses data to improve quality of care

For RDQAs:

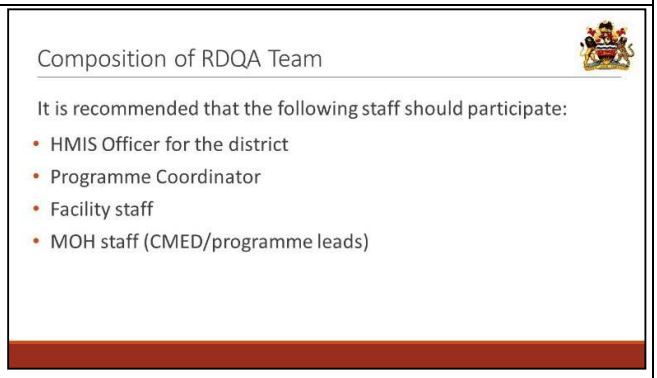
- Health sites do not initiate RDQAs

Slide 17

NOTE: This slide is animated. Wait for participants to answer the question before clicking to reveal the answers.

ASK: Who should participate in an RDQA?

ALLOW a few responses and then **CLICK** to reveal the answers.



EXPLAIN that conducting RDQAs is a team effort. **EMPHASIZE** that the team should be made up of these staff types.

Trainer Instructions: Step 6 (30 minutes)

Use slides 18–19 and the facilitator notes to guide this step.

Slide 18

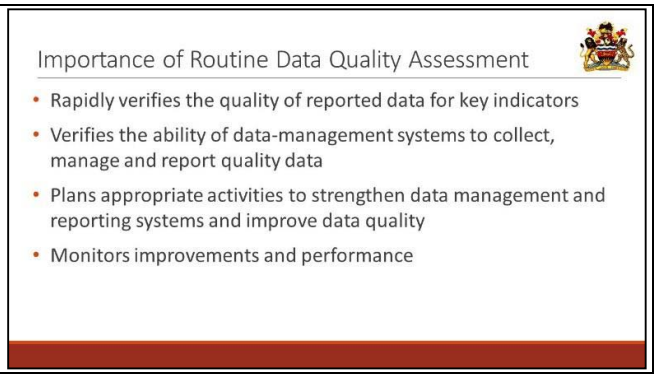
20 minutes total

DIVIDE participants into the same groups of four.

ALLOW participants to work for 5 minutes in their groups to discuss the importance of RDQA at the facility and district levels, and record highlights of their discussion.

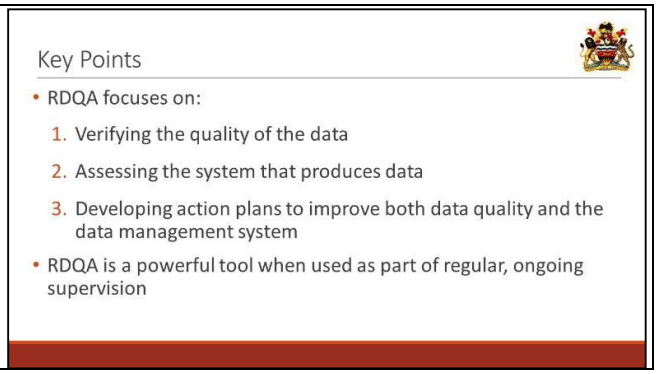
ASK each group to appoint a secretary and someone to present.

ALLOW 2–3 minutes for each group to present.

Slide 19		
	NOTE: This slide is animated. **CLICK** to reveal each point one by one. **REFER** to participant responses from the previous exercise. **USE** the points on the slide to complete the discussion on importance of RDQA.	

Trainer Instructions: Step 7 (5 minutes)

Use slide 20 and the facilitator notes to guide this step.

Slide 20		
	ASK a participant to read each of the key points. **ASK** if there are any questions before concluding the session.	

Routine Data Quality Assessment Tool

District	Blantyre
Assessment date (dd/mm/yyyy)	11/16/17
Facililty Name	Ndirande
Name of Program:	Maternity

	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5	Indicator 6
Indicator(s) Reviewed	% of women whose HIV status was ascertainedby the end of ANC	% of HIV infected women who were on ART by the end of ANC	% of women whose HIV status was ascertained in maternity	% of children alive and confirmed not infected by age 24 months	% of HIV exposed infants who started NVP prophylaxis	% of patients retained alive on ART by the end of the quarter
Reporting Period Verified:	2017 Q3 (july -sept)					

Assessment Team:	**Name**	**Job Title**	**Email & phone #**
Primary contact:	**lixy**		
	brian		
Contract data Staff at the facility			

Data Verification and System Assessment Sheet

Component of the M&E System	Answer Codes Yes—completely Partly No—not at all N/A		

Part 1: Data Verifications

A - Documentation Review:		*Write indicators under review below*					
	Review availability and completeness of all indicator source documents for the selected reporting period.	*% of women whose HIV status was ascertained by the end of ANC*	*% of HIV infected women who were on ART by the end of ANC*	*% of women whose HIV status was ascertained in maternity*	*% of children alive and confirmed not infected by age 24 months*	*% of HIV exposed infants who started NVP prophylaxis*	*% of patients retained alive on ART by the end of the quarter*
1	*Review available source documents for the reporting period being verified. Is there any indication that source documents are missing?*	Yes	Yes	No	No	No	No
	If yes, determine how this might have affected reported numbers.			•			
2	*Are all available source documents complete?*	No	Yes	No	No	Yes	Yes
	If no, determine how this might have affected reported numbers.			•			
3	*Review the dates on the source documents. Do all dates fall within the reporting period?*	No	Yes	Yes	Yes	Yes	Yes

	If no, determine how this might have affected reported numbers.						
4	*Number of tools used to collect and generate these indicators*						
B - Recounting reported Results:							
	Recount results from source documents; compare the verified numbers to the site-reported numbers and explain discrepancies (if any).						
4	*Recount the number of people, cases, or events during the reporting period by reviewing the source documents.* ***[A]***	1000	90	100	200	120	79
5	*Enter the number of people, cases, or events reported by the site during the reporting period from the site summary report.* ***[B]***	800	90	300	100	121	78
6	*Calculate the ratio of recounted to reported numbers. [B/A]*	80%	100%	300%	50%	101%	99%
7	*What are the reasons for the discrepancy (if any) observed (i.e., data entry errors, arithmetic errors, missing source documents, other)?*						

C - Cross-check reported results with other data sources:							
Cross-checks can be performed by examining separate inventory records for numbers of people receiving particular services during the reporting period to see if these numbers corroborate the numbers in the reports. Other cross-checks could include, for example, randomly selecting 20 patient cards and verifying if these patients were recorded in the HTS versus ANC, HTS versus Maternity, etc.							
Cross-Check 1: Verify the primary source of data against the secondary source of data.							
8	*Select 5% of units being counted (or at least 20 units) in the secondary data source. How many units were selected?*	20	20	20	20	20	20
9	*For how many units does the information for the indicator in the secondary data source match the information in the primary data source?*	20	8	10	16	12	15
10	*Calculate % difference for cross-check 1: If difference is below 90%, select an additional 5% of individual client records (or at least an extra 10 records) and redo the calculation (ADD the numbers to the existing numbers in the above cells).*	100%	40%	50%	80 %	60%	75 %

Part 2. Systems Assessment								
I - M&E Structure, Functions, and Capabilities								
1	*There are designated staff responsible for reviewing data collection tools and aggregated numbers prior to submission to the next level to district HMIS office.*	Yes - completely						
2	*The responsibility for recording the delivery of services on source documents is clearly assigned to the relevant staff (e.g. health care providers).*	Partly						
3	*All staff positions dedicated to data management systems are filled at the facility.*	No - not at all						
4	*All data staff have received training on the data management processes and tools.*	Yes - completely						
5	*For EMR facilities, all users received training*	Partly						
II - Indicator Definitions and Reporting Guidelines								

The M&E Unit has provided written guidelines for reporting							
4	*Are there operational indicator definitions meeting relevant standards that are systematically followed by all service points?*	Yes - completely					
5	*Does the facility have clearly documented (written) guidelines on what is reported?*	Yes - completely					
6	*Does the facility have clearly documented (written) guidelines for who to report to?*	Yes - completely					
7	*Does the facility have clearly documented (written) guidelines on how and when to report?*	No - not at all					
III - Data Collection and Reporting Forms and Tools							
9	*Are the national registers and reporting forms used consistently according to national guidelines?*	No - not at all					
10	*Does the site have sufficient registers and forms for data*	Partly					

	collection and reporting?						
11	*HIV services are usually provided by different partners. Are services conducted by IP included in quarterly HIV reports?*	No - not at all					
12	*Does the facility have lever arch file to store quarterly HIV reports?*	Yes - completely					
13	*Does the facility have lever arch files to store other service delivery reports?*	Partly					
14	*Does a senior staff member (e.g., the statistic clerk, HMIS Officer) review the aggregated numbers prior to the submission/release of reports from district office?*	Partly					
15	*(For EMR facility only) Does the facility conduct retrospective data entry within two weeks after EMR downtimes?*	No - not at all					
16	*(For EMR facility using ESCOM power source only) Is there an alternative*	Yes - completely					

	source of power in case of ESCOM blankout?						
IV - Data Management Processes							
13	*Does clear documentation of collection, aggregation, and manipulation steps exist?*	Partly					
14	*Are procedures to identify and reconcile discrepancies in reports clearly defined and followed?*	Yes - completely					
15	*Are there clearly defined and followed procedures to periodically verify source data?*	Partly					
16	*(For district and central hospitals only) Are quality controls in place for entering data from paper-based forms into a computer? (e.g., double entry, post-data entry verification)*	Yes - completely					
V - Links with National Reporting System							
19	*Is the site using all national registers and reporting forms in service delivery?*	No - not at all					

20	*Are data reported through a single channel of the national information systems?*	No - not at all					

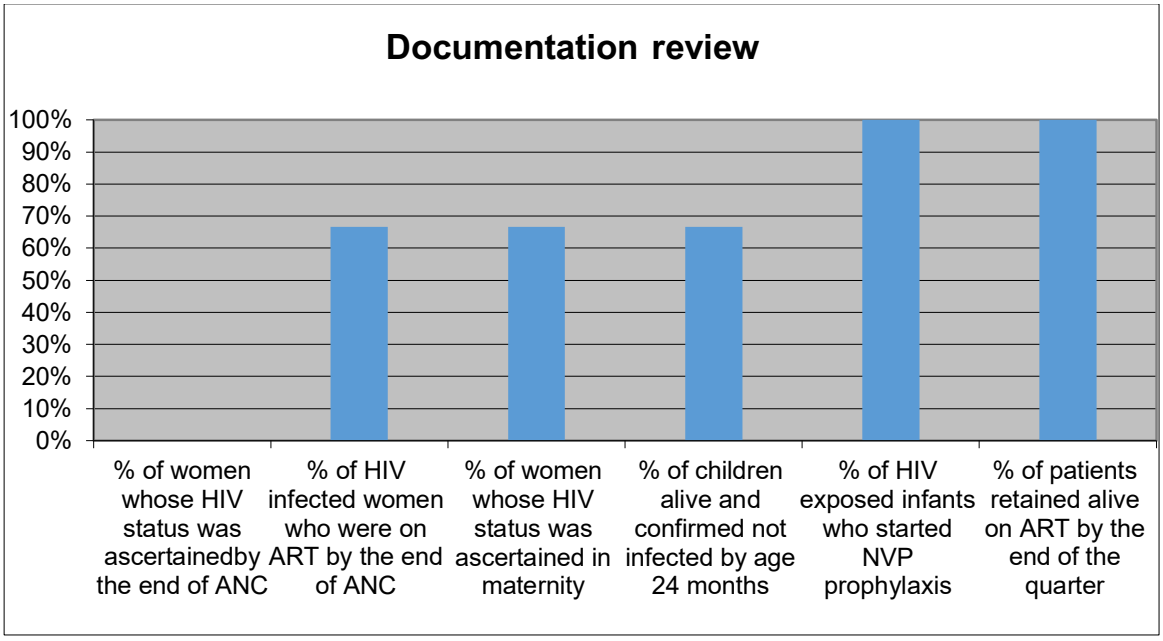
Part 3: Recommendations for the Service Site

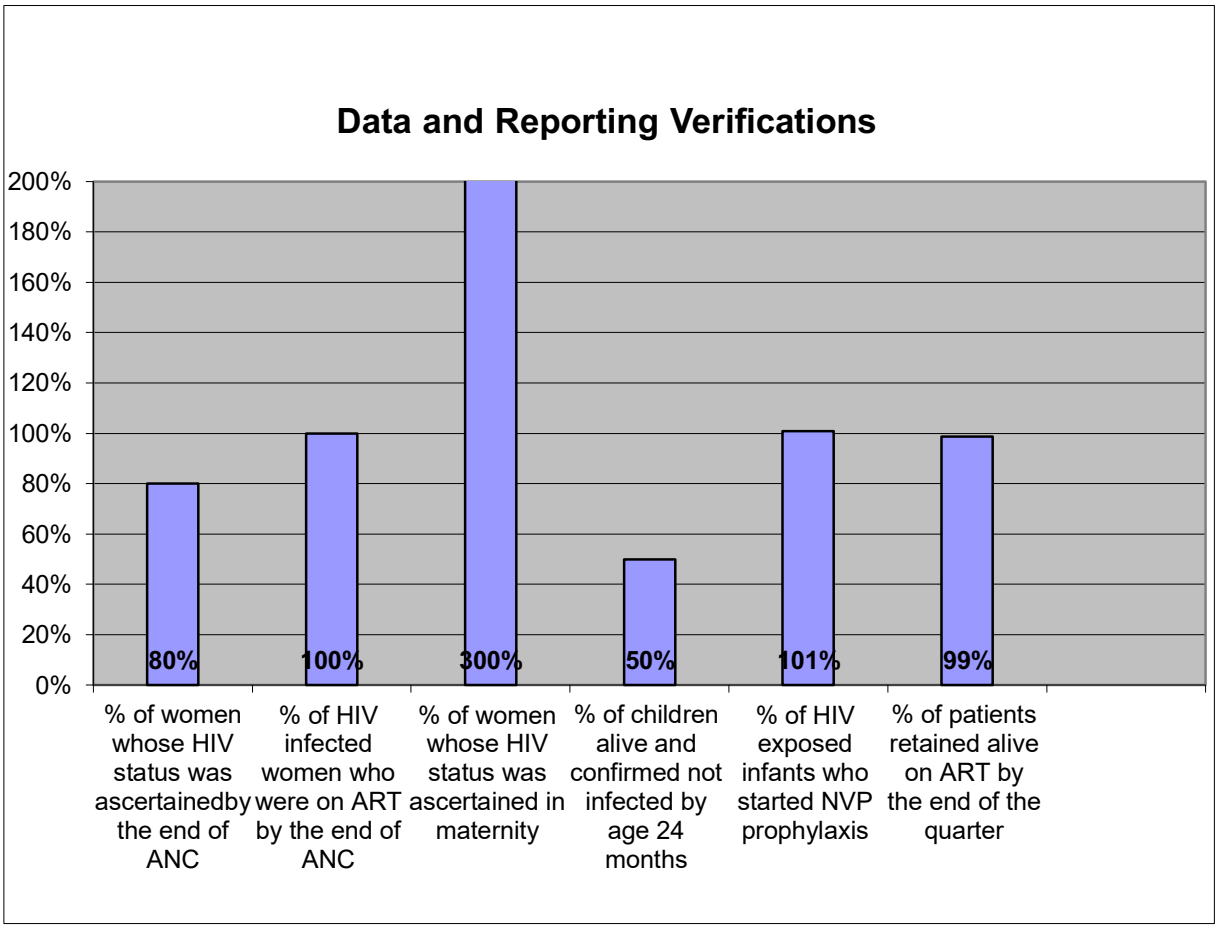
13	*Is there anything else that we should know to understand how your work in data management and reporting? manipulation steps exist?*	
14	*What is your main challenge regarding data management and reporting?*	

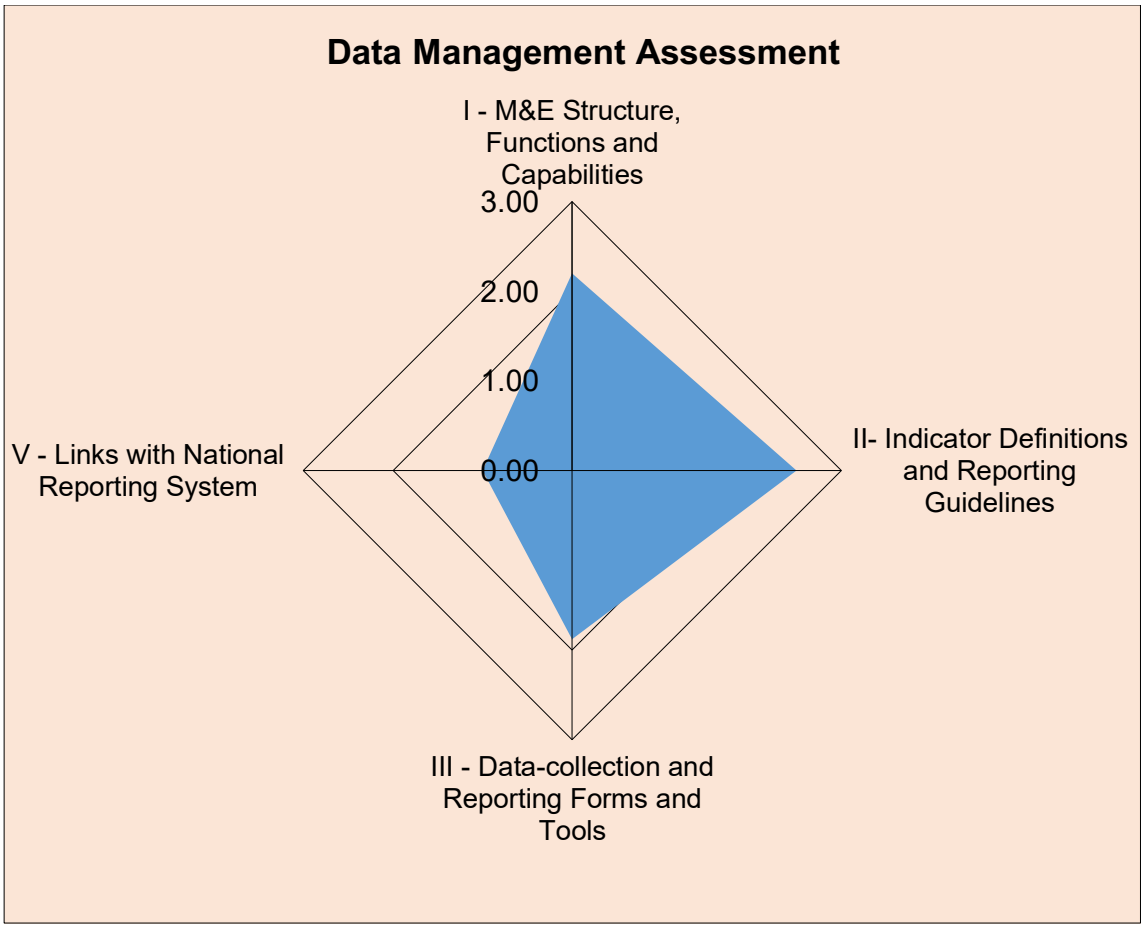
Part 4: Recommendations for the Service Site

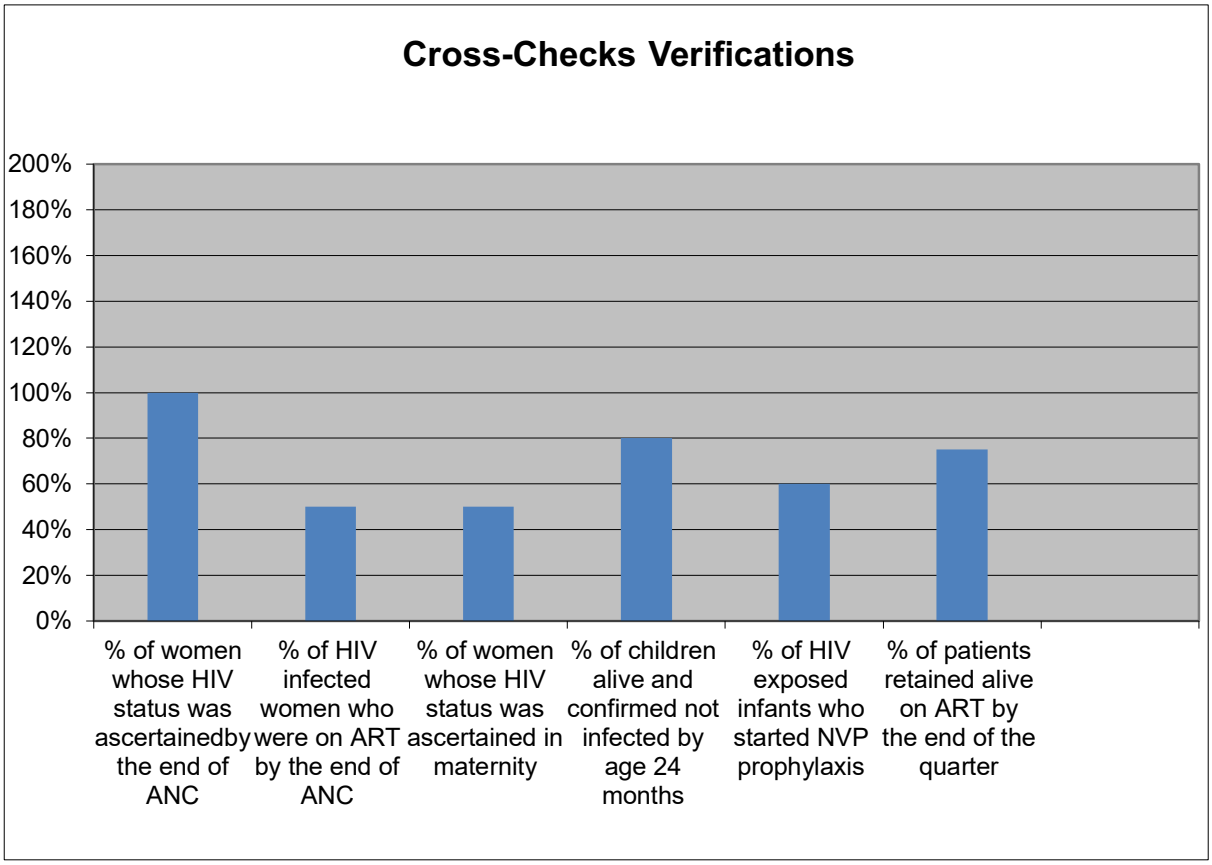
Based on the findings of the systems review and data verification at the service site, please describe any challenges to data quality identified, and recommend strengthening measures, with an estimate of the length of time the measures could take. These will be discussed with the programme.

	Identified Weaknesses	**Description of Action Point**	**Res po-nsible**	**Ti me-Line**
1				
2				
3				
4				


Documentation review
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% of women whose HIV status was ascertainedby the end of ANC
% of HIV infected women who were on ART by the end of ANC
% of women whose HIV status was ascertained in maternity
% of children alive and confirmed not infected by age 24 months
% of HIV exposed infants who started NVP prophylaxis
% of patients retained alive on ART by the end of the quarter


Data and Reporting Verifications
200%
180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
80%
100%
300%
50%
101%
99%
% of women whose HIV status was ascertainedby the end of ANC
% of HIV infected women who were on ART by the end of ANC
% of women whose HIV status was ascertained in maternity
% of children alive and confirmed not infected by age 24 months
% of HIV exposed infants who started NVP prophylaxis
% of patients retained alive on ART by the end of the quarter


Data Management Assessment
I - M&E Structure, Functions and Capabilities
3.00
2.00
1.00
0.00
II- Indicator Definitions and Reporting Guidelines
III - Data-collection and Reporting Forms and Tools
V - Links with National Reporting System


Cross-Checks Verifications
200%
180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
% of women whose HIV status was ascertainedby the end of ANC
% of HIV infected women who were on ART by the end of ANC
% of women whose HIV status was ascertained in maternity
% of children alive and confirmed not infected by age 24 months
% of HIV exposed infants who started NVP prophylaxis
% of patients retained alive on ART by the end of the quarter

Module Six
Session 6.1

MODULE 6: DATA ANALYSIS, INTERPRETATION & USE
Session 6.1: Introduction to Data Analysis

Time: 150 minutes

Learning Objectives

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

1. Define data analysis, interpretation and use
2. Describe the processes for analysing, interpreting, and using data
3. Describe different examples of how to transform data into information
4. Explain the principles and uses of data analysis
5. Distinguish between descriptive and explanatory data analysis
6. Distinguish between quantitative versus qualitative variables

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	60 minutes	Interactive lecture, discussion	How data analysis is used (slides 4–15)	Flip chart, markers, tape, LCD, Handout 6.1.1
3	5 minutes	Facilitator presentation	Types of data analysis (slides 16–18)	Flip chart, markers, tape, LCD
4	15 minutes	Interactive lecture, pair activity, group activity	Variables (slides 19–23)	Flip chart, markers, tap,e LCD
5	60 minutes	Group discussion/activity	Using Data for Decision Making (slide 24)	Flip chart, markers, tape, LCD, Handout 6.1.2
6	5 minutes	Facilitator presentation	Key Points (slide 25)	Flip chart, markers, tap,e LCD

Resources Needed

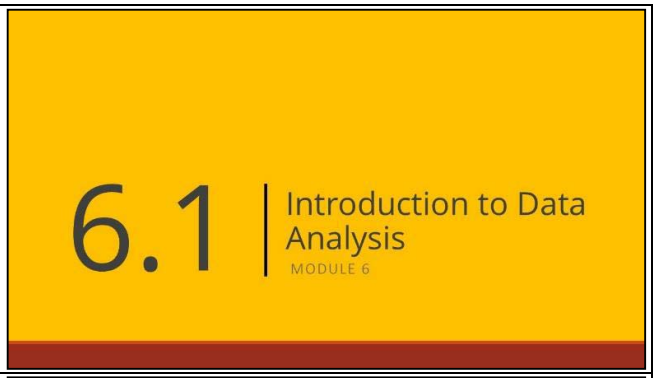
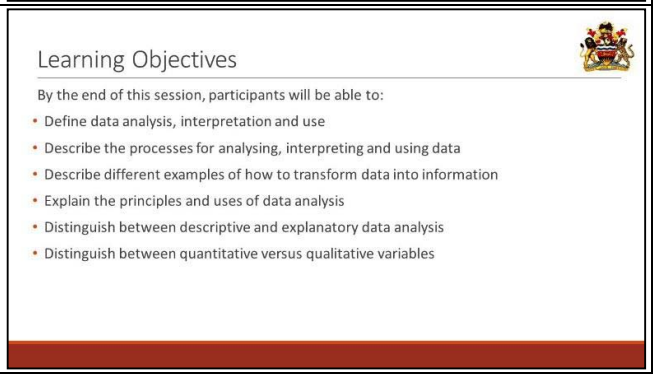
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- Facilitator Instructions 6.1.2: Using Data for Evidence-Based Decision Making

Handouts

- Handout 6.1.1: Ways to Use Data Analysis Results
- Handout 6.1.2: Case Studies: Using Data for Evidence-Based Decision Making

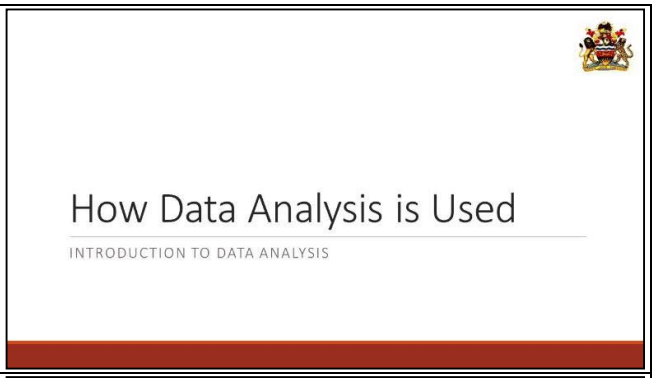
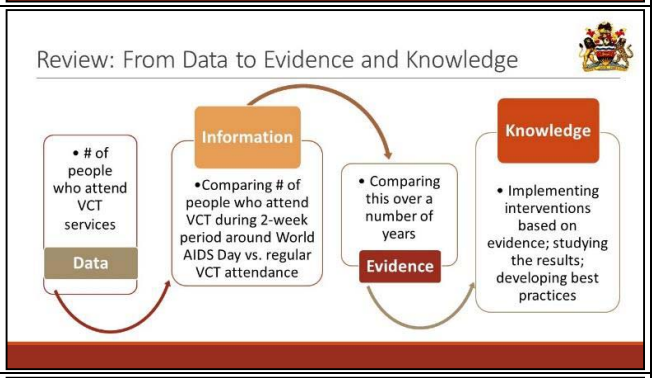
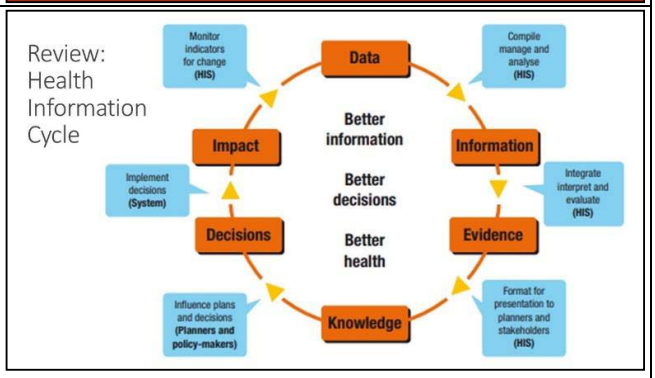
Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (60 minutes)

Use slides 4-15 and the facilitator notes to guide this step.

Slide 4	**EXPLAIN** that this session will begin by reviewing the role of data analysis, interpretation, and use in the HIS. It will also look at the different ways in which data analysis is used to achieve the health system's goals, and to improve patient outcomes and population health.	
Slide 5	**ASK** participants to recall the relationship between data, information, evidence, and knowledge, and how being able to use data effectively is essential for health care and health system decision making.	
Slide 6	**REMIND** participants that the information cycle is an important foundation for this course. **RECALL** that this is the cycle that data go through to become useful. We start with data, which then become information, evidence, and knowledge. We can then use these to make decisions, which leads to the impacts of those decisions, and adds further to the collection of data. **HIGHLIGHT** that the purpose of the HIS is captured in the black text in the middle: better information, better decisions, and better health. **POINT OUT** the first blue box, 'Compile, manage, and analyse (HIS)'. **NOTE** that the activities in the blue boxes were touched on in the sessions on data management and using e-HIS software to collect, process, and report data.	

ASK participants to reflect on the title of this module (Data Analysis, Interpretation and Use) and **IDENTIFY** the steps in this cycle that they think will be addressed through the sessions in this module.

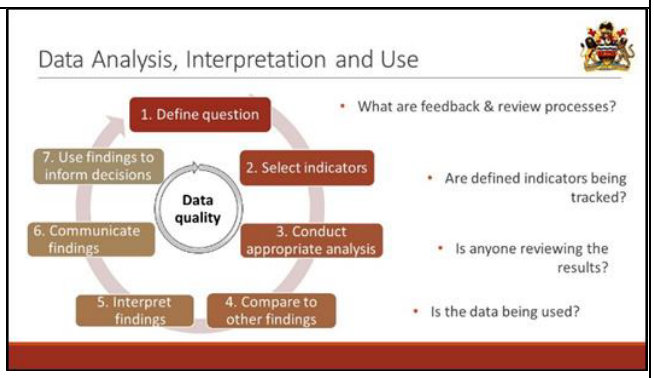
Answers:

- *Compile, manage, and analyse (HIS)*
- *Integrate, interpret, and evaluate (HIS)*
- *Format for presentation to planners and stakeholders (HIS)*
- *Monitor indicators for change (HIS)*

EXPLAIN that there is a specific process for analysing, interpreting, and using data. **GO ON** to the next slide.

Slide 7

NOTE: This slide is animated. Only the data analysis process appears when the slide is first loaded.



REVIEW the process of data analysis, interpretation, and use:

1. Define the **question that needs to be answered**. This establishes the purpose of the analysis.
2. Define data needs and identify relevant **indicators**. Then identify sources of data and confirm calculation of the indicators.
3. Conduct **appropriate analysis** after accessing the raw data.
4. Reconcile with **other data sources and findings**, e.g., surveys. (In some circumstances, this step may not be necessary.)
5. **Interpret the findings.** This requires in-depth knowledge of the subject matter, programme, and target population. (In some instances, further discussions with community members are required.)
6. **Communicate** (present) he results. Give feedback on findings to promote improved data quality and use.
7. **Decision making**. The findings are used to inform a decision.

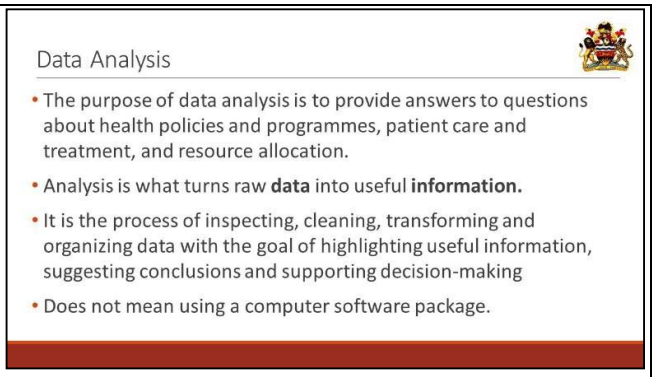
NOTE: It is important to consider data quality at each step.

CLICK on the slide and **EMPHASIZE** that there is a feedback mechanism in the process. **ASK** participants why feedback is important?

Answers:

- *We should make sure to provide feedback about the indicators when we are analysing the data.*
- *When we present and discuss the data, we should provide feedback about the analysis.*
- *When we use the data to make decisions, we should provide feedback about the data presentation and discussion, and about the indicator tracking.*

Slide 8

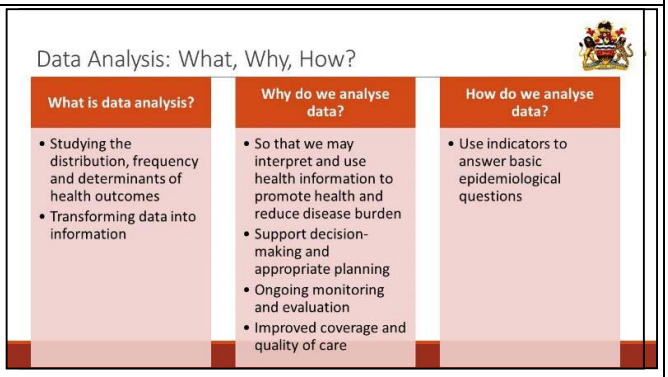


EXPLAIN that data analysis means taking the data that you collect and looking at them in the context of the questions that you need to answer. For example, how would you know if your programme is meeting its objectives? How do clinicians know if their patients are adhering and responding to treatment? How would policy makers know that treatment guidelines are producing the intended results?

EMPHASIZE that data analysis does not necessarily mean using a complicated computer analysis package.

EMPHASIZE that even the greatest amount and best quality of data mean nothing if data are not properly analysed—or are not analysed at all.

Slide 9



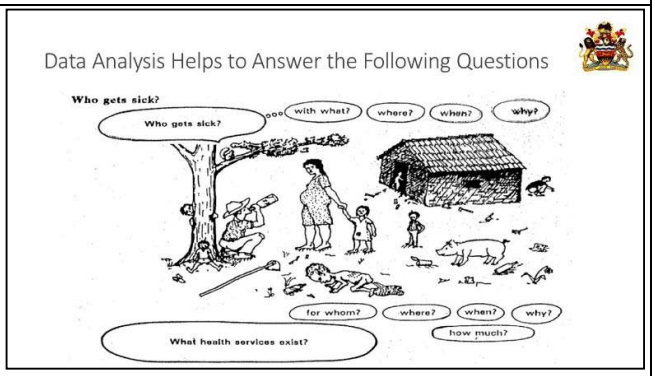
EXPLAIN the meaning (what), purpose (why), and outcome (how) of data analysis

ASK WHY we analyse data.

Answer: *when we study (understand) the distribution, frequency, and determinants of health problems and disease, then we can obtain, interpret, and use health information to promote health and reduce disease (improve coverage and quality of care).*

EXPLAIN that we will discuss the concepts of epidemiology in more detail later in this module.

Slide 10



ALLOW participants a few minutes to read the slide.

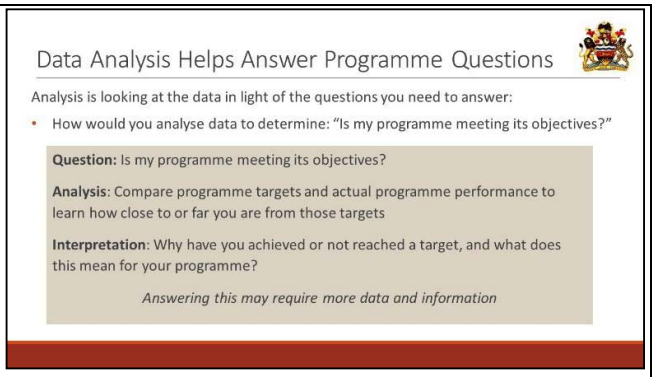
Then **TELL** the participants that you will now go through examples of how results from data analysis are used to answer some of these questions.

NOTE that we will learn more about the study of the distribution and determinants of disease in session 6.4 on epidemiology.

Slide 11

Data analysis helps answer programme questions.

EXPLAIN that, for example, if you need to know whether your programme is meeting its objectives, or is on track towards doing so, you would look at your programme targets and compare them with actual programme performance. This is analysis.

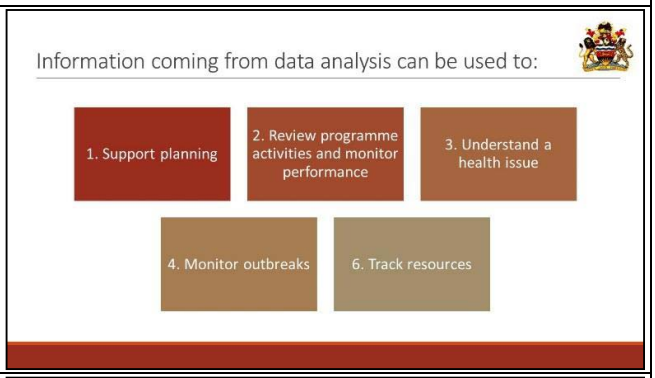


Later, we will take this one step further and talk about interpretation.

Interpretation is using the analysis to further explore your findings and understand the implications for your programme. For example, through analysis, you find that your programme achieved only 10% of its target; now you have to figure out *why.* In many cases, this means using additional information, such as vital statistics, population-based surveys, and qualitative data to supplement the routine service statistics.

Slide 12

EXPLAIN that the next few slides provide some other practical examples of how the information coming out of data analyses can be used to answer different questions and inform a variety of decisions.

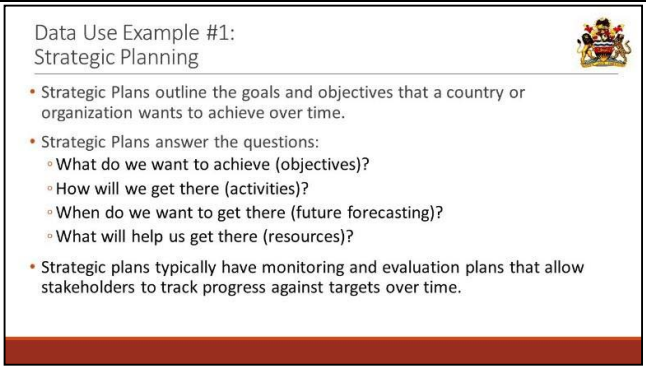


Slide 13

EXPLAIN that data are used in a number of steps in the planning cycle, especially M&E.

EXPLAIN what strategic planning does; using the points on this slide, also **EXPLAIN** the main questions that strategic plans answer.

POINT OUT that strategic plans usually include M&E plans that can be used to track progress towards a programme's overall goal or objectives.



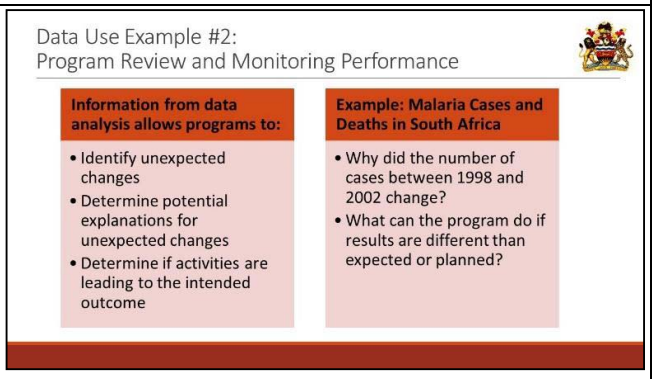
REFER participants to Example #1: Strategic Planning in **Handout 6.1.1: Ways to Use Data Analysis Results**.

GUIDE participants through the table from the HSSP so that they understand how it relates to planning and data use:

- This table includes an indicator (percentage of health facilities with stock outs of tracer medicines) as well as a starting point (baseline/recent estimates) and targets for three different periods.
- At three different points in time, data analysis can be performed using data on stock outs from health facilities during a specified period.
- The results of this data analysis will tell stakeholders if the activities laid out in the strategic plan are meeting targets. These targets indicate that the strategic plan is achieving its desired outcomes.

NOTE that they will learn more about indicators later in this module.

Slide 14



EXPLAIN that we also use data for evaluation as part of a periodic, rigorous review of programme activities.

This review allows programmes to determine if their activities are achieving the intended outcome(s).

If data analysis does not show the expected progress, then the programme can pose additional questions to determine why the results are different than expected.

The programme may also decide to change approach so that it can move in the desired direction.

REFER to Example #2: Programme Review and Monitoring Performance in **Handout 6.1.1.**

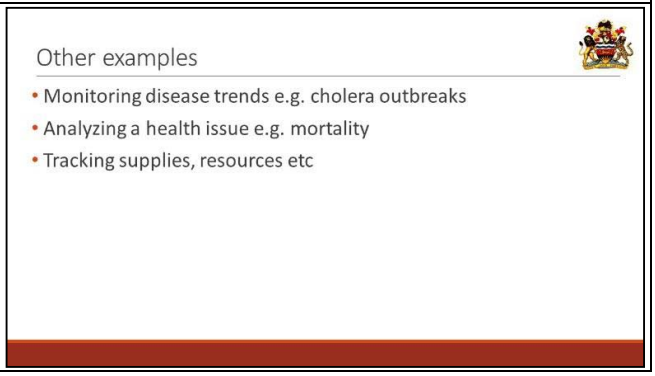
READ the title: **Malaria Cases and Deaths in South Africa (1971–2007)**.

EXPLAIN that this chart looks at malaria cases and deaths. **GIVE** participants adequate time to read and understand the report excerpt and chart.

ASK: Can you think about possible reasons for the changes in the number of cases between 1998 and 2002?

One of the reasons is presented on the graph; additional reasons are outlined in the actual report.

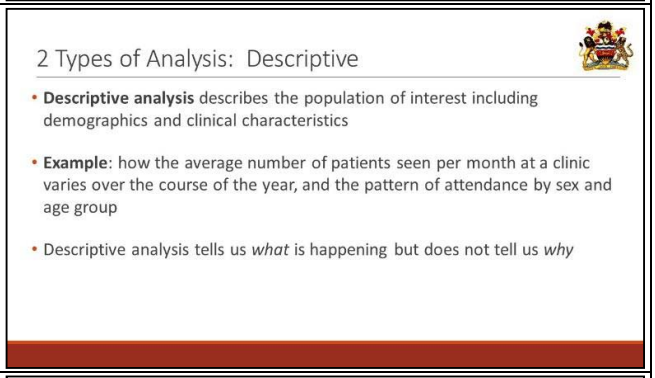
Slide 15



Trainer Instructions: Step 3 (5 minutes)

Use slides 16–18 and the facilitator notes to guide this step.

<table>
<tr>
<td>Slide 16</td>
<td>EXPLAIN that now that we understand how data analysis can be used, our focus can turn to some of the core concepts of data analysis.</td>
<td> 
</td>
</tr>
<tr>
<td>Slide 17</td>
<td>EXPLAIN that there are two different types of analysis: descriptive and explanatory.

EXPLAIN that the world of data analysis is vast and can be complex. In this course, we will focus on descriptive analysis, as this is most often used in our setting.</td>
<td> 
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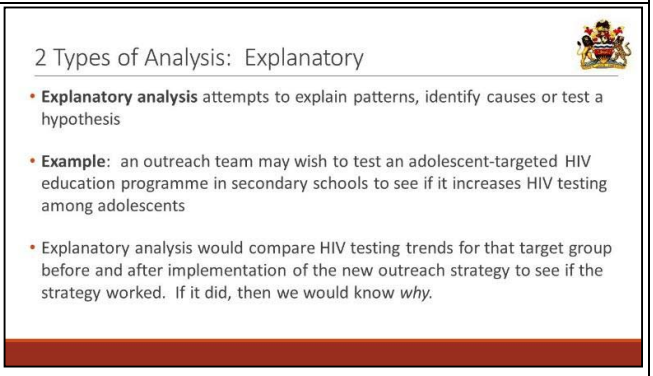
<tr>
<td>Slide 18</td>
<td>ENSURE that participants understand what is meant by hypothesis. According to the Cambridge Dictionary, it is an idea or explanation for something that is based on known facts, but has not yet been proven. In statistics, a hypothesis describes the question we would like to answer, and therefore test in our analysis.

After the third bullet, ASK: If the results of this explanatory analysis showed that the programme did not work, then what would be the next step?</td>
<td> 
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Trainer Instructions: Step 4 (15 minutes)

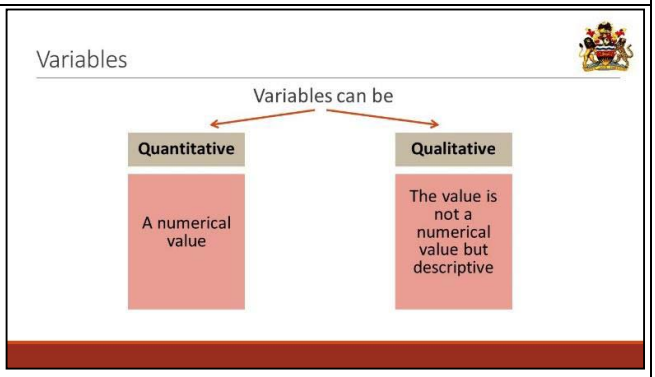
Use slides 19–23 and the facilitator notes to guide this step.

Slide 19

EXPLAIN the following about **variables**:

- They are called variables because the values of their characteristics can vary.
- A variable may also be called a data item. Age, sex, business income and expenses, country of birth, capital expenditure, class grades, eye colour and vehicle type are examples of variables.
- It is helpful to become familiar with the different types of variables, because they are analysed in different ways. For example, we have already discussed the difference between quantitative data (numbers) and qualitative data (words). You can imagine that only certain analyses can be performed on one or the other. Let's take a look at the different types of variables now. Then we will be in a good starting place for the next session—6.2 on basic statistics.

Slide 20

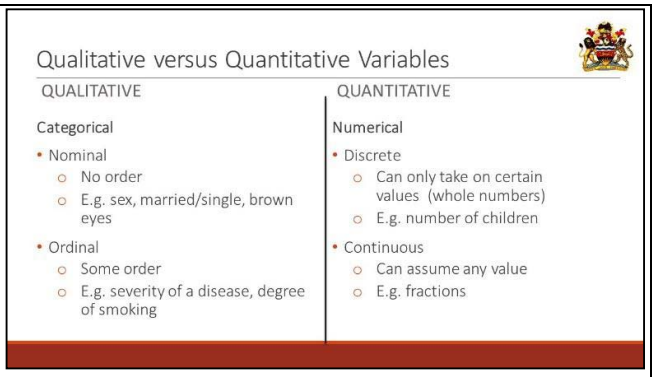


EXPLAIN that we briefly discussed the difference between quantitative and qualitative data in module 2. In this session, we will look at these in more depth:

Quantitative variables are numerical measures. A quantitative or numerical variable takes number values for which maths operations—addition, subtraction, multiplication, and division—make sense. The values of a quantitative variable are usually recorded as a unit of measurement, such as *seconds* or *kilograms*.

Qualitative variables are factors that place an individual into one of several categories or groups. They may or may not have a clear natural order.

Slide 21



EXPLAIN that there are some quantitative variables where only measurement in whole numbers makes sense. These are called **discrete variables**; they are used in cases where we are counting something that cannot, because of its nature, be divided. An obvious example of this would be people—because we cannot have fractions of people! A family or household, for example can have 5 or 6 members, but not 5.5 members. Another example is the number of patient visits to a clinic. It is possible for a clinic to have 40 visits in a day, but not 40.5.

Other quantitative variables can have any value, including fractional or decimal values—and can even include infinity. These are called **continuous variables**. Weight is one example of this. Weight can be rounded to the nearest kilogram (75 kg), or it can be written more precisely by including decimal places (74.87 kg). This type of data is considered to be continuous because it can be any number, or fractional amount. Other examples are laboratory counts (e.g., bilirubin or haematocrit levels), blood pressure, body temperature, and many other physiological measures.

As for qualitative data, **nominal variables** are those that are grouped into categories which have no natural order. Some qualitative variables do have some order; these are called **ordinal variables**.

ASK: What are other examples of quantitative discrete data where only whole numbers make sense?

- *CD4 count: You can't count half cells.*
- *Numbers of: surgeries, condoms issued, IUCDs inserted, HIV tests done.*

ASK: What are other examples of quantitative continuous data where any number value, even fractional or decimal, makes sense?

- *Distance to clinic.*
- *Birth weight*

Related to qualitative variables, **ASK** participants: What are other examples of categorical data without a natural order?

- *Sex*
- *Type of motor vehicles: Cars, SUVs, trucks*

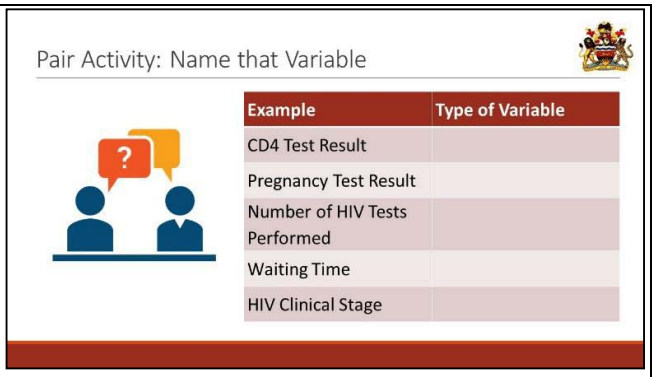
ASK: What are examples of categorical data with a natural order?

- *BMI: Underweight – Normal – Overweight – Obese*
- *Level of Education: Primary School – High School – University Undergraduate*

Slide 22

ASK participants to complete this table, either on their own or with a partner.

What types of variables are these? For each example, indicate whether the variable is categorical nominal, categorical ordinal, quantitative continuous, or quantitative discrete.

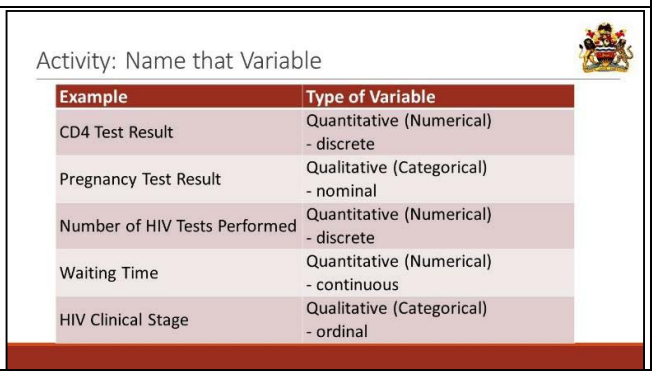


CIRCULATE through the room to make sure that participants understand the task and to answer any questions.

After 2–3 minutes, randomly **ASK** a few participants for their responses.

Slide 23

PRESENT the answers on this slide.



Trainer Instructions: Step 5 (60 minutes)

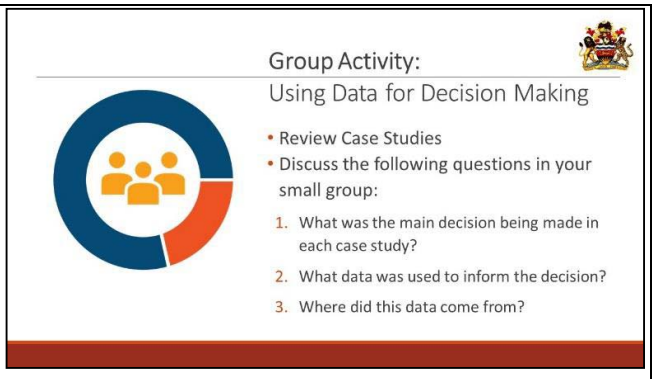
Use slide 24 and the facilitator notes to guide this step.

Slide 24

60 minutes

REFER participants to **Handout 6.1.2: Case Studies: Using Data for Evidence-Based Decision Making**.

REVIEW the instructions with participants, then **DIVIDE** participants into groups of three or four and **GIVE** them 30 minutes to work in their small groups.



- **MONITOR** participant progress. Make sure participants are focusing on the type of data being used to make each decision and where the data comes from.
- **ENCOURAGE** participants to be thorough in their review of the data used in the case studies.

- **BRING** the class together again after 30 minutes.
- **ASSIGN** each group to review their responses for one of the case studies.
- **RECORD** responses about type of data and where it comes from on a flip chart.

ASK participants what the main points were that they learnt from reviewing the cases.

After a brief discussion, **SUMMARIZE** the discussion using the following points:

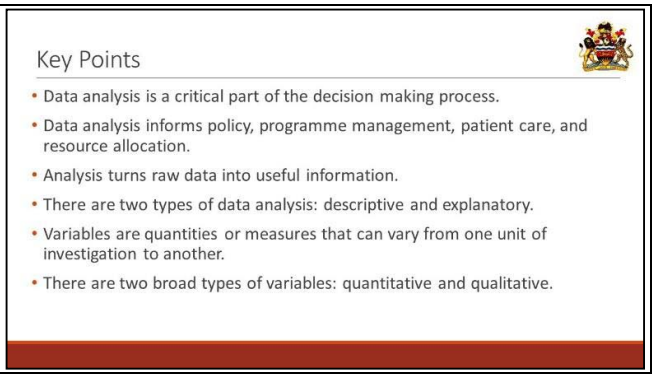
- Decisions tend to rely on multiple types and sources of data, including (but not limited) to paper-based and electronic systems (such as the EMR) .
- Data used most frequently in these decisions are patient data.
- Data from multiple paper-based and electronic systems can be linked and support each other.
- Data tend to inform a course of action when they are analysed and interpreted.

Trainer Instructions: Step 6 (5 minutes)

Use slide 25 and the facilitator notes to guide this step.

Slide 25

REVIEW the key points from this session.



Data Use Example #1: Strategic Planning

GOVERNMENT OF THE REPUBLIC OF MALAWI

Health Sector Strategic Plan II 2017-2022

No.	Results chain	Domain	HSSP Thematic Area	Indicator	Baseline / recent estimates (source, year)	Target 2018	Target 2020	Target 2022	Period of reporting	Smallest geographic area	Dis-aggregation	Responsible programme	Alignment
36	Output	Access	Medicine and medical supplies	% of health facilities with stock-outs of tracer medicines	20% (National Pharmaceutical strategic plan)	5%	5%	5%	3 years	N/A	None	HTSS Pharma	HSSP I, 100LCI

Data Use Example #2: Program Review and Monitoring Performance

3.1 Annual malaria trends in South Africa

The annual malaria trends from 1971 to December 2007 are shown in figure 1. The prevalence of malaria had been escalating at alarming rates since the mid 90s. The highest number of cases (61 934) was reported in 2000, the worst levels of malaria recorded since the epidemics of the 1930s. Many factors may have contributed to this. First, change from DDT as the insecticide of choice to synthetic pyrethroids resulted in the emergence of resistant anopheline mosquitoes. There was evidence of the presence of detectable numbers of *Anopheles funestus* mosquitoes inside houses sprayed with pyrethroids in the Ndumu area of northern KwaZulu-Natal 7. Secondly, there was evidence of parasites resistance to anti-malarial drugs especially chloroquine 8 & 9. Third, the country experienced unusually heavy rains following several years of drought; this increased the number of breeding habitats for mosquito vectors. Lastly, the large influx of economic migrants from Mozambique, Zimbabwe many of whom carry malaria parasites, also resulted in a large number of imported cases and unexplained local upsurges and lack of finding index cases during sporadic outbreaks. The reduction in malaria cases and deaths since the year 2000 can be attributed to a number of interventions such as:

- the change of first-line treatment to co-artemether;
- the re-introduction of DDT spraying; as well as
- the regional approach to malaria control in the Lubombo Spatial Development Initiative.

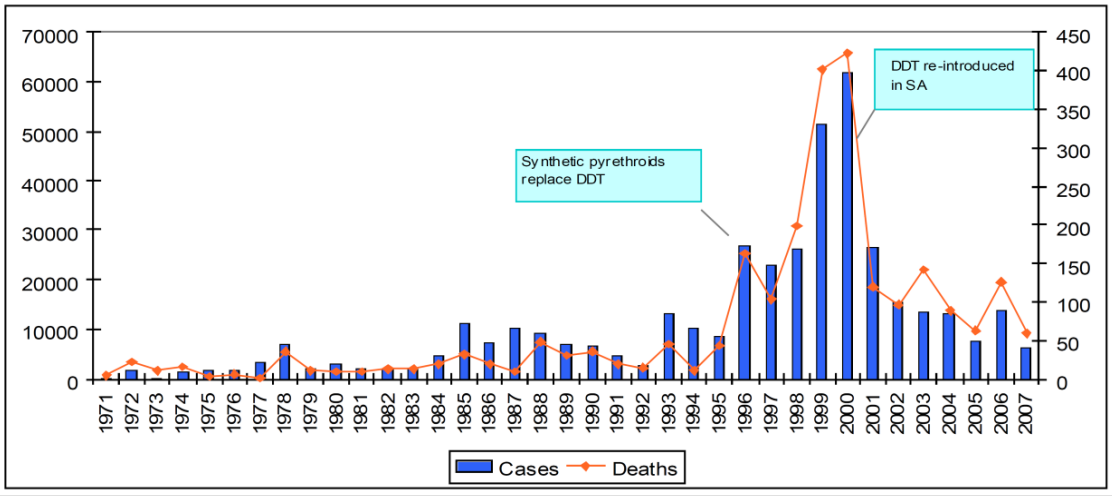
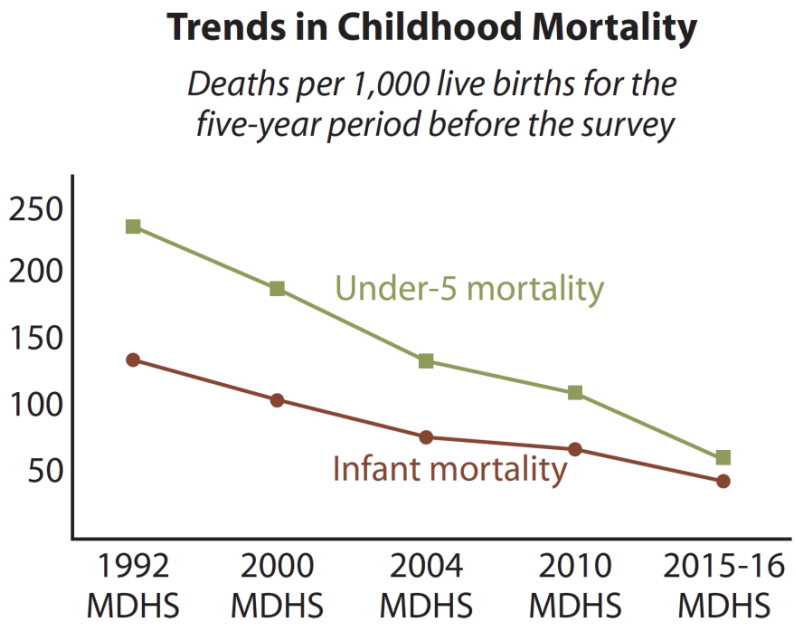


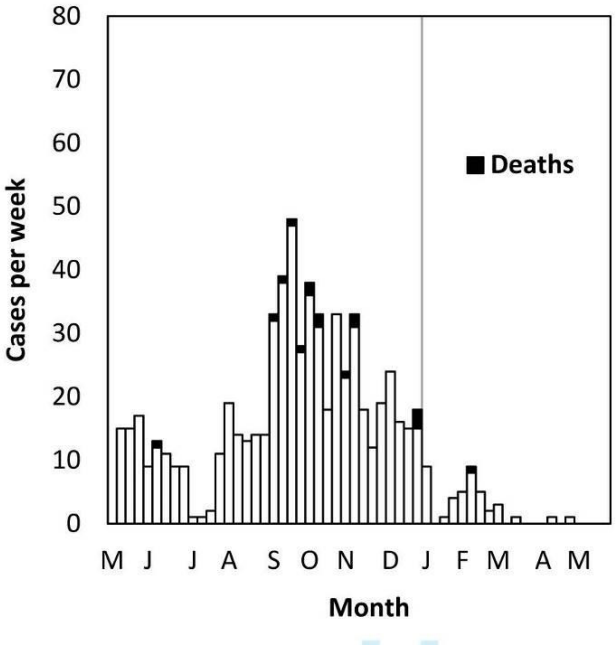
Figure 1: Malaria Cases and Deaths in South Africa (1971–2007)

Source: Epidemiology and Surveillance Directorate and Communicable Disease Control Directorate

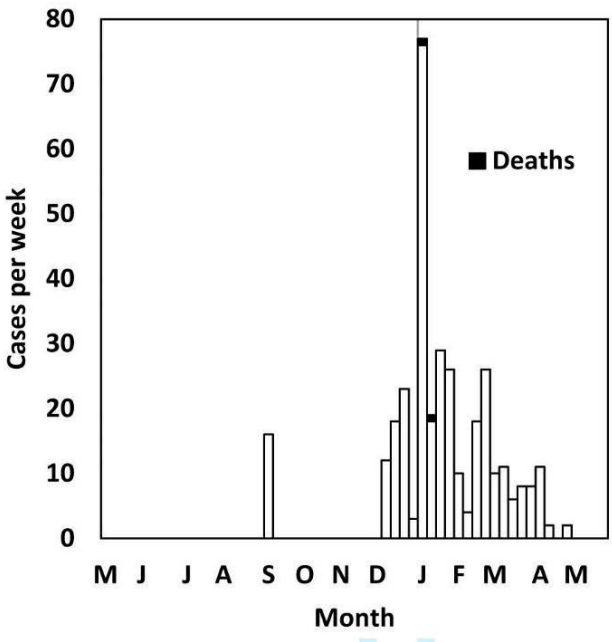
Data Use Example #3: Health Issue Analysis



Data Use Example #4: Monitoring an Outbreak



Machinga District

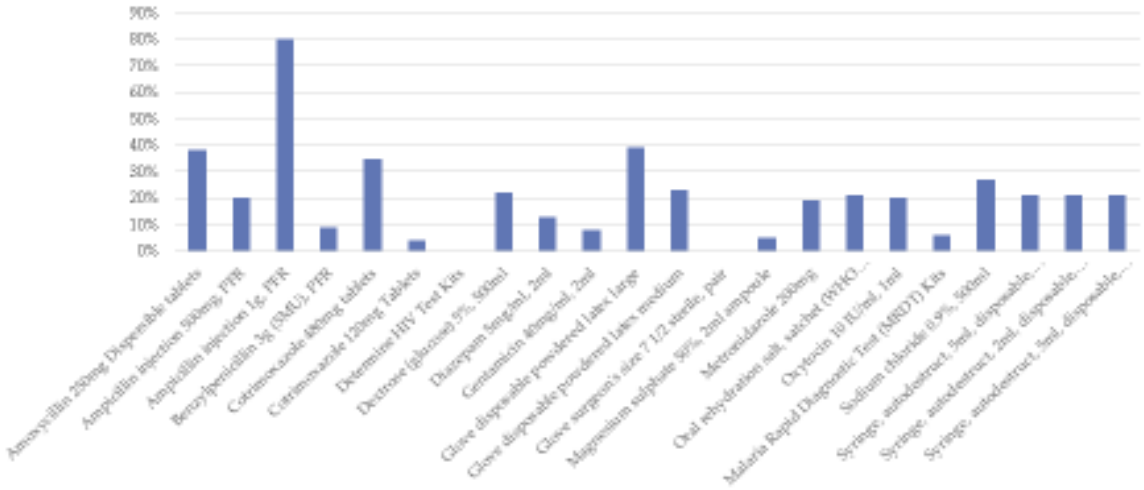


Zomba District

Khonje, et al. 2012

Data Use Example #5: Tracking—Supplies, Staff, etc.

Facility stock-out rates in Malawi (2016)



Handout 6.1.2: Case Studies: Using Data for Evidence-Based Decision Making

Read the following case studies and answer the questions below each one.

1. Dr Marcus Phiri, responsible for the HIV/AIDS care and treatment clinic at the Ethemba District Hospital, has been considering the need for an additional nursing officer. His nursing officers complain during their Wednesday staff meetings about heavy workloads, and that they cannot spend adequate time with their clients and provide quality service. At the same time, he has heard people complain about the long queues at the clinic for services.

   The HIV/AIDS care and treatment clinic's Monthly EMR Report for March indicates a total of 1,618 new and return visits; the clinic is currently fully staffed, with two clinicians and three nursing officers. Dr Phiri concludes that each nursing officer is handling approximately 27 visits per day, which is a reasonable workload for a nursing officer. Dr Phiri decides to run additional reports on weekly and daily visits.

   In examining the data, he notes that, while the average number of visits each day is 81, the clinic averages only 55 visits most days—with a spike on Tuesdays, when the clinic has as many as 100 visits because people are timing their visit to coincide with market day. Dr Phiri decides to explore changing the nursing officer scheduling to ensure that three nursing officers are always working at the clinic on Tuesdays, and two on the other days of the week.

   - What is the main decision made in this case?

   - What data were used to inform this decision?

   - Where did the data come from?

2. The quarterly report provides an aggregated total number of malaria diagnoses for the past three months among children under five in the district. In reviewing this report, Dr Tsalani, the Ethemba District Hospital DMO, notices that the number has increased by 15%. Dr Tsalani seeks additional information on outreach or promotional campaigns targeting malaria, and discovers that a local NGO stopped community outreach on using bed nets six months ago. Dr Tsalani develops a plan to advocate for increased resources for community outreach activities on malaria from both the provincial office and other partners.

    - What is the main decision made in this case?

    - What data were used to inform this decision?

    - Where did the data come from?

3. At the end of September, Dr Marcus Phiri, uses the Ethemba District Hospital electronic health information system to run a report on the quantity of first-line ARV treatments dispensed to current patients during the quarter. He notices that the number of first-line ARV treatments dispensed in July was significantly higher than the numbers dispensed in August or September. After running additional facility and patient reports, Dr Phiri identifies this as an adherence problem among ART patients, who are not returning for additional ARV treatment as scheduled because they have not run out of their current supply. After reviewing his budget to determine if he can hire additional staff or expand mobile team services, he decides to task the mobile team with identifying and working with community members who can provide ongoing support to ART patients while the mobile team is working with other facilities.

    - What is the main decision made in this case?

    - What data were used to inform this decision?

    - Where did the data come from?

4. At the national level, stakeholders meet in Lilongwe to review and update the ARV regimens included in the Essential Medicines List. Data from the districts are showing an increase in the number of patients with declining CD4 counts after starting on ARV treatment, indicating that their treatment is not effectively suppressing the virus. Additional data show that the majority of these patients have experienced significant side effects that affect their adherence to treatment. Recent research suggests that substituting Tenofovir for Stavudine and Zinovudine will alleviate many of the side effects experienced by this group of patients. Stakeholders are considering changing the guidelines for initiating and changing ARV regimens to reflect these research findings.

   - What is the main decision made in this case?

   - What data were used to inform this decision?

   - Where did the data come from?

Session 6.2: Basic Statistics in Public Health

Time: 110 minutes

Learning Objectives

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

1. Distinguish between sample and population
2. Demonstrate the correct use of counts, frequencies, and ratios
3. Describe and calculate proportions and percentages
4. Describe and calculate the standard measures of central tendency (mean, median, mode)
5. Define outliers
6. Describe measures of spread (range, min-max, percentile)
7. Describe the measures of variability (variance, standard deviation) and explain their purpose

Session Overview

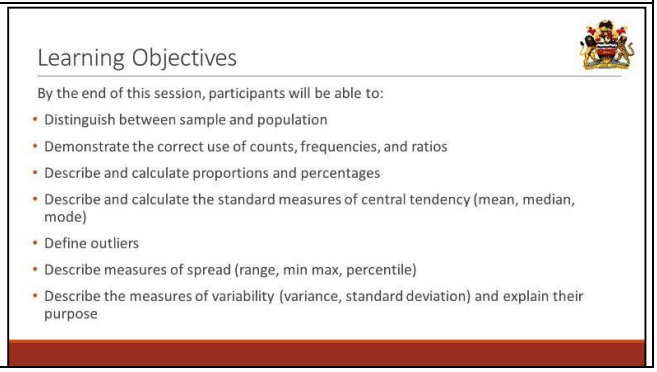
Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	5 minutes	Interactive lecture	Sample versus population (slides 4–5)	Flip chart, markers, tape, LCD
3	30 minutes	Interactive lecture, practical application	Basic statistic concepts (slides 6–17)	Flip chart, markers, tape, LCD
4	40 minutes	Interactive lecture, practical application	Measures of central tendency (slides 18–30)	Flip chart, markers, tape, LCD
5	15 minutes	Interactive lecture	Measures of spread (slides 31–34)	Flip chart, markers, tape, LCD
6	10 minutes	Interactive lecture,	Measures of variability (slides 35–38)	Flip chart, markers, tape, LCD
7	5 minutes	Facilitator presentation	Key points (slides 39–40)	LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

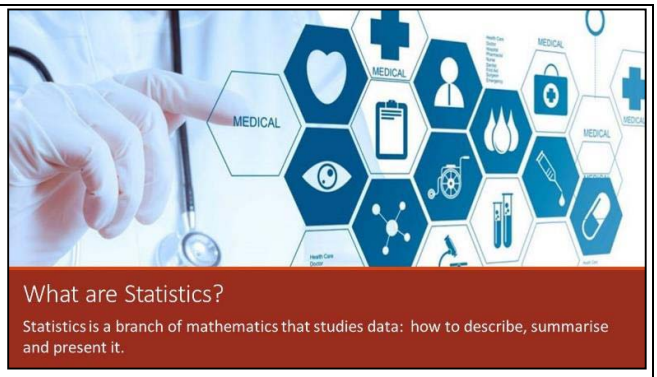
Trainer Instructions: Step 2 (5 minutes)

Use slides 4–5 and the facilitator notes to guide this step.

Slide 4

EXPLAIN that statistics help us describe large sets of measurements with just a few summary values.

They also help us make comparisons, and, in the research environment, they allow us to conduct more advanced analyses of data

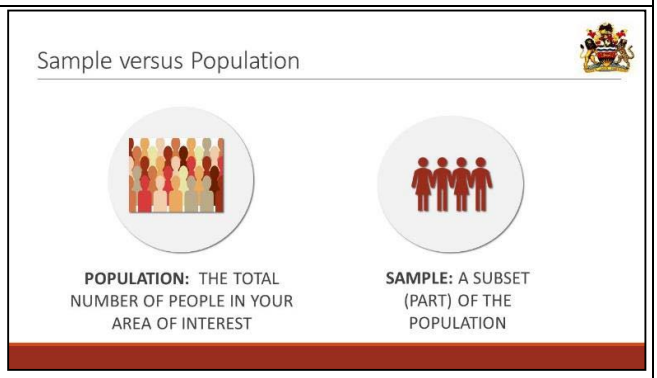


Biostatistics refers to application of statistics in the health-related fields.

Slide 5

EXPLAIN that before we get into statistics, we must first understand what sampling is, and how and why it is used.

EXPLAIN that ministries of health are interested in improving health for the entire population. However, because every person does not have the same access to health services, we don't have data for the entire population.



ASK participants: Which groups are more or less likely to access public health services (e.g., urban versus rural, citizens versus migrants, wealthier versus poorer)?

EXPLAIN that some interventions or policies require targeting specific groups. For example, we do not need to look at data for male patients when we are developing an intervention for cervical cancer screening.

EXPLAIN that surveys, such as DHS, are conducted using a sample of the population. The intention of this sampling is to choose participants in such a way that the resulting data will be both reliable and representative of the general population. However, if the sampling is not correctly designed or implemented, this could affect the quality of the results.

When analysing and interpreting data, it is important to consider who is captured in the data (sample) versus who is the target population.

- RHIS
- Non-routine: Surveys (e.g., DHS)

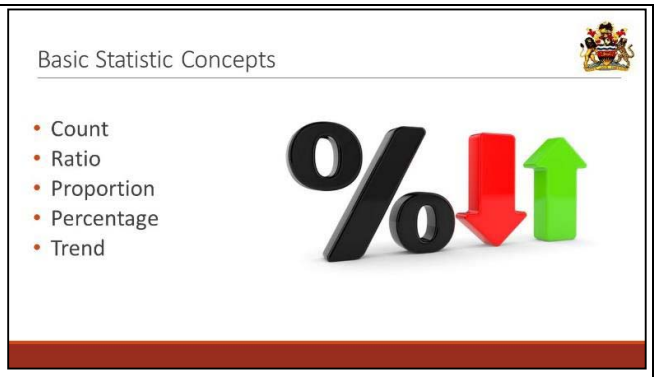
Trainer Instructions: Step 3 (30 minutes)

Use slides 6–17 and the facilitator notes to guide this step.

Slide 6

EXPLAIN that this slide lists the basic statistical terms used in data analysis.

All of these measures can be used to express progress towards a goal, such as increasing the percentage of HIV-positive patients who remain on ART, or reducing the maternal mortality ratio over time.

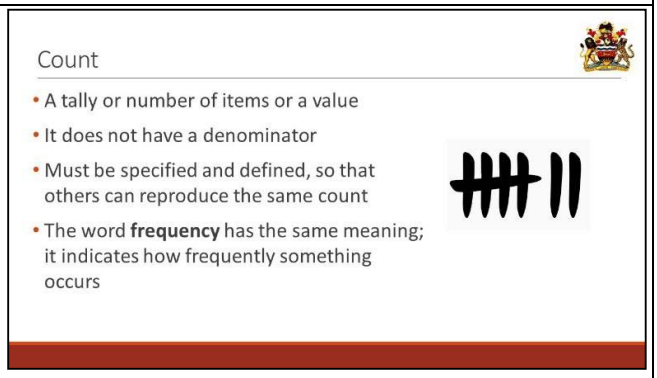


Slide 7

EXPLAIN counts.

ASK participants to give a few examples of a count and **how and why** counts are used.

PROVIDE a few more examples before moving on to the next slide.



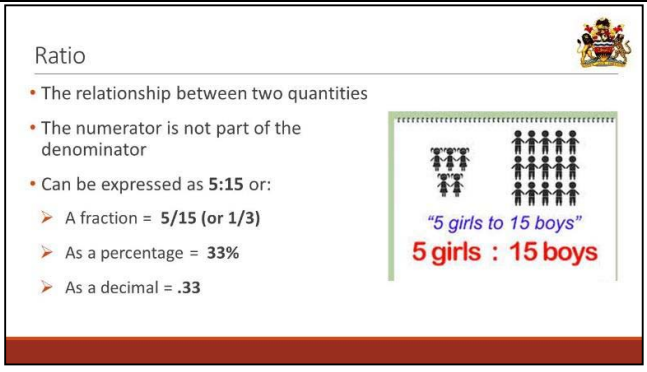
Examples:

- The number of patients with diarrhoea seen per day
- The number of new patients with diarrhoea seen per day by age group
- The total number of patients with diarrhoeal disease seen in the clinic since an outbreak began

Slide 8

EXPLAIN ratios using the image and text on the slide.

PROVIDE another example: If a box contains six red marbles and four blue marbles, the **ratio** of red marbles to blue marbles is expressed as '6 to 4', also written 6:4.



ASK participants to give a few examples of a ratio and **how and why** they are used.

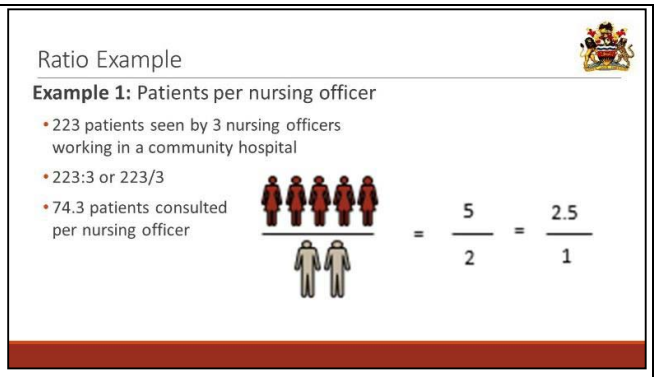
ALLOW a few responses and then **CLICK** for examples of ratios on the next slide.

Slide 9

EXPLAIN that these are both only examples and not real data.

EXPLAIN that in the last example, there were 2.5 female patients for every male patient diagnosed with cancer.

ASK: When would you use a ratio? Why?



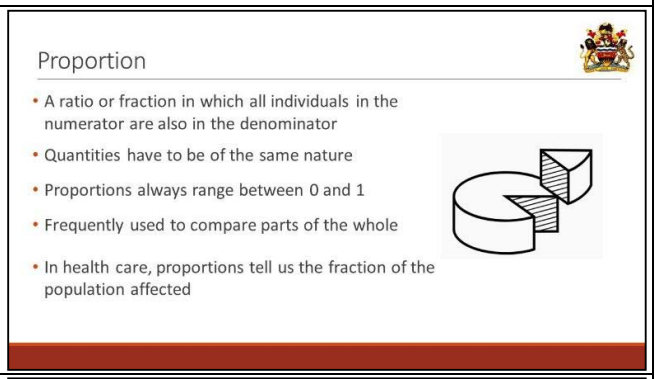
ENSURE participants understand the purpose of ratios, and then **CLICK** to the next slide.

Slide 10

EXPLAIN proportions.

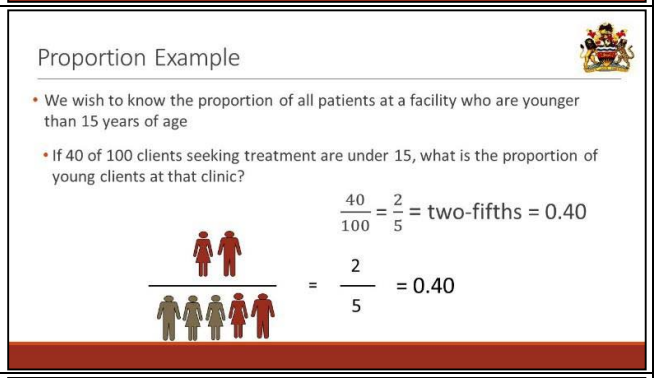
ASK participants to give a few examples of proportions and **how and why** they are used.

ALLOW a few responses, and then **CLICK** for examples of proportions on the next slide.



Slide 11

NOTE that the denominator, or whole, is 100, not 80. That's because all the individuals in the 'part'—in this case, the patients under the age of 15—also need to be included in the total. All individuals included in the numerator must also be included in the denominator.



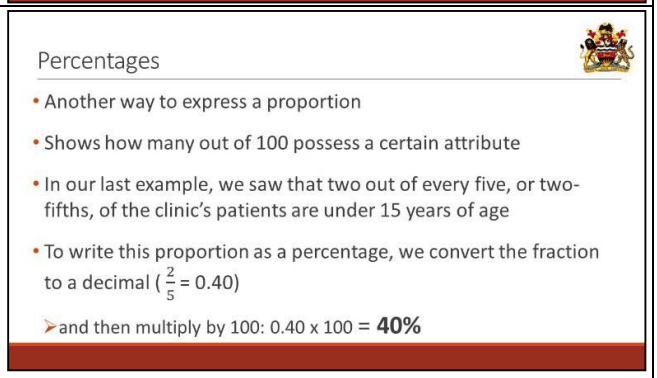
Slide 12

EXPLAIN percentages.

ASK participants to give a few examples of percentages and **how and why** they are used.

ALLOW a few responses.

EXPLAIN that percentages are useful because they make comparisons easier. Different measurements may have different denominators. Percentages standardize each quantity so that they represent fractions of 100. This enables us as health providers to engage in conversation, and compare what is happening in our own work environment with what is happening in other settings.



Slide 13

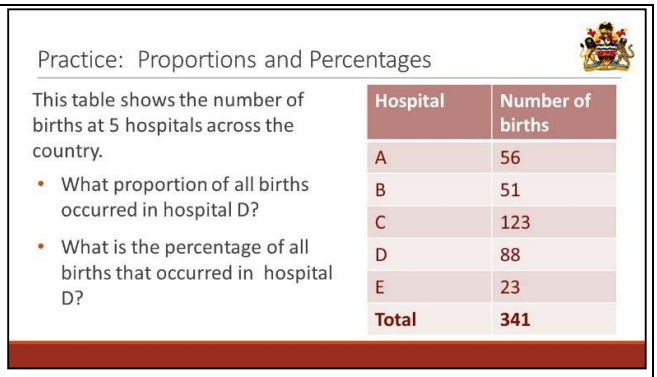
ASK participants to take out their notepads.

EXPLAIN that this table shows the number of births at five hospitals across the country.

ASK them to answer the first question.

Answers:

- *Proportion: 0.258*
- *Percentage: 25.8%*



If they are having trouble, **ASK:**

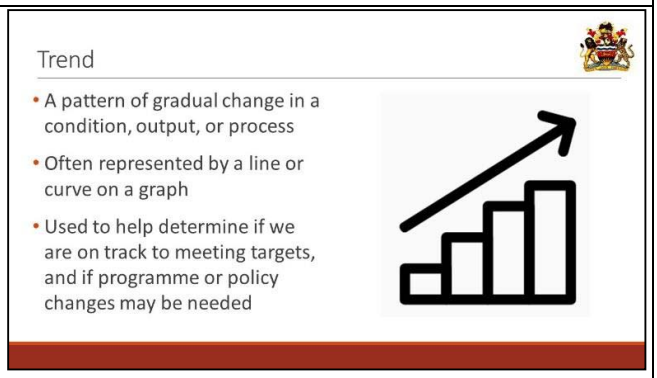
- How many births in hospital D?
- How many births in total?
- How can we find out the proportion using these two numbers?
  - *Divide 88 by 341*

DISCUSS rounding and when to round.

Slide 14

EXPLAIN trends.

ASK participants to give a few examples of trends and **how and why** they are used. **ALLOW** a few responses.

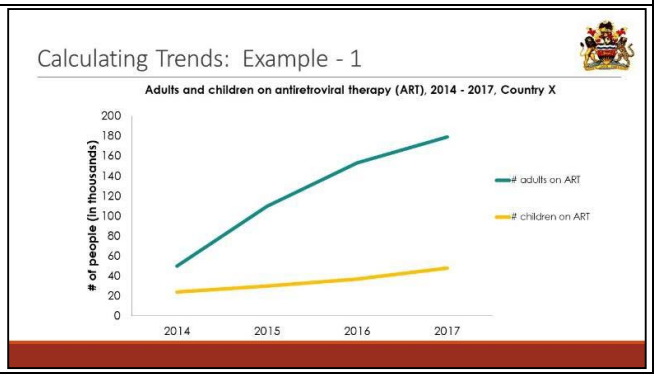


EXPLAIN that when the same information can be monitored over time, it is possible to estimate a trend, which can help you to interpret the data. You may observe increases, decreases, or static behaviour. However, to follow a trend you must not only be aware of what is currently happening, but also be knowledgeable enough about all of the variables that may not be included in the trend to predict what may happen in the future.

NOTE that it is important to consider the time period when looking for trends in data. For example, data can be observed from century to century, decade to decade, year to year, month to month, or day to day.

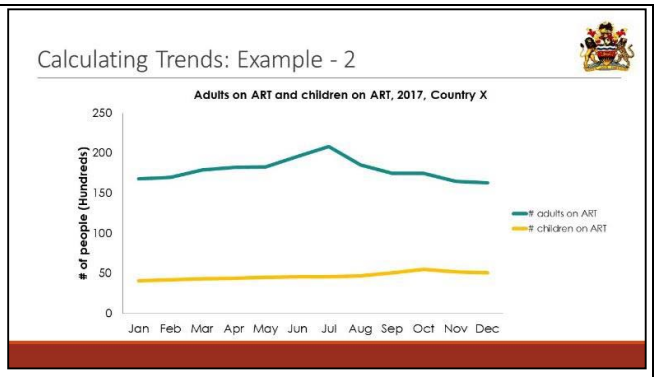
Slide 15

EXPLAIN that trend data are often best displayed using a line graph. This graph shows the numbers of adults and children on ART for a four-year period, 2014–17. It is difficult to read the text here, but you can see that there is a general upward trend for both indicators.



Slide 16

EXPLAIN the following:



- This graph compares the same indicators as presented earlier, but month by month for only the year 2017. The trend for adult treatment (the upper line) is a general increase through July, then a sharp decrease and steady decline through the end of the year. The trend for treatment of children (the lower line) is a gradual increase through October, followed by a slight dip down and stagnant level observed for the last two months of the year.
- These data were taken from all the treatment sites in one district. The graph on the previous slide would lead us to believe that this province is increasing ART treatment for both adults and children. So if we were to make a decision for this district—for example, to set its 2018 targets—based on that graph, we might aim high, given the apparent rate at which the site has been able to increase the number of patients it treats.
- Now that we see this second graph, we would likely reconsider our decision. Instead of assigning higher targets on the assumption that this province is performing well, we might instead be concerned about the performance of this province. In that case, we would likely need more data to explain the dip in July, and explore ways to reverse the downward trend.

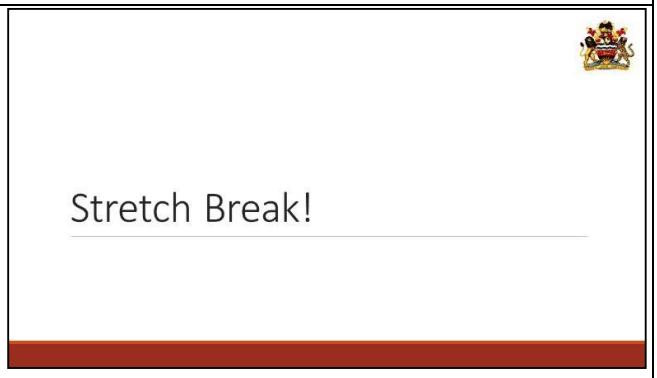
Slide 17

HAVE participants get up and walk around the room for a minute.

ASK them to shake hands with anyone they don't know.

After 1-2 minutes, **BRING** everyone back to their seats.

ASK them to calculate the proportion of people whose hands they just shook!



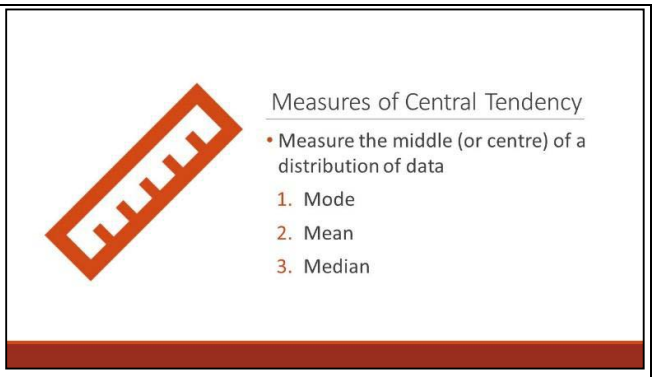
LET them explain how they calculated it.

Trainer Instructions: Step 4 (40 minutes)

Use slides 18–30 and the facilitator notes to guide this step.

Slide 18

EXPLAIN that you would like to talk about central tendency. The most commonly measured characteristic of a collection of data (or data set) is its centre, or the point around which the observations or data points tend to cluster. Measures of central tendency show the middle or centre of a distribution of data.



ASK: When we say distribution of data, what are we referring to?

Answer**:** *The distribution is a listing of all the values or a visual representation of all of the values in a dataset and how often they occur. We will talk more about distributions shortly.*

ASK: Why is it useful to measure central tendency?

Measures of central tendency are very useful in statistics for the following reasons:

- **To find representative value:**
  Measures of central tendency, or averages, give us a single value for the distribution; this value represents the entire distribution.
- **To condense data:**
  Data sets can be very large. By using measures of central tendency, we can condense a large number of values into a single value.
- **To make comparisons:**
  Measures of central tendency enable us to compare two or more distributions.
- **Helpful in further analysis:**
  Many statistical analysis techniques—such as measures of dispersion, skewness, and correlation, and index numbers—are based on measures of central tendency. This is why you may sometimes hear measures of central tendency referred to as measures of the first order.

Slide 19

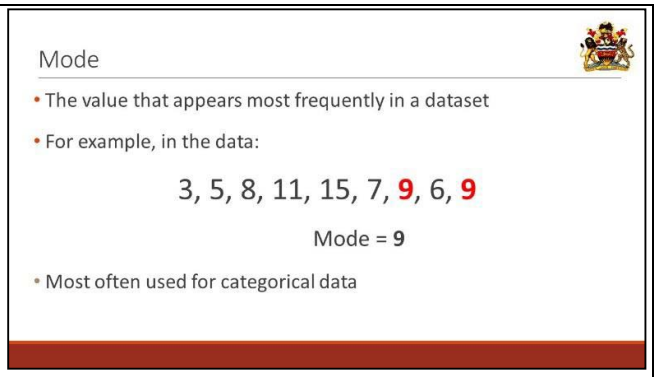
EXPLAIN mode.

ASK participants to give a few examples of **how and why** mode is used.

ALLOW a few responses.

Possible answers:

- *Often the mode is used for categorical data (rather than numbers)*
- *In a survey, you can use the mode to determine the most popular option*

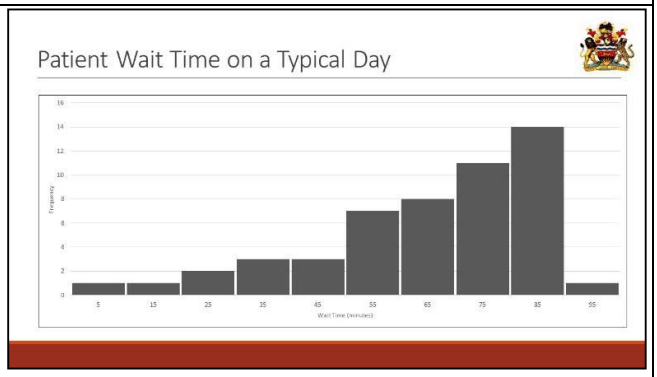


Slide 20

EXPLAIN that it is easy to spot the mode in a graph, because it is simply the value where the graph shows the highest frequency. For example, in this graph, showing wait times on a typical day at Upile Health Centre, the mode is 81 to 90 minutes.

ASK: What does this mean?

Answer: *When patients responded to a question about wait times, most of them answered 81–90 minutes.*



Slide 21

EXPLAIN that sometimes a data distribution will have more than one mode. This type of distribution, with two different modes, is called a **bimodal distribution.**

Here's an example from Upile Health Centre, showing when patients arrive at the clinic on a market day. We can see from the graph that the data distribution has two peaks: mid-morning (between 10 AM and noon), and later in the afternoon (3–5 PM).

ASK: Can you think of ways that the health centre in-charge might use the above information on the bimodal distribution of patient arrival times?

Possible answers:

- *If the health centre in-charge has another nurse on duty, they can arrange their schedules so that the two of them are available at the two peak times, and they can take their lunch breaks between 1 and 2 PM; or one can come in later, say 10 AM, when the workload gets heavy.*

- *The clinic manager can schedule health talks on various topics at the two peak times, so that as many patients as possible get to hear the information.*

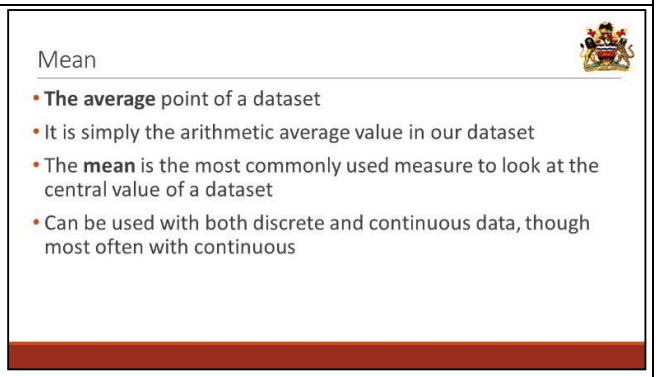
NOTE: We will discuss bar graphs and histograms later in the module.

Slide 22

EXPLAIN mean.

ASK participants to give a few examples of the mean and **how and why** it is used.

ALLOW a few responses.



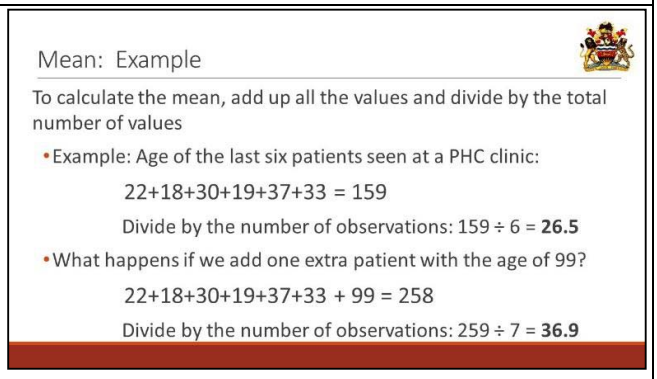
EXPLAIN that the mean, or arithmetic average, is essentially a model of your data set. You will notice that the mean might not be one of the actual values that you have observed in your data set. However, an important characteristic of the mean is that it includes every value in your data set as part of its calculation.

Slide 23

NOTE: This slide is animated.

EXPLAIN that to calculate the mean, you add up all of your figures, and divide by the total number of figures.

ASK participants to calculate the mean on their own. **GIVE** them 2–3 minutes.



When they are all done working, **ASK** for a volunteer to give the answer, then **CLICK** to reveal it.

CLICK again to show the next question and **ASK** them to calculate the mean again, adding the new value.

When they are all done working, **ASK** for a volunteer to give the answer, then **CLICK** to reveal it.

EXPLAIN that in our first example, we had a mean age of 26.5. If we were to add a seventh person whose age is 99—an extremely high value—our mean age becomes 36.9:

(22 + 18 + 30 + 19 + 37 + 33 + 99) = 258 ÷ 7 = 36.9.

In other words, adding that one elderly person to the group causes the mean age to increase by around 10 years!

The mean takes into consideration the magnitude of every value; because of this, **the mean is sensitive to extreme values**, as the example in the slide illustrates.

If there are data in the data set with extreme values—extremely high or low compared to the other values in the data set—the mean may not be the most accurate method to use in assessing the point around which the observations tend to cluster.

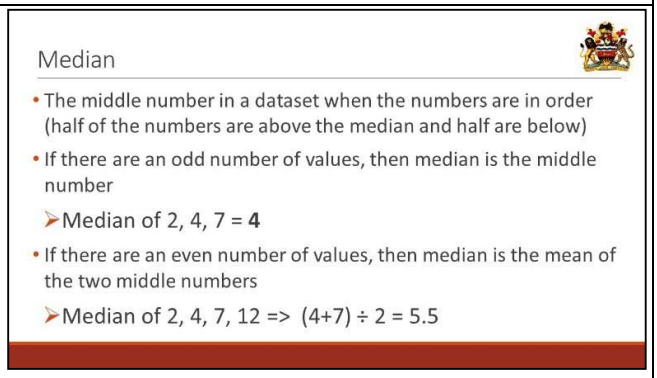
Use the mean when the data are normally distributed (symmetric).

Slide 24

EXPLAIN median.

ASK participants to give a few examples of the median and **how and why** it is used.

ALLOW a few responses.



EXPLAIN that the median is another measurement of central tendency. Because it takes into consideration the order and relative magnitude of the values, it is not as sensitive to extreme values as the mean.

To determine the median, you have to rank (or order) the figures before you can calculate it.

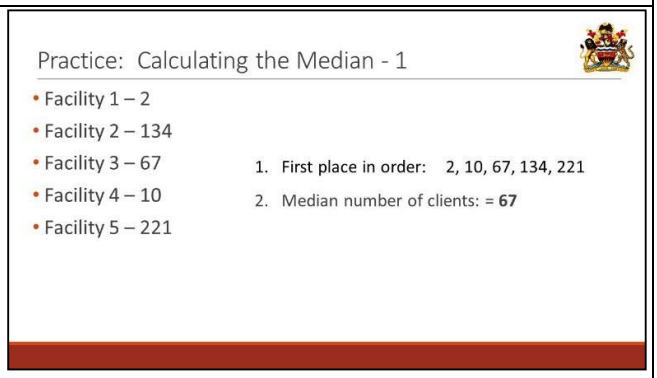
If a list of values is ranked from smallest to largest, or vice versa, then half of the values are greater than or equal to the median, and the other half are less than or equal to it. We therefore use the median when data are skewed, or not symmetrical.

ASK participants if they understand the terms **symmetrical** and **skew**. If not, give a brief description, and let them know that we will discuss these later in the session.

Slide 25

NOTE: This slide is animated. Wait for participants to respond to the question before clicking to reveal the correct answer.

EXPLAIN that in this example, five facilities have reported the number of patients who have come for VCT in the past month.

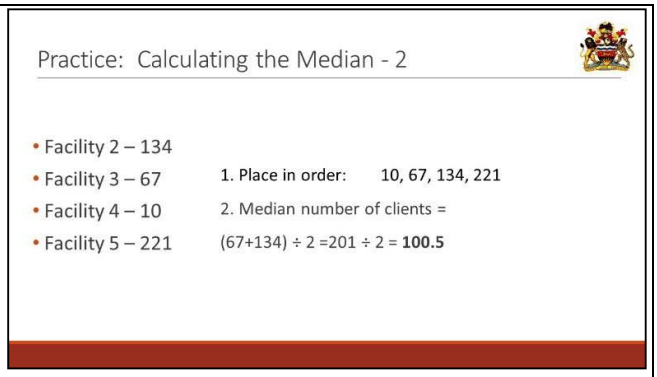


ASK participants to calculate the median on their own. **GIVE** them 2–3 minutes.

When they are all done working, **ASK** for a volunteer to give the answer, then **CLICK** to reveal the steps.

EXPLAIN that first we reorder the numbers (smallest to largest). Because we have an odd number of clients, we can simply select the middle number, which in this case is 67.

Slide 26



NOTE: This slide is animated. Wait for participants to respond to the question before clicking to reveal the correct answer.

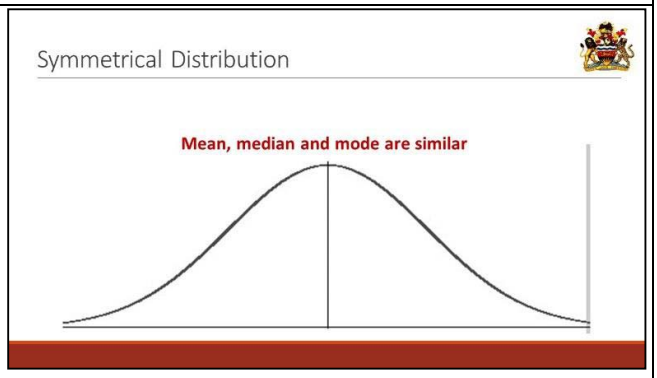
EXPLAIN that in this example, only four facilities have reported the number of patients who have come for VCT in the past month.

ASK participants to calculate the median on their own. **GIVE** them 2–3 minutes.

When they are all done working, **ASK** for a volunteer to give the answer, then **CLICK** to reveal the steps.

EXPLAIN that in this case we have an even number of values. So, we reorder the numbers from smallest to largest, add the two middle figures (67 + 134), and divide by two to get 100.5.

Slide 27



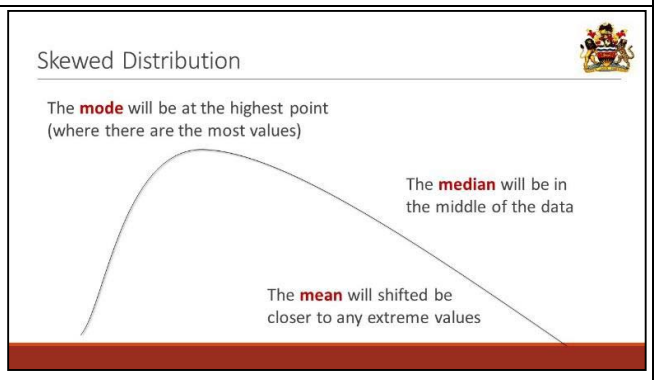
EXPLAIN that we have been using the word 'distribution' throughout this session.

ASK: Who can remind us what a distribution is?

Answer: *The distribution is a listing or visual representation of all of the values in a dataset and how often they occur.*

EXPLAIN that here we are looking at a symmetrical (or normal) distribution. In a symmetrical distribution, the mean, median, and mode are similar, falling somewhere in the middle of the data set, as shown here.

Slide 28



EXPLAIN that in a skewed distribution, the mean, median, and mode are in different positions. The median will remain in the centre (or middle) of the data, whereas the mean will be influenced by the presence extreme values, and be shifted (or skewed) in that direction.

The graph in this slide displays a positive skew or right-skewed data, in which the 'tail' is on the right. (When the **tail** is on the **left**, it shows a negative skew or **left-skewed data**.)

A common example of this distribution or shape is the number of children that women have—which usually peaks at around 2–4 and then declines, with fewer women having more children.

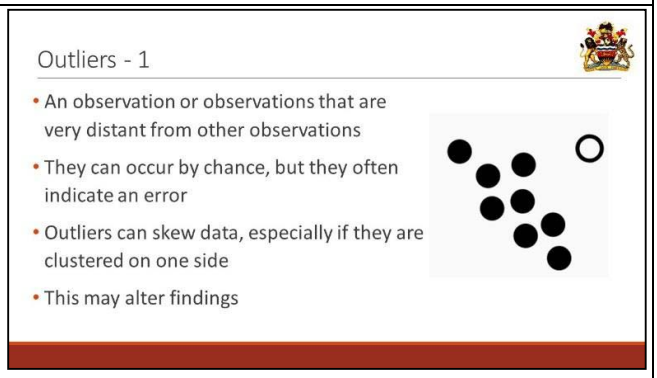
The same concepts would apply if this were a negative or left-skewed distribution.

Slide 29

EXPLAIN that we just discussed how the mean will shift in response to any extreme values, while the median and mode do not.

In statistics, we use the word **outlier** to refer to extreme values.

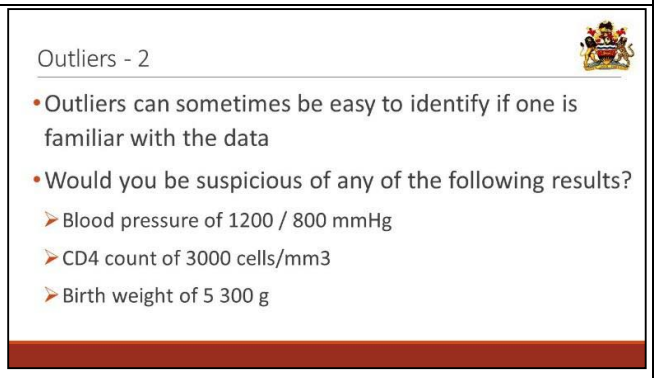
EXPLAIN outliers using the points on the slide.



Slide 30

ASK participants if any of the results on the slide look odd.

Possible answers:



- *If we investigate each of these observations, we might find that some contain correct values, but others contain errors. For example, both the systolic and diastolic blood pressure reading appear to have an extra zero at the end—a reading of 1200/800 mmHg would be impossible.*
- *A CD4 count of 3000 mm^3, meanwhile, would be extremely unusual. Upon investigation, we might find that the CD4 count of 3000 was meant to be 300, with the error being an extra zero was added.*
- *A birth weight of 5300 g is large, but is certainly possible; further investigation might confirm this value.*

EMPHASIZE:

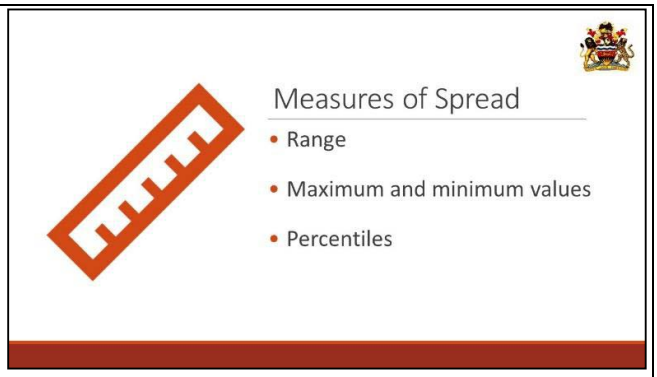
- If an outlier is present, check the data for errors and make the necessary corrections.
- ONLY correct or change data when you have firm evidence that data were wrongly captured.
- NEVER change data simply because an observation is unusual or 'looks odd'.

Trainer Instructions: Step 5 (15 minutes)

Use slides 31–34 and the facilitator notes to guide this step.

Slide 31

EXPLAIN: Often, we are not only interested in the typical or average values, but also want to understand how values differ. For this we would want to understand the high and low values, and how widely the values are scattered.



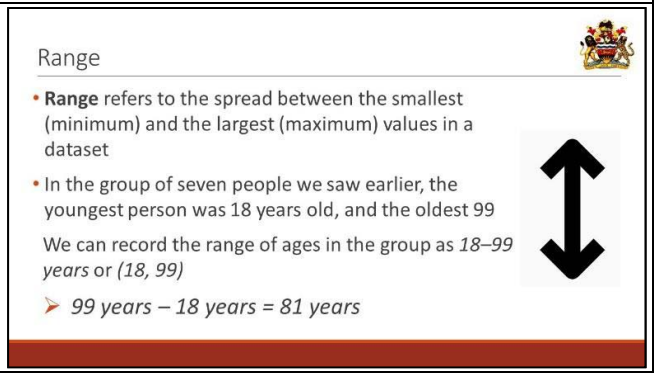
For example:

- What is the typical or average initial CD4 count for HIV patients at our clinic? What are the lowest and highest initial counts we see? How different are the initial counts among our patients? How do the average initial counts for male and female patients compare?
- What is the typical or average birth weight for infants born in our catchment area? What are the lowest and highest birth weights? Are the weights widely scattered, or are most weights close to the average? Are infant birth weights similar among younger and older women?
- What is the typical or average wait time for primary-care clinic patients? What are the longest and shortest wait times we observe? How do wait times differ among our patients? Do they vary by day and time of year? How?

Slide 32

We will now learn about several other statistics or measures that help to capture and summarize the spread of the data.

EXPLAIN range.

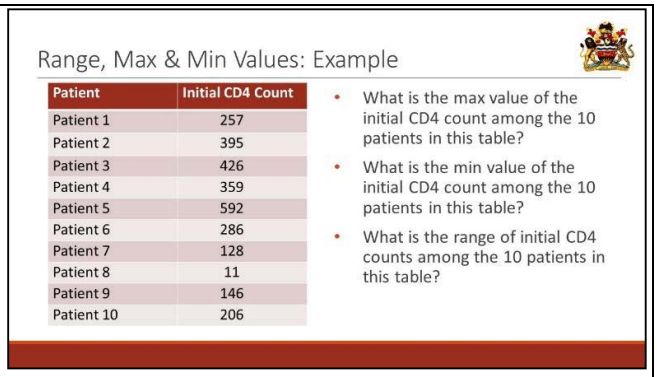


Slide 33

EXPLAIN that the range is essentially telling us the maximum and minimum values in a dataset. In statistics, we call these 'max' and 'min' values.

ASK: What is the max value of the initial CD4 count among the 10 patients in this table?

Answer: ***592*** *(Patient 5)*



ASK: What is the min value of the initial CD4 count among the 10 patients in this table?

Answer: ***11*** *(Patient 8)*

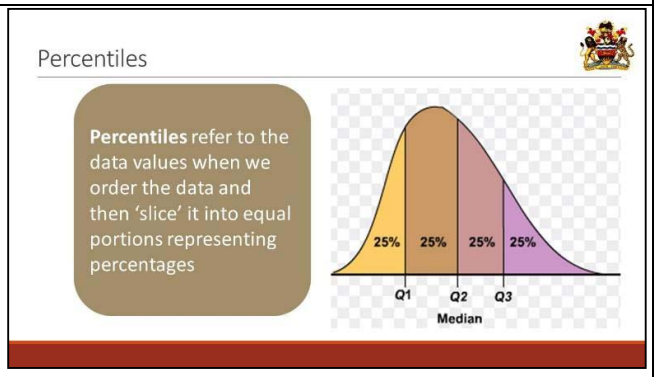
ASK: What is the range of initial CD4 counts among the 10 patients in this table?

Answer: *592 – 11 =* ***581***

Slide 34

EXPLAIN that now we are going to talk about percentiles.

Percentiles allow us to describe the spread of data in a distribution objectively, using numbers instead of using such vague terms as 'narrow' or 'wide'. We will not go into detail about percentiles, but wanted to give you an idea of how they are used and why.

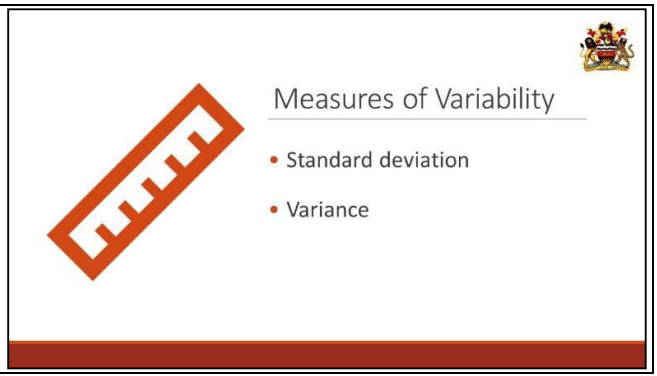


Trainer Instructions: Step 6 (10 minutes)

Use slides 35–38 and the facilitator notes to guide this step.

Slide 35

EXPLAIN that you will now briefly describe the measures of variability and their purpose.

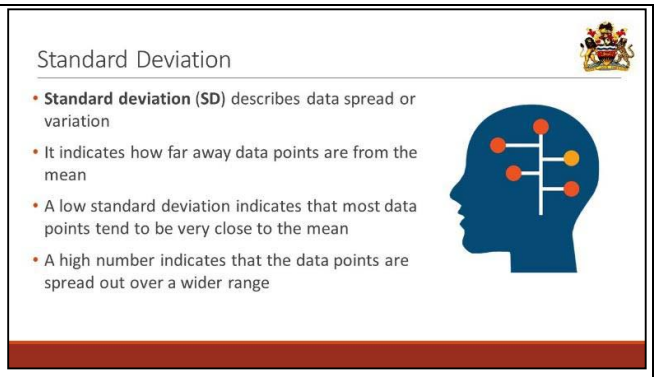


Slide 36

EXPLAIN that standard deviation is a way to describe how far data points are from the mean.

ASK participants to discuss in pairs what we might use standard deviation for.

GIVE them 2–3 minutes, and then **ASK** for volunteers to share their ideas.

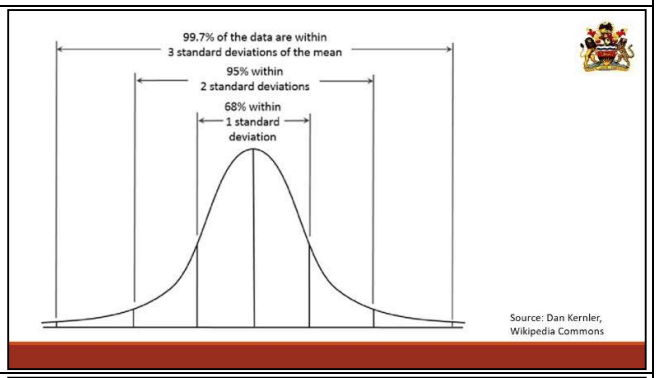


ALLOW a few responses.

EMPHASIZE that without the standard deviation, you can't compare two data sets effectively. Suppose two sets of data have the same average; does that mean that the data sets must be exactly the same? Not at all. For example, the data sets 199, 200, 201 and 0, 200, 400 both have the same average (200), yet they have very different standard deviations. The first data set has a *very* small standard deviation (*s*=1) compared to the second data set (*s*=200).

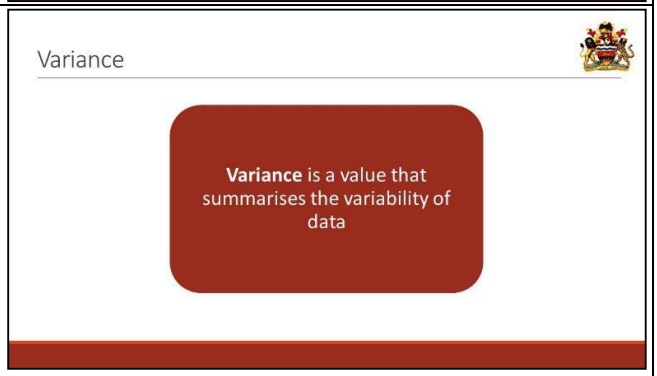
Slide 37

POINT OUT that standard deviation refers to the portion of the data set that is away (deviates) from the mean. For example, in a normal distribution, 68% of a data set is considered to be within one standard deviation away from the mean.



Slide 38

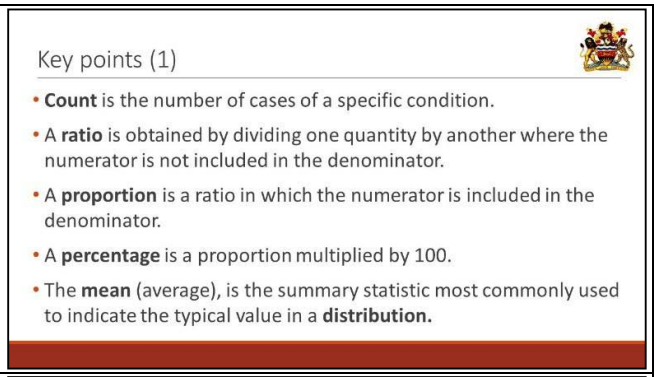
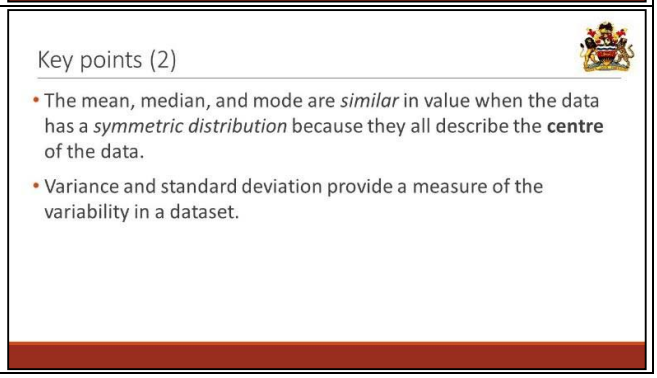
EXPLAIN that **variance** is similar to standard deviation, but a bit more complex. Variance summarizes the variability of all the data points in a data set, whereas the standard deviation simply summarizes the range of variability. Variance can be used to calculate probability, test theories, and calculate sample sizes.



For any participants who may ask, the calculation is the square of differences of individual observations from the mean added together; THIS sum is then divided by ***n-1****.*

Trainer Instructions: Step 7 (5 minutes)

Use slides 39–40 and the facilitator notes to guide this step.

Slide 39		
Slide 40	**ASK** participants if they have any questions.	

Session 6.3

Session 6.3: Key Concepts in Epidemiology

Time: 115 minutes

Learning Objectives

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

1. Define epidemiology
2. Describe the role of epidemiology in public health
3. Distinguish between descriptive and analytic epidemiology
4. Describe the components of descriptive epidemiology
5. Define measures of disease frequency

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Interactive lecture	Role of epidemiology in public health (slides 4–8)	Flip chart, markers, tape, LCD
3	30 minutes	Interactive lecture, group activity	Descriptive epidemiology (slides 9–17)	Post-it Notes, Flip chart, markers, tape, LCD
4	30 minutes	Interactive lecture, practical application	Measures of disease frequency (slides 18–29)	Flip chart, markers, tape, LCD
5	5 minutes	Interactive lecture, practical application	Analytic epidemiology (slides 30–31)	Flip chart, markers, tape, LCD
6	30 minutes	Small group activity	Key concepts in epidemiology (slide 32)	Flip chart, markers, tape, LCD, Handout 6.3.1
7	5 minutes	Facilitator presentation	Key points (slide 33)	LCD

Resources Needed

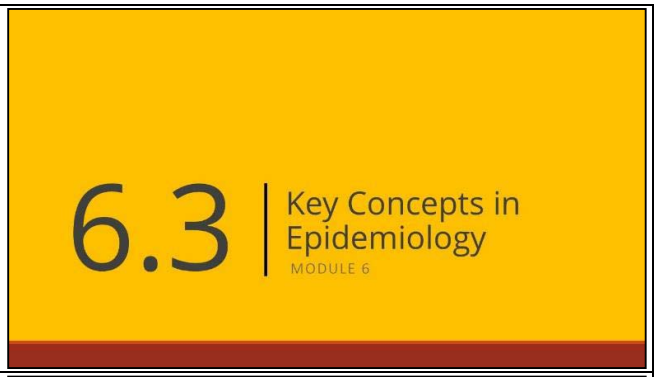
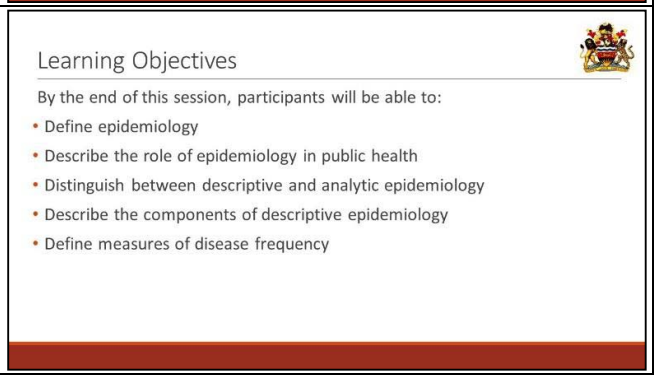
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

Handout 6.3.1: Key Concepts in Epidemiology

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (10 minutes)

Use slides 4–8 and the facilitator notes to guide this step.

Slide 4	**NOTE** This slide is animated. Wait for participants to answer the question before clicking to reveal the definition. **ASK:** What is epidemiology? **ALLOW** a few responses and then **CLICK** to reveal the definition.	

EMPHASIZE that epidemiology is not concerned with disease processes in individuals, but rather with the existence, distribution, causes, and control of disease in specific populations.

Another definition: epidemiology is the study of the **distribution** and **determinants** of health events in populations, and the application of this knowledge to control health problems.

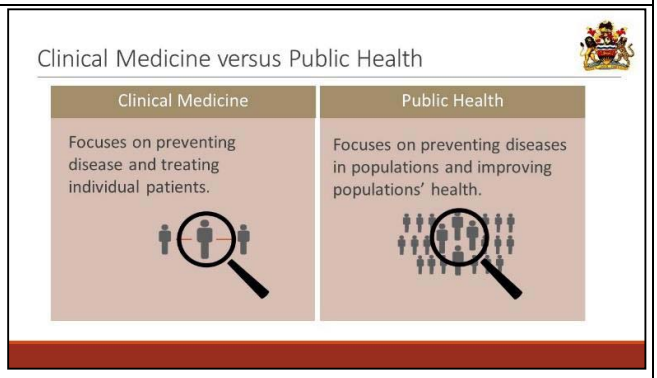
Slide 5

NOTE: This slide is animated.

ASK: What is the main difference between public health and clinical medicine?

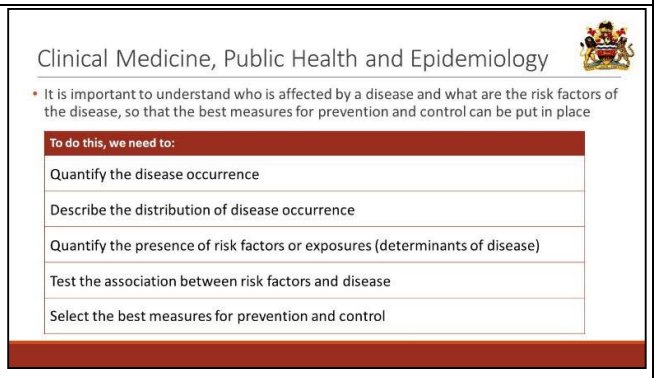
ALLOW a few responses.

CLICK and **EXPLAIN** that clinical medicine is focused on preventing and treating disease in individuals, whereas public health is focused on preventing disease in populations and improving population health. Larger numbers of people are reached through public health because the population is the target rather than individuals.



Slide 6

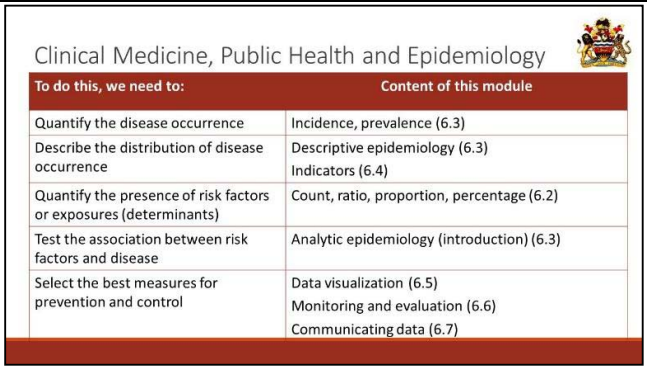
EXPLAIN that epidemiology is the main tool of public health; it is used to understand health outcomes through measures of disease frequency. We will spend much of this session focused on describing health outcomes. The causes of disease are also of interest to epidemiologists, but we will touch on the causes of disease only very lightly during this course.

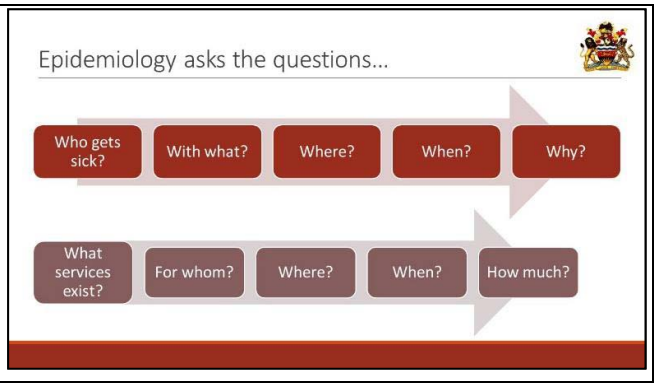


Slide 7

EXPLAIN that to understand who is affected by a disease and what its risk factors are, we need to be able to do the things listed in the left column of the table shown in the slide.

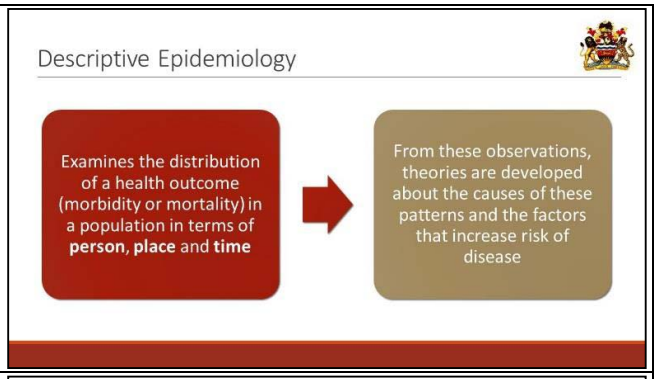
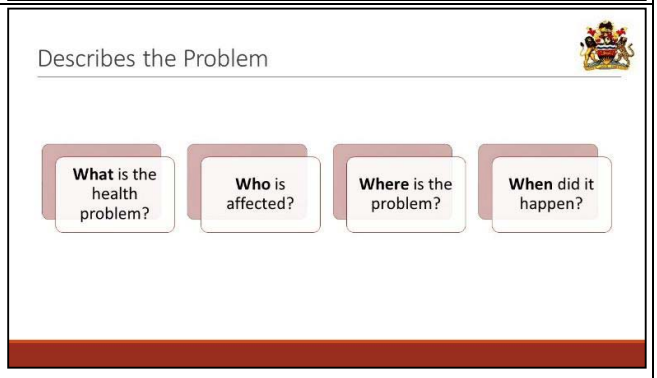
READ the left-hand column and **EXPLAIN** that each of these topics will be covered in this module as shown.



Slide 8	**EXPLORE** the questions that should be asked when confronted by any health scenario. **COMMENT** that these questions are the basic epidemiological questions that are asked in order to fully describe, and thus understand, a health situation (potential health problems).	

Trainer Instructions: Step 3 (30 minutes)

Use slides 9–17 and the facilitator notes to guide this step.

Slide 9	**EXPLAIN** that descriptive epidemiology simply tells a story about where we are now and what we are experiencing. Examples of this include crude death rates and maternal mortality ratios for a given period, such as this year.	
Slide 10	**EXPLAIN** that the main purpose of descriptive epidemiology is to describe the frequency and pattern of a health event in order to understand the distribution of health-related events. It describes what the health problem is, who is affected by it, and where and when the health events occurred.	

Frequency refers to the number of events as well as the rate and risks; **pattern** refers to the occurrence of health events by person, place, and time.

ASK: When describing a health problem, what do we want to know?

We ask questions such as:

What is it?

- Is it an infectious disease outbreak?
- Is it a non-communicable disease?
- Is it an injury?

Who is experiencing this disease or injury?

- Men or women?
- Adults or children?

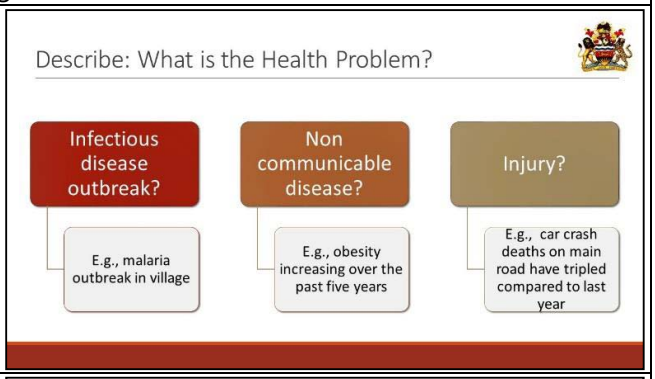
Where is it occurring?

- In the city or country?
- In the mountains or by the lake?
- In crowded areas?

When is it occurring?

- At a certain time of year or season?
- During the day or night?
- Are the cases happening close together?

Slide 11



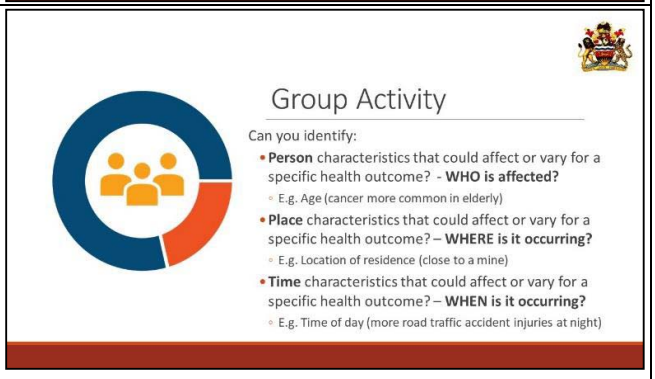
Slide 12

10 minutes total

NOTE: This slide is animated. **CLICK** to reveal each characteristic when you are ready to explain it (as designated below).

POST three flip charts in different areas of the teaching venue.

WRITE 'WHO' on the first chart, 'WHERE' on the second chart, and 'WHEN' on the third chart.



GIVE each participant three sticky notes (these could be three different colours for each of the questions that you pose).

CLICK to reveal **person** characteristics and **ENSURE** they understand what this refers to.

CLICK to reveal **place** characteristics and **ENSURE** they understand what this refers to.

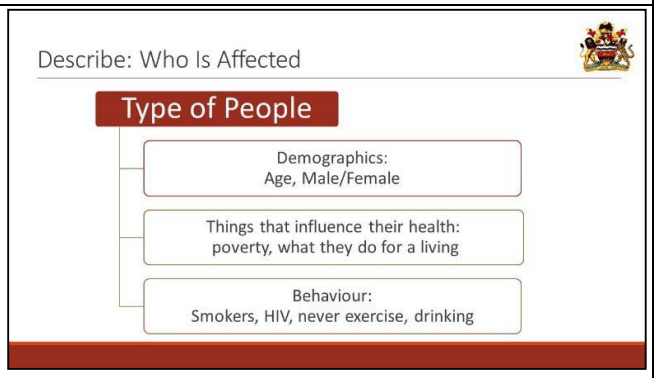
CLICK to reveal **time** characteristics and **ENSURE** they understand what this refers to.

ASK each participant to write examples of WHO, WHERE and WHEN characteristics on three separate sticky notes (one on each).

GIVE participants five (5) minutes to complete their sticky notes for each question and to stick them on the appropriate flip charts.

REVIEW the responses provided for each and then **SUMMARIZE** using the next five slides.

Slide 13



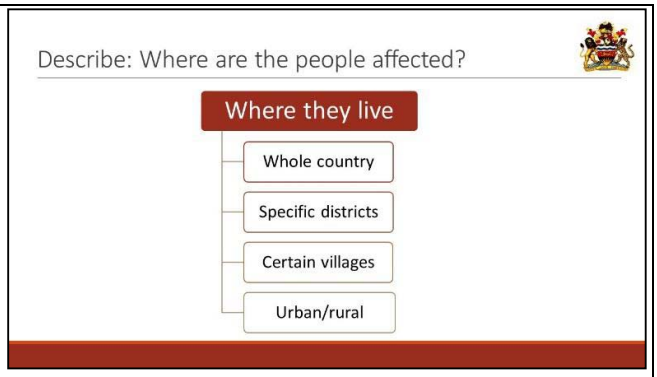
EXPLAIN that in descriptive epidemiology, **who** is affected relates to type of people, including the demographics and context or attributes that influence their health, and the behaviours that people engage in that affect their health.

Person attributes include age, sex, ethnicity/race, and socioeconomic status. Because personal characteristics may affect illness, organization and analysis of data based on person attributes may use inherent characteristics of people (such as age, sex, or race), biologic characteristics (immune status), acquired characteristics (marital status), activities (occupation, leisure activities, use of medications/tobacco/drugs), or living conditions (socioeconomic status, access to medical care).

Age and sex are included in almost all data sets; they are the two most commonly analysed person characteristics. However, depending on the disease and the data available, analyses of other person variables are usually necessary. Usually epidemiologists begin the analysis of person data by looking at each variable separately. Sometimes, two variables such as age and sex can be examined simultaneously. Person data are usually displayed in tables or graphs.

EXPLAIN that we describe who is affected so we can understand why. For example, the frequency of many adverse health conditions increases with decreasing socioeconomic status: tuberculosis and infant mortality are both associated with lower income. The patterns in data analysis may reveal more harmful exposures or less access to health care. Or they may uncover something that is difficult to describe or quantify, such as cancer.

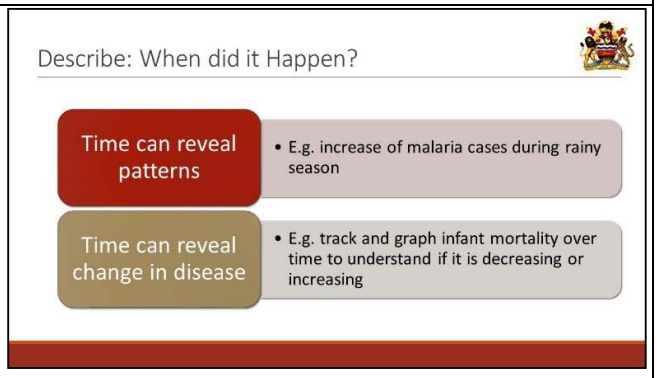
Slide 14



WHERE refers to where people live (i.e., where the issue is occurring)—such as whole country of Malawi, specific districts, certain villages, or the urban rural area.

Describing the occurrence of disease by place provides insight into the geographical aspects of the problem. Characterization by place refers not only to place of residence, but also to any location relevant to the occurrence of disease, such as place of diagnosis or reporting, birthplace, workplace, school district, hospital unit, or recent travel destinations. Place may be as large as a continent or country, or as small as a street address, hospital wing, or operating room. Sometimes place refers not to a specific location at all, but to a category of place, such as urban or rural, or domestic or foreign.

Slide 15

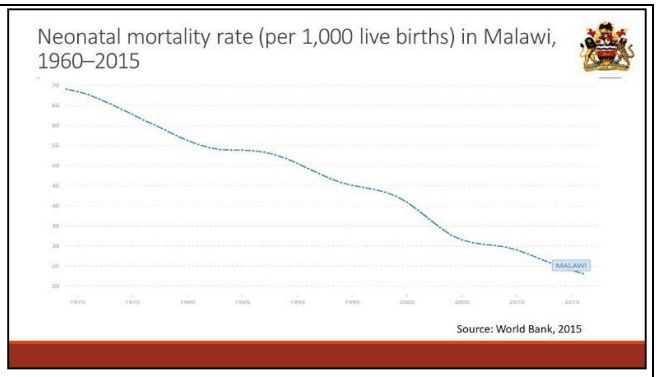


EXPLAIN that when we describe **when** a disease happens, we are focusing on time, which can reveal patterns—for example, seasonal changes in the occurrence of malaria.

Time can also reveal change in disease over time. For example, we can track and graph infant mortality over time to understand whether it is decreasing or increasing. Here we are moving from descriptive epidemiology to comparison. The occurrence of disease changes over time. Some of these changes occur regularly; others are unpredictable. An example of a disease that occurs during the same season each year is influenza, which tends to occur more frequently in winter. In contrast, diseases such as hepatitis B and salmonellosis can occur at any time.

For diseases that occur seasonally, health officials can anticipate their occurrence and implement control and prevention measures, such as an influenza vaccination campaign or mosquito spraying. For diseases that occur sporadically, investigators can conduct studies to identify the causes and modes of transmission, and then develop appropriately targeted actions to control or prevent further occurrence of the disease.

Whatever the situation, displaying the patterns of disease occurrence by time is critical for monitoring disease occurrence, and for assessing whether public health interventions have made a difference.

Slide 16	**EXPLAIN** that we will now look at an example. **ASK:** Can you answer the questions of descriptive epidemiology for the graph? Answers: • People: Neonates • Place: Malawi • Time: 1960–2015	
Slide 17	**EXPLAIN** that, for example, here we see infant mortality in Malawi from 1960 to 2015. The graph in the previous slide shows change in infant mortality over time, but if we wanted to describe the health outcome in 2015, we can see that infant mortality that year was about 23 per 1000 live births.	Infant Mortality (Malawi, 1960–2015) **What is the health problem?** — **Death** **Who is affected?** — Neonates (First 28 days of life) **Where is the problem?** — Malawi **When did it happen?** — • 1960 - 2015 • In 2015, neonatal mortality is about 23 per 1,000 live births • From 1960 to 2015, neonatal mortality went from around 69 to 23 per 1000 live births

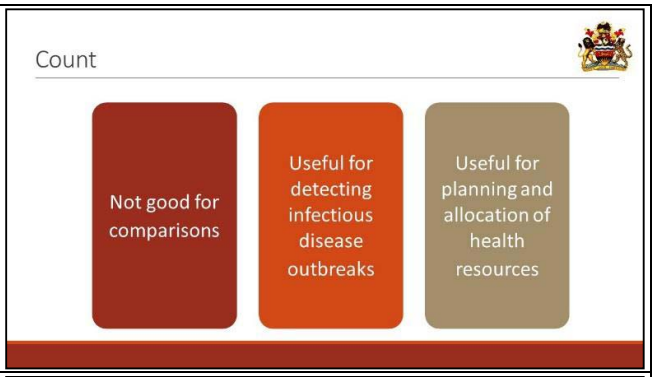
Trainer Instructions: Step 4 (30 minutes)

Use slides 18–29 and the facilitator notes to guide this step.

Slide 18	**EXPLAIN** that these are some measures of disease frequency that epidemiologists use to understand population health. We will go through each of these during the remainder of this session. We just learnt some of the basics of these measures in the basic statistics session.	Measures of Disease Frequency Count Prevalence (proportion) Incidence
Slide 19	**REMIND** participants of the definition of **count**. **ASK:** What are some ways we can use counts? **ALLOW** a few responses and then **CLICK** to the next slide.	Count • Number of cases of disease (or behaviour) • E.g., number of type 2 diabetes cases among women Diabetes No diabetes What is the count of type 2 diabetes cases among women? **The number of diabetes cases is 5**

Slide 20

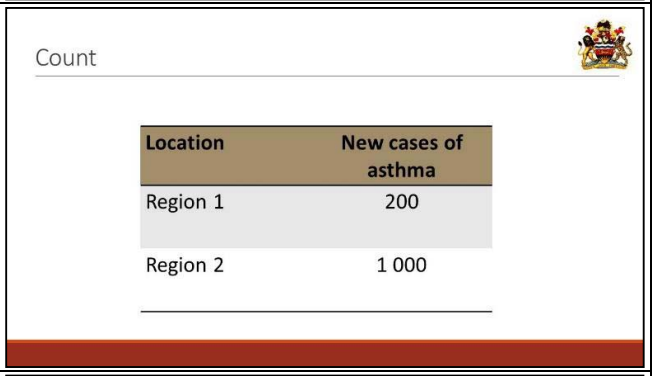
EXPLAIN how counts are used.



Slide 21

ASK participants which region has the biggest problem with new asthma cases. Some participants may say Region 2.

NOTE: If no participant raises the concern of the population size, then move to the next slide.

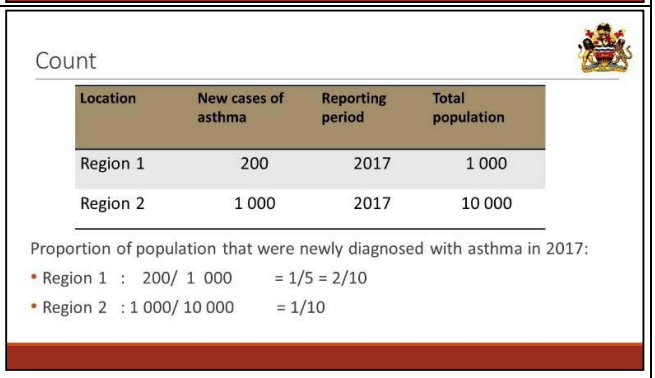


Slide 22

ASK: Now which region has the biggest problem with new asthma cases?

EXPLAIN that the denominator (population size, in this case) can influence the findings.

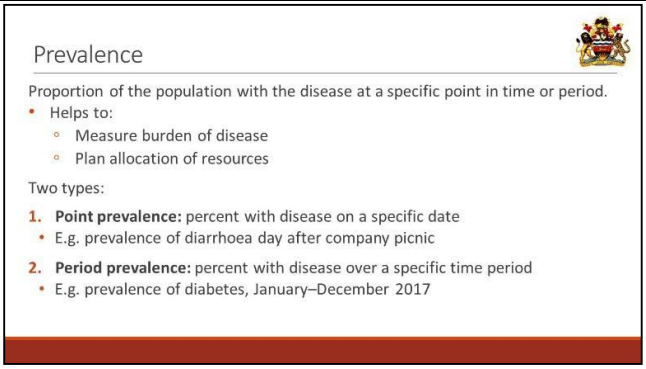
EMPHASIZE that one should also always check that the time period used for comparison is the same.



Slide 23

EXPLAIN that another way to use proportions is to describe prevalence. Prevalence refers to the proportion or percentage of the population with the disease (or behaviour) at a specific point in time or period.

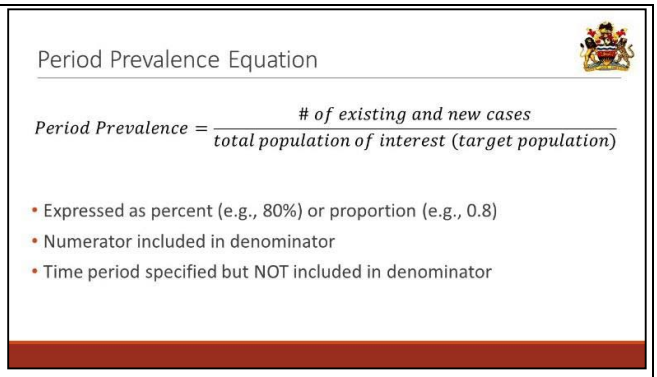
EMPHASIZE that period prevalence is the prevalence most often encountered in public health practice when looking at risk behaviours and non-communicable disease, so we will focus our discussion on period prevalence.



Slide 24

EXPLAIN that the equation for calculating period prevalence is the number of existing and new cases divided by the number of people in the population during the time period under study.

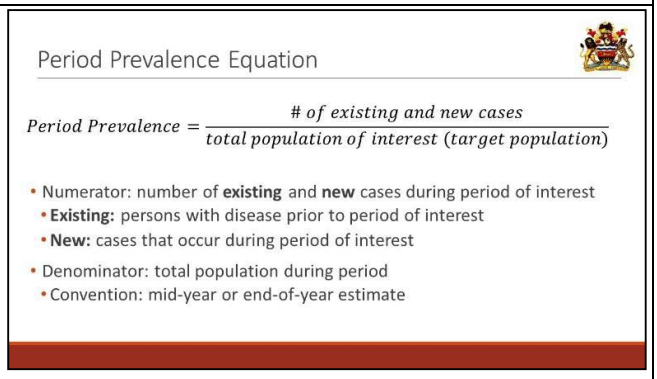
NOTE that prevalence is usually expressed as a percentage or proportion. The numerator is included in the denominator; the time period should be specified, but it is NOT included in the denominator.



Slide 25

EXPLAIN that as mentioned above, the equation for calculating period prevalence is the number of existing and new cases of disease divided by the number of people in the population. The numerator includes the number of both existing and new cases.

Existing cases are those that first occurred prior to the period of interest; new cases are those that first occurred during the period of interest. The denominator includes the total population during the period of interest. The convention is to use a mid- or end-of-year estimate for the population.

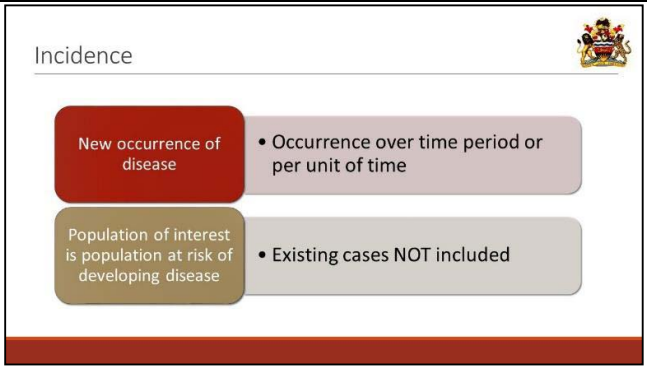


Slide 26

EXPLAIN that incidence refers to the new occurrence of disease; it occurs either over a period of time or per unit of time.

The population of interest is the population at risk of developing the disease. Existing cases of disease are NOT included as they are in prevalence estimates.

GIVE examples.

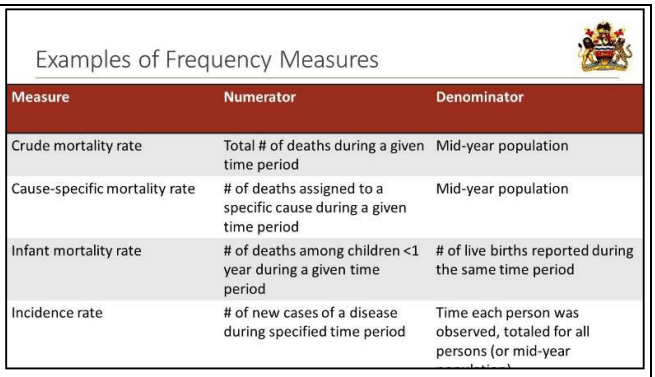


Slide 27

EXPLAIN that the examples shown in this slide are commonly discussed frequency measures.

ASK participants if they have any experience working with these rates.

NOTE: The slide text is cut off in the guides – it says 'or mid-year population'



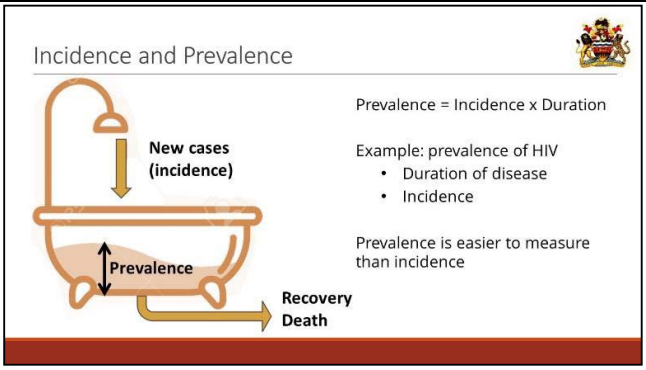
Examples of Frequency Measures

Measure	Numerator	Denominator
Crude mortality rate	Total # of deaths during a given time period	Mid-year population
Cause-specific mortality rate	# of deaths assigned to a specific cause during a given time period	Mid-year population
Infant mortality rate	# of deaths among children <1 year during a given time period	# of live births reported during the same time period
Incidence rate	# of new cases of a disease during specified time period	Time each person was observed, totaled for all persons (or mid-year

Slide 28

NOTE: This slide is animated.

EXPLAIN that here we see a classic image in epidemiology that shows the relationship between incidence and prevalence. New cases (incidence) enter the prevalence 'pool', shown here by the orange 'liquid' in the box. Cases leave the prevalence 'pool' through either recovery or death. Prevalence can increase or decrease due to incidence or changes in recovery or death. This is why it is best to have at least the incidence and prevalence measures to understand a health outcome.

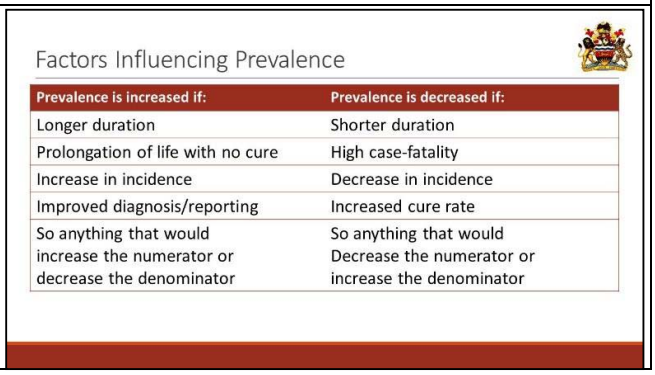


For example, new HIV cases add to the prevalence. If the population were not receiving ART, many people would die, while the prevalence would remain stable or even be low. However, if the population were receiving ART, they would continue to have HIV but never recover, and few of them would die. In that case, the number of people with HIV (prevalence) would keep increasing.

Slide 29

REVIEW the factors that influence prevalence on the screen.

EXPLAIN how the change in numerator and/or denominator influences the prevalence.



Factors Influencing Prevalence

Prevalence is increased if:	Prevalence is decreased if:
Longer duration	Shorter duration
Prolongation of life with no cure	High case-fatality
Increase in incidence	Decrease in incidence
Improved diagnosis/reporting	Increased cure rate
So anything that would increase the numerator or decrease the denominator	So anything that would Decrease the numerator or increase the denominator

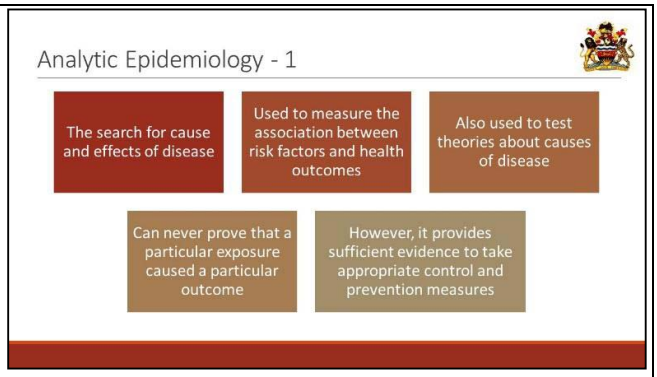
Trainer Instructions: Step 5 (5 minutes)

Use slides 30–31 and the facilitator notes to guide this step.

Slide 30

EXPLAIN that up until now the session has focused on descriptive epidemiology—the **what.** Epidemiologists use analytic epidemiology to quantify the association between exposures and outcomes, and to test hypotheses about causal relationships—the **why**.

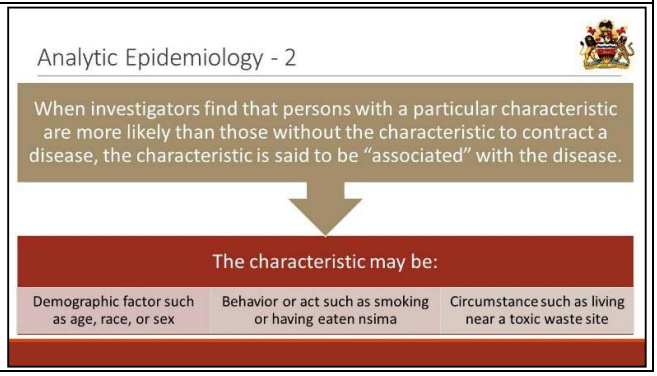
USE the points on the slide to define analytic epidemiology.



EMPHASIZE that descriptive epidemiology can be used to generate theories (or hypotheses) about why events are occurring, but we need analytic epidemiology in order to test those theories (or hypotheses).

Slide 31

EXPLAIN that the key process in analytic epidemiology is comparison. We need to compare the characteristics of different groups in order to test theories about cause and effect.



Trainer Instructions: Step 6 (30 minutes)

Use slide 32 and the facilitator notes to guide this step.

Slide 32

30 minutes total

REFER to **Handout 6.3.1: Key Concepts in Epidemiology.**

DIVIDE participants into groups of two or three to complete the exercise.

GIVE them 15 minutes to complete the exercise. **MONITOR** their progress and assist if necessary.

On completion, **GO THROUGH** each question by having volunteers present their results for each question and discuss any issues that may arise.

EXPLAIN that this provides a summary of all epidemiology measures that are used. Only measures of disease frequency are discussed in the course, but this handout can be used by participants who would are interested in the others.

Trainer Instructions: Step 7 (5 minutes)

Use slide 33 and the facilitator notes to guide this step.

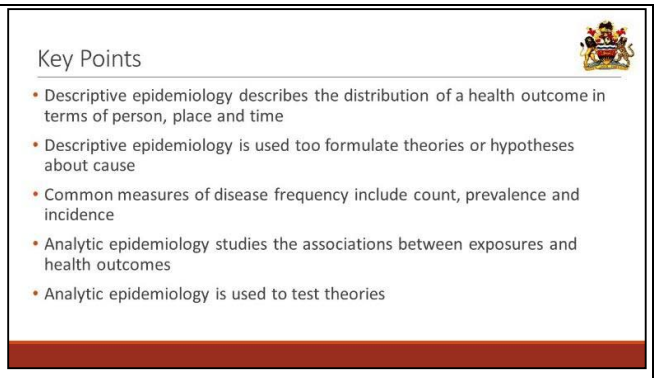
Slide 33

END the session by summarizing the key points.

ASK: Which type of epidemiology is used to come up with theories about causes and effects of disease and which is used to test those theories?

Answer:

Descriptive is used to generate.
Analytic is used to test.



ASK participants if they have any questions before closing the session

6.3.1: Key Concepts in Epidemiology

1. If a survey shows that in January 2017 there were 250 children under the age of five severely malnourished, out of a total catchment population of 10,000 children under five, what was the prevalence of severe malnutrition in this community for children under five in January 2017?

Answer:

$$\frac{250}{10\,000} = 0.025 = 2.5\% \text{ or } 25 \text{ per } 1\,000 \text{ children under 5}$$

25 out of 1 000 children under five are severely malnourished

Note that some participants may use more or less decimal points in their results. You could use this opportunity to discuss the optimal use of decimal points when presenting results for different audiences and for different purposes.

2. If 10 professional nurses saw 300 clients in a day in total, what is the average number of clients seen per professional nurse?

Answer:

$$\frac{300}{10}$$

– Average = mean = 10 = 30 clients per nurse

3. Out of 250,000 developmental screenings done in the province in 2000, 34 children were detected with developmental delay. What percentage had developmental delay?

Answer:

$$\text{Percentage} = \frac{34}{250000} = 0.01\%$$

– 0.01% of children were identified with developmental delay.

4. If you wanted to measure the effectiveness of an HIV/AIDS education programme, would you use incidence or prevalence as a measure?

Answer:

Start with the purpose or objective of an education campaign.

- Education campaigns usually focuses on risk factors for transmitting infections and methods of preventing HIV.
- This would affect the new cases of HIV.
- As such, one would use incidence as a measure of effectiveness.

5. Community A has 500 asthma sufferers in a population of 20,000, while Community B has 1,000 asthma sufferers in a population of 100,000. Which community has a bigger problem with asthma?

Answer:

Community A = 500

$\overline{20000} = 2.5\%$

Community B = 1000

$\overline{100000} = 1\%$

Community A has the bigger problem with asthma in the community

6. Look at the table below: What can you say about the trend in growth faltering?

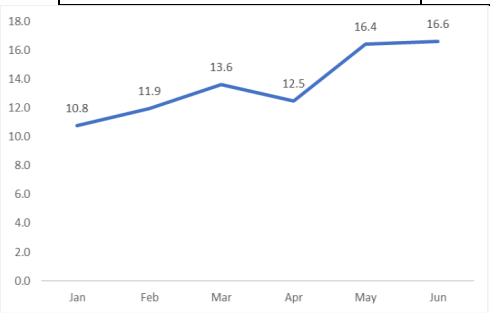
–	Jan	Feb	Mar	Apr	May	Jun
Failure to gain weight	35	37	45	40	55	49
Children weighed	325	310	330	320	335	295

Answer:

	Jan	Feb	Mar	Apr	May	Jun
Failure to gain weight	35	37	45	40	55	49
Children weighed	325	310	330	320	335	295
Percentage	10.8	11.9	13.6	12.5	16.4	16.6

Answer:

	Jan	Feb	Mar	Apr	May	Jun
Failure to gain weight	35	37	45	40	55	49
Children weighed	325	310	330	320	335	295
Percentage	10.8	11.9	13.6	12.5	16.4	16.6



There is an increasing trend in growth faltering over the 6 months period.

Session 6.4

Session 6.4: Indicators

Time: 150 minutes

Learning Objectives

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

1. Define and identify the five types of health indicators
2. Explain the purpose of health indicators
3. List the characteristics of strong health indicators
4. Describe how denominators are selected and calculated
5. Identify factors to consider when selecting indicators for analysis
6. Name the six common pitfalls when selecting indicators
7. Discuss how to interpret the results of indicators

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	35 minutes	Interactive lecture, large group discussion	Definition & types of indicators (slides 4–15)	Flip chart, markers, tape, LCD, Handout 6.4.1
3	25 minutes	Interactive lecture, group activity	Characteristics of strong indicators (slides 16-20)	Flip chart, markers, tape, LCD
4	40 minutes	Interactive lecture, group work	Calculating indicators, estimating and checking denominators (slides 21-25)	Flip chart, markers, tape, LCD, Handout 6.4.2, Handout 6.4.3, Handout 6.4.4
5	10 minutes	Interactive lecture	Selecting indicators (slides 26)	Flip chart, markers, tape, LCD
6	20 minutes	Interactive lecture, small group work	Interpreting indicators (slides 27-31)	Flip chart, markers, tape, LCD
7	5 minutes	Facilitator presentation	Key points (slide 32)	LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

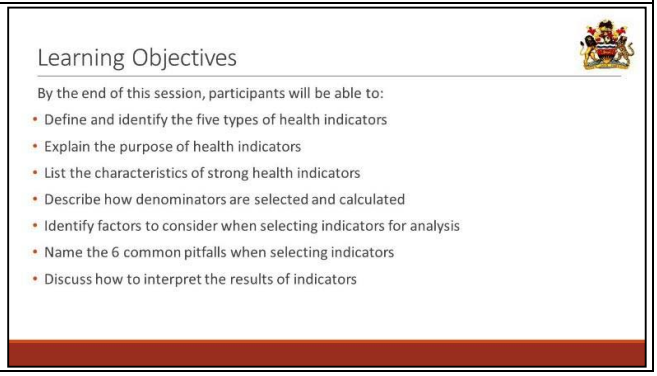
- MOH SOP on Revision of Indicators and Data Collection Tools
- National Health Indicators Handbook for Malawi

Handouts

- Handout 6.4.1: Sample Indicators for MCH
- Handout 6.4.2: Indicator Documentation Guide
- Handout 6.4.3: Indicator Documentation Template
- Handout 6.4.4: Maternal Mortality Indicator Information

Trainer Instructions: Step 1 (5 minutes)

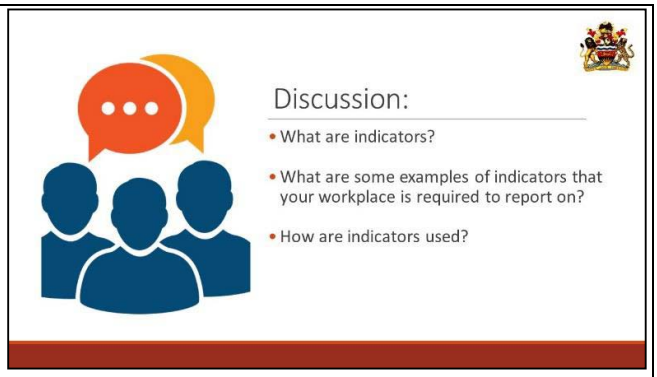
Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (35 minutes)

Use slides 4–15 and the facilitator notes to guide this step.

Slide 4



ASK participants:

- What are indicators?
- What are some examples of indicators that your workplace is required to report on?
- How are these indicators used? *(5 minutes total)*

Possible answers:
HIS indicators: *The National Health Indicator Handbook includes a list of indicators for monitoring HSSP II. In addition, each programme has indicators it needs to report on that relate to HIV, TB, STIs, mental health, and so on*.

The **UN Sustainable Development Goals**, or SDGs, and **the WHO 100 list** are examples of international indicators.

The health goal (SDG 3) comprises 13 targets, including four listed as 'means-of-implementation' targets. Each target has one or two proposed indicators; in total, there are 27 indicators.

The WHO Global Reference List of 100 Core Health Indicators is a standard set of 100 indicators prioritized by the global community to provide concise information on the health situation and trends, including responses at national and global levels.

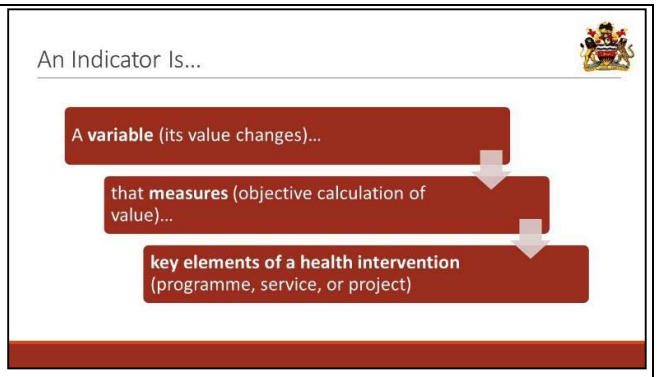
ADJUST your presentation according to the feedback received and the level of discussion that you have during the group activity. **FOCUS** on areas that were missed or that require strengthening.

Slide 5

EXPLAIN: We use indicators in daily life, sometimes without realizing it. They are the clues, signs, or markers that let us know how close we are to our path and how much things are changing. For example, if you drive a car and the gas gauge shows you are low on gas, it is not actually the gas you are looking at but rather the gas gauge, which is an indicator of the amount of gas in your tank.

Slide 6

EXPLAIN: Indicators are variables that measure one aspect of a health intervention, programme or project. Let's take a moment to go over each piece of this definition.



EXPLAIN the following:

First, the purpose of indicators is to show whether, and how, health programmes or interventions have caused a change as intended.

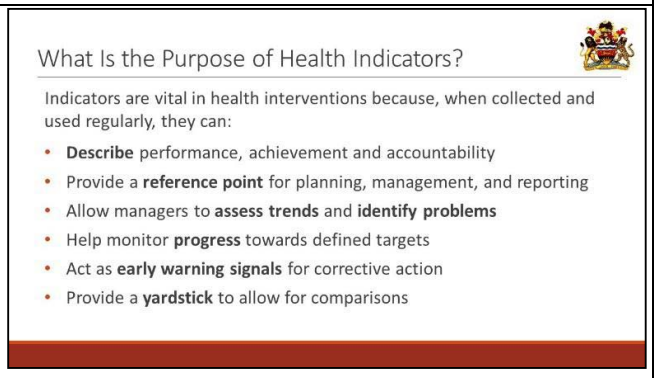
Second, an indicator is a measurement. It measures the value of the change in meaningful units that can be compared to past and future units and values.

Third, an indicator focuses on a single aspect of a health intervention, programme, or project. It may be an input, an output, or an overarching objective, but its measurement will be carefully defined in a way that captures that aspect as accurately as possible.

A full, complete, and appropriate set of indicators for a programme or intervention will include at least one indicator for each significant aspect of its activities.

Slide 7

EXPLAIN: Examples of performance, achievement, and accountability:



Performance refers to the effective or efficient operation of an activity.

- Example: Percentage of health facilities that reached their coverage targets for DPT3

Achievement refers to the accomplishments of an activity, project, or programme.

- Example: Percentage of HIV-positive pregnant women who received antiretroviral drugs

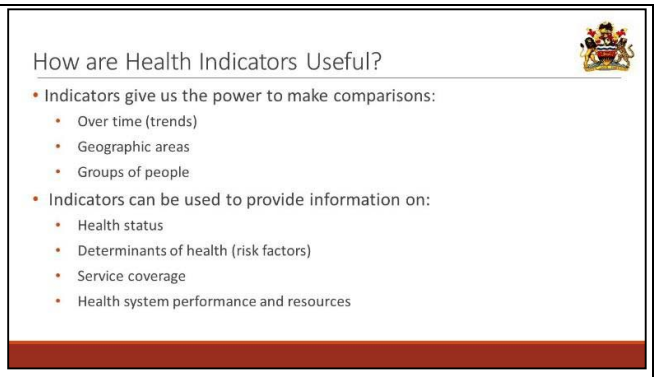
Accountability refers to responsibility for the performance and/or achievements of an activity, project, or programme.

- Example: Percentage of clinics complying with national guidelines for sexually transmitted infections

NOTE that, as useful as indicators are, not all indicators are useful for measuring performance. It takes practice to understand which ones will provide the best information for your health care delivery.

Slide 8

EXPLAIN that indicators can be grouped as shown here:



Health status

ASK: Can anyone think of an indicator they have either used or seen used to measure health status?

Possible answers:

- *Life expectancy at birth*
- *Malaria mortality rate*

Risk factors

ASK: Can anyone think of an indicator they have seen used to measure risk factors?

Possible answers:

- *Children under 5 years of age who are stunted*
- *Population using safely managed sanitation services*

Service coverage

ASK: Can anyone think of an indicator they have used or seen used to measure service coverage?

Possible answers:

- *Antenatal coverage*
- *Tuberculosis case detection rate*

Health systems performance and resources

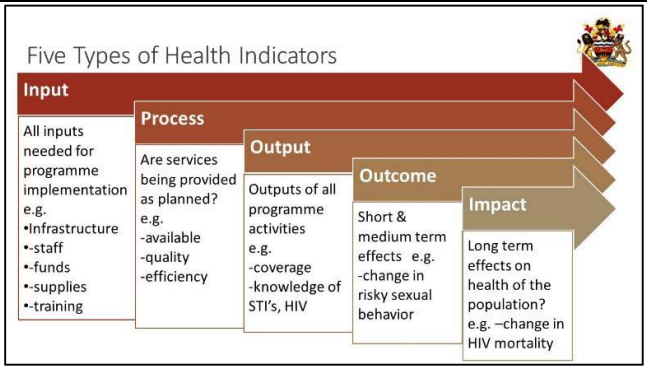
ASK Can anyone think of an indicator they have used or seen used to measure health system performance or resources?

Possible answers:

- *Bed capacity*
- *Total current expenditures on health (% of gross domestic product)*

Slide 9

EXPLAIN that indicators that measure health need to measure all aspects of the system, as shown here. We have seen some of these terms before.



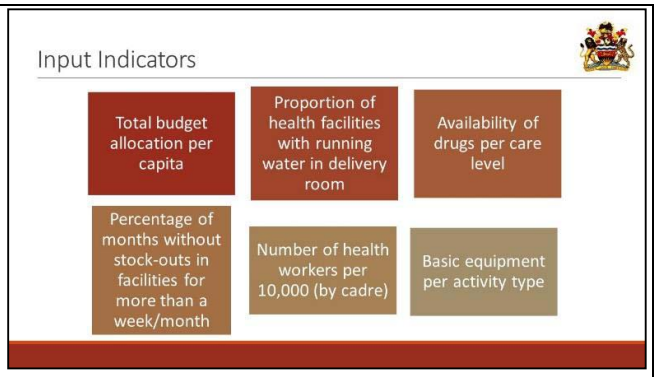
ASK: We have already discussed the terms input, process, and output in previous modules. What were they referring to?

Answer: components of the HIS.

GO THROUGH the slide and explain that examples of indicators for each component will be presented in the following slides.

Slide 10

NOTE: This slide is animated. Wait for participants to answer the question before clicking to reveal the examples.



ASK Can anyone remind us of the definition of *input?* Why would we monitor inputs?

Answer: Resources that go into a programme; recall that it is used to monitor affordability and availability; include financing, staffing, facility, equipment, policies.

CLICK to reveal the examples of input indicators on the slide.

Slide 11

NOTE This slide is animated. Wait for participants to answer the question before clicking to reveal the examples.

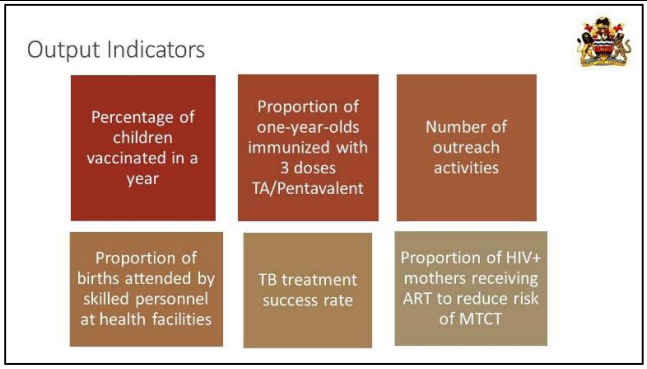
ASK: Can anyone remind us of the definition of *process?* Why would we monitor processes?

Answer: Activities the programme carries out; recall that it is used to monitor service delivery and accessibility.

CLICK to reveal the examples of process indicators on the slide.

Slide 12

NOTE This slide is animated. Wait for participants to answer the question before clicking to reveal the examples.



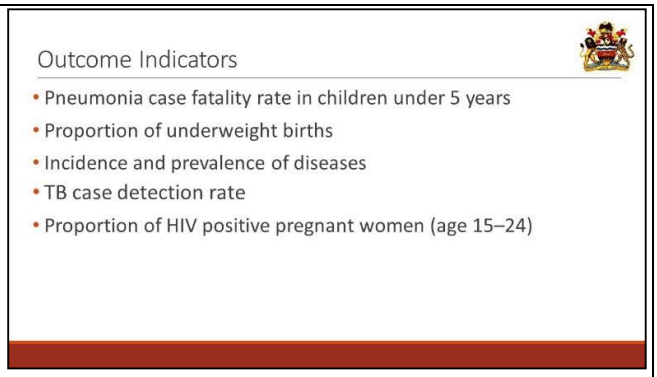
ASK: Can anyone remind us of the definition of *output* and why we monitor outputs?

Answer: Short- or medium-term 'results' from programme processes; what is produced from activities; they provide information on the quantity of services provided, client satisfaction, use of the programme; performance, coverage, and quality—outputs give no indication of the effects on health.

CLICK to reveal the examples of output indicators on the slide.

Slide 13

NOTE: This slide is animated. Wait for participants to answer the question before clicking to reveal the examples.



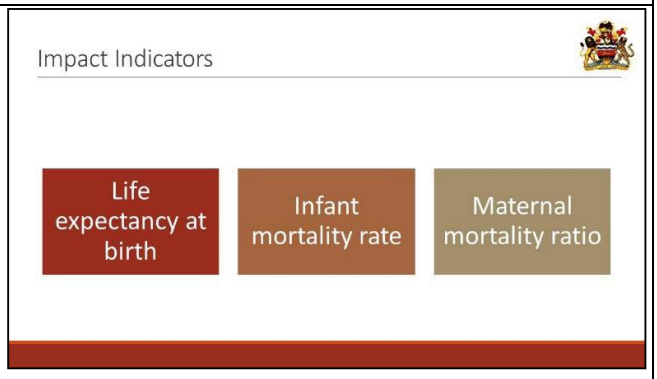
ASK: Can anyone remind us of the definition of *outcome* and why we would monitor outcomes?

Answer: Longer-term changes resulting from the programme or intervention. of programme; recall that these measure coverage, effectiveness, sustainability.

CLICK to reveal the examples of outcome indicators on the slide.

Slide 14

NOTE: This slide is animated. Wait for participants to answer the question before clicking to reveal the examples.



ASK: What do we mean when we talk about *impact*? Why do we measure *impact*?

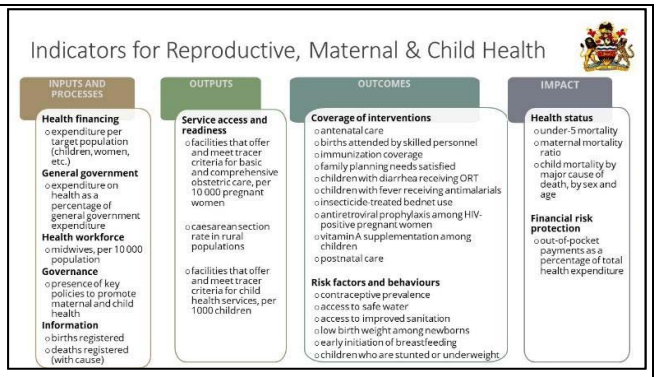
Answer: Long-term change in health status of the population or performance of the health system.

CLICK to reveal the examples of impact indicators on the slide.

EXPLAIN that measuring impact is important—but can be complicated, expensive, and often impractical. It is important to be realistic about the constraints, as it requires a level of research expertise, commitment to longitudinal study, and allocation of resources that are typically beyond the capabilities of implementing organizations. It is crucial to identify when it makes sense to measure outcomes and impacts, and when it might be best to stick with outputs—especially when an organization's control over results is limited and causality remains poorly understood.

Slide 15

REFER participants to **Handout 6.4.1: Sample Indicators for Reproductive, Maternal & Child Health**



EXPLAIN: This is an example of a package of health indicators for reproductive, maternal, and child health programme monitoring. To represent this broad health topic, indicators were chosen from all components of the monitoring, evaluation, and review framework.

Typically, the best indicators of progress in a country's priority health topic are those that are identified by health authorities in the country itself, instead of those adapted or imposed from outside sources; indicators selected by the country using them are more likely to be of greater relevance to that country's needs.

ASK participants to name an example of each type of indicator.

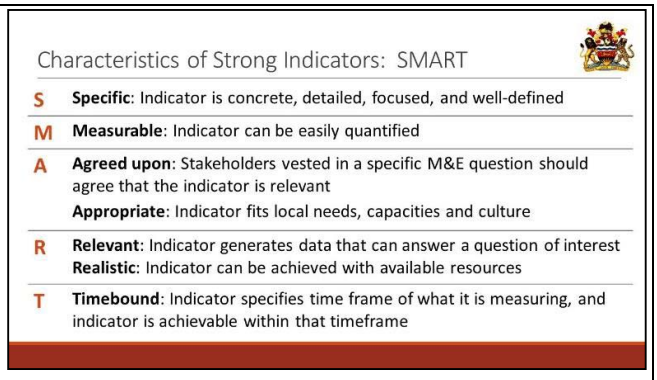
NOTE: *Process indicators are a bit tricky to uncover in this list. See if any participants notice this!*

Trainer Instructions: Step 3 (25 minutes)

Use slides 16–20 and the facilitator notes to guide this step.

Slide 16

EXPLAIN that in order for indicators to be useful, they should adhere to the set of six characteristics shown here as much as possible. Like objectives, indicators also need to be **SMART**: specific, measurable, agreed upon/appropriate, relevant/realistic, and time-bound.



ASK a participant to read each characteristic; **ENSURE** understanding before moving on to the next.

NOTE that few indicators fit all of these criteria. Indicators are usually developed and evaluated over time, and chosen based on a variety of considerations. We should always ask ourselves:

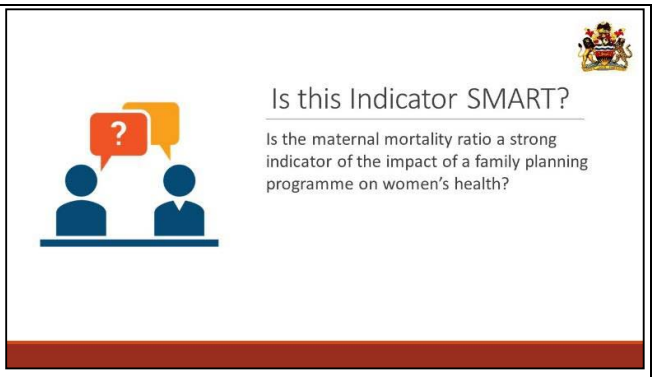
- What am I really trying to understand?
- Are there valid, standardized indicators that I should use?
- How often will I need to measure this indicator?

Slide 17

10 minutes total

ASK participants to discuss the question on the slide with the person next to them. **ALLOW** them 5 minutes to discuss.

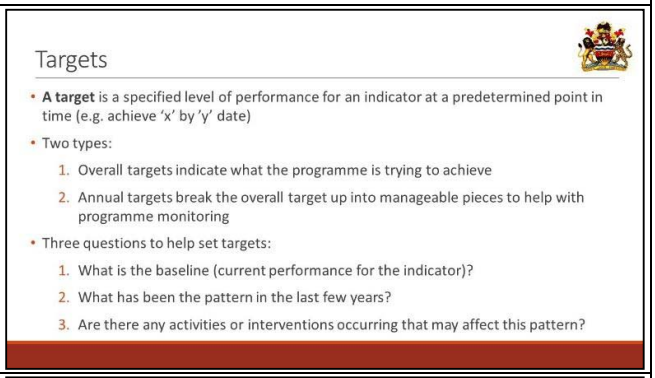
HAVE a volunteer respond to the question and **DISCUSS** the relevant points as a large group.



Answer: *Although family planning programmes often intend to reduce maternal mortality, the maternal mortality ratio is not a valid measure of the impact of a family planning programme on women's health. While family planning programmes contribute to reducing maternal mortality, numerous other factors, such as prenatal care, a referral system, access to hospital care, and transportation also influence the ratio. What might be a more valid indicator? In this case, the result itself needs narrowing, to focus on a particular effect of family planning programmes on women's health, before a valid indicator to capture and measure that effect can be determined.*

Slide 18

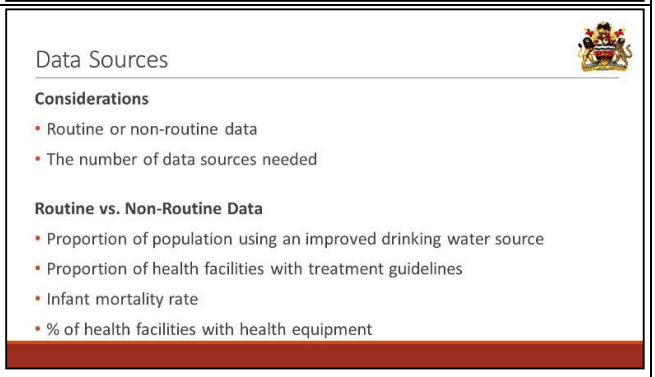
EXPLAIN targets using the notes on the slide.



Slide 19

EXPLAIN that when selecting or learning about indicators, it is important to consider where the data will come from. Will it come from routine or non-routine data? How many data sources will be needed to calculate the indicator?

ASK: Are these four indicators best measured using routine or non-routine data sources? Why?



NOTE that routine data will miss any deaths that occur in the community or outside of the public health sector. This figure may be quite large if access to or use of public health services is poor/low.

SUMMARIZE the exercise by saying that some indicators are not always clearly defined or easy to measure with routine data.

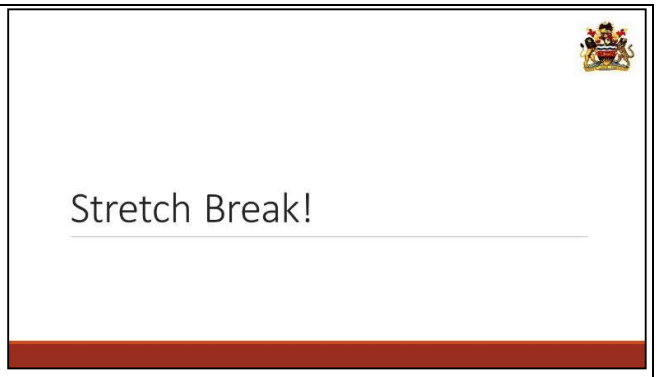
Slide 20

HAVE participants get up and walk around the room for a minute.

Then **ASK** them to jump up and down for 30 seconds.

After one or two minutes, **BRING** the group back to their seats.

ASK 3–5 volunteers to say ONE WORD (ONLY ONE WORD) to describe how they are feeling right now.



Then **ASK** one of those volunteers how they know that they are feeling that way.

- Do they feel sleepy? Confused? Engaged? Excited?
- What are the 'indicators' they are monitoring in their mind/body?

Trainer Instructions: Step 4 (40 minutes)

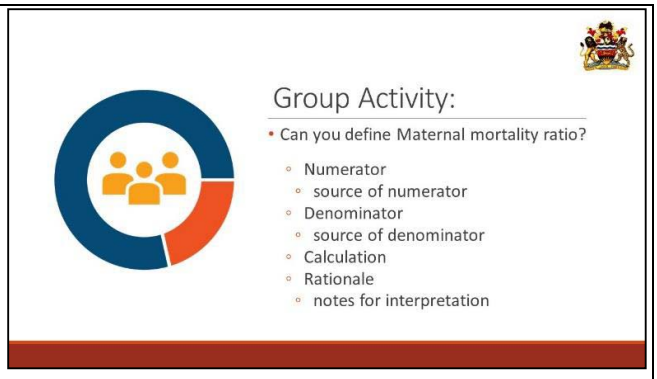
Use slides 21–25 and the facilitator notes to guide this step.

Slide 21

20 minutes total

REFER participants to **Handout 6.4.2: Indicator Documentation Guide** and **Handout 6.4.3: Indicator Documentation Template**

SPLIT participants into groups of 2–4 to fill in as many of the fields noted on the slide as they can for this well-known indicator.



GIVE the group 10 minutes to work on the template.

After 10 minutes, **PROVIDE** participants with **Handout 6.4.4: Maternal Mortality Ratio** to compare their responses to the details in the Handbook.

DISCUSS the challenges participants had with defining the numerator and denominator.

HIGHLIGHT that maternal mortality ratio has both a survey-based and HMIS-based indicator; **COMPARE** and **CONTRAST** as you go through the responses below.

ASK volunteers to provide their responses (one by one) for the following questions:

- Numerator
- Source of numerator
- Denominator
- Source of denominator
- Calculation
- Rationale
- Notes for interpretation

NOTE: Some participants may not know the data sources for the indicators.

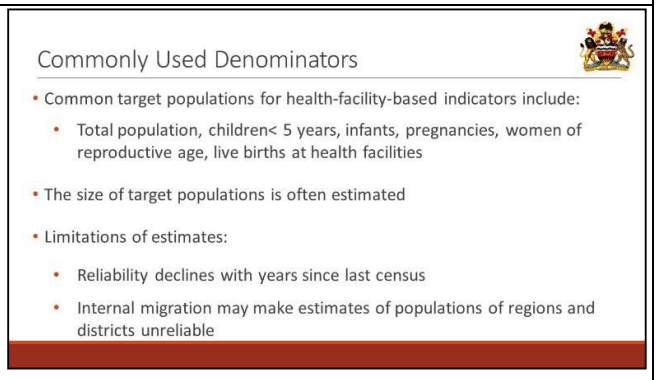
Slide 22

EXPLAIN that Malawi's National Health Indicators Handbook was updated in June 2018; it provides detailed information on each indicator, how it is calculated, and accompanying targets. These indicators support monitoring for the MOHP's five-year strategic plan, the HSSP.

The guide includes 110 national health indicators, which use both routine and non-routine data sources for greater opportunities to monitor progress.

At more than 100 pages, it was unrealistic to print for all participants. The document is available online; for more information, we highly recommended that you download a copy.

Slide 23



EXPLAIN that in all of the measures we look at, the numerator is the total that have the outcome of interest. It is, however, sometimes more difficult to decide on or estimate denominators.

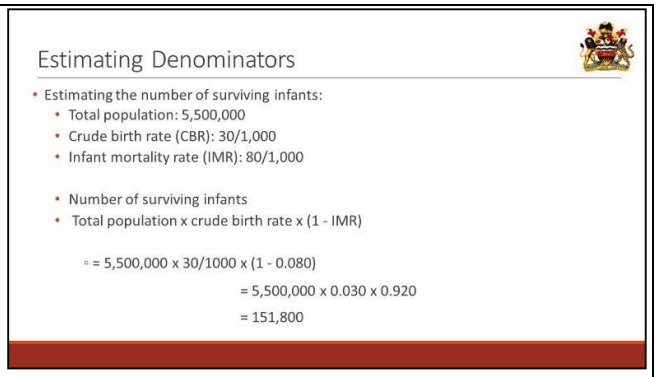
Estimates for target populations are often used—for example, projections or modelled estimates from the national population census.

Slide 24

GUIDE participants through the example.

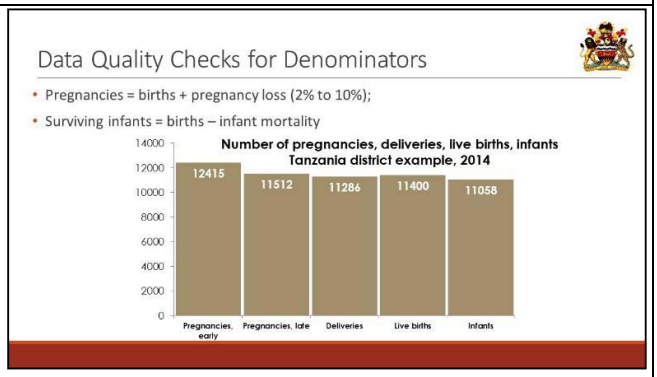
ENSURE that participants understand before moving on.

NOTE that an alternative method that is sometimes used to estimate the number of surviving infants is to make a projection based on the number of infants counted during the most recent census.



Slide 25

DISCUSS the following points:



- Estimates of pregnancies, deliveries, births, and surviving infants must be internally consistent. (**REMIND** participants what it means for data to be internally consistent).
- The denominators used to calculate coverage with ANC services, delivery at health facilities, and immunization must be internally consistent.
- Due to early pregnancy loss, the number of early pregnancies (e.g., if measuring coverage of ANC care before 12 weeks) should be about 10% greater than the number of births.
- Due to stillbirths, the number of late pregnancies (ANC care during the last 12 weeks) should be about 2% greater than the number of births.
- Due to births of twins, the number of deliveries may be 1% less than the number of births.
- Due to infant mortality, the number of surviving infants is less than the number of births.

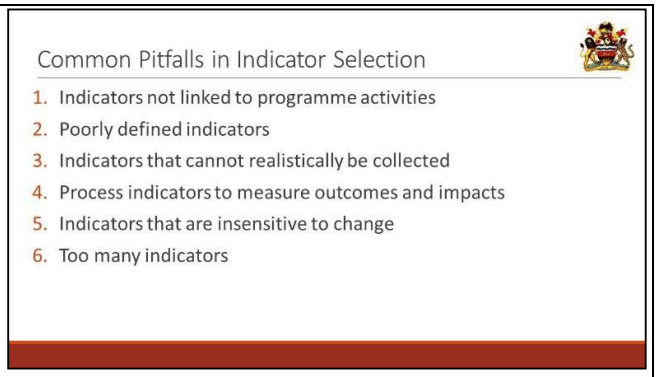
Regardless of what assumptions are made:

- Estimates of pregnancies, deliveries, births, and surviving infants must be consistent with one another.
- At the national level, no indicator should show coverage greater than 100%. (However, this does sometimes occur in border areas, when people from across the border access health services here.)
- You must describe your assumptions as part of the analytic report.

Trainer Instructions: Step 5 (10 minutes)

Use slide 26 and the facilitator notes to guide this step.

Slide 26



EXPLAIN: There are some common mistakes that people make when trying to create or select indicators. Often, indicators are not linked to programme activities, or are poorly defined. Selecting indicators that do not exist and cannot realistically be collected means that indicators will not be reported. Process indicators are sometimes used to measure outcomes and impacts. Some indicators are not very sensitive to change—for example, after prevalence becomes low, many measures of transmission intensity change very little. Probably the easiest pitfall to avoid is having too many indicators. Having too many indicators makes it difficult to collect high-quality data, and to interpret the data that you have.

ASK participants to identify the characteristic or characteristics (S, M, A, R, T) that are likely missing when making these common pitfalls.

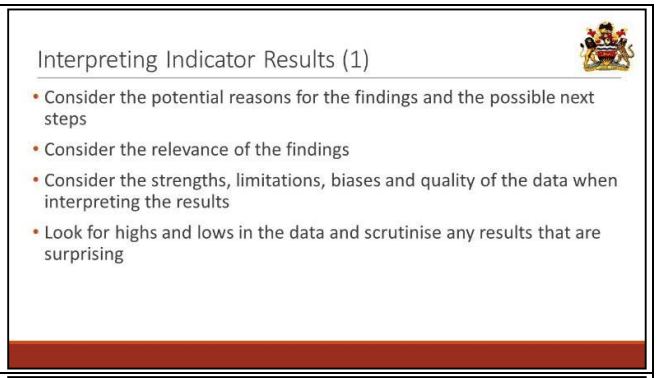
Possible answers include:

- *Indicators not linked to programme activities: not relevant, appropriate*
- *Poorly defined indicators: not specific*
- *Indicators that cannot realistically be collected: not realistic*
- *Process indicators to measure outcomes and impacts: not appropriate*
- *Indicators that are insensitive to change: not measurable, specific*
- *Too many indicators: not specific, relevant, realistic*

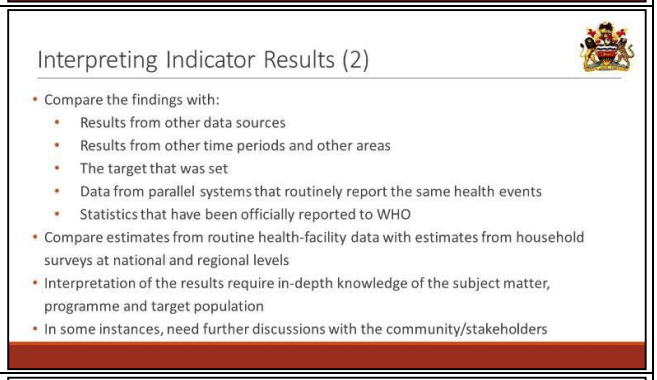
Trainer Instructions: Step 6 (20 minutes)

Use slides 27–31 and the facilitator notes to guide this step.

Slide 27

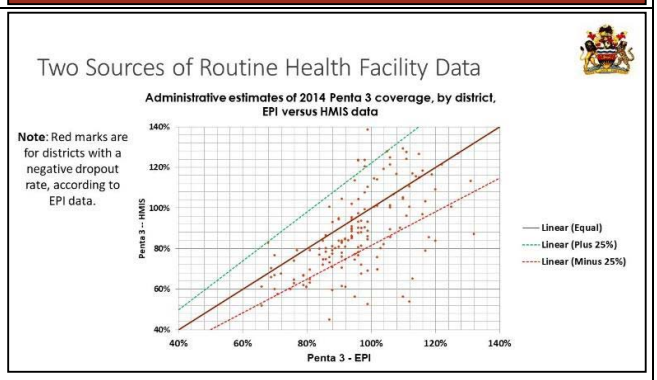


Slide 28



Slide 29

EXPLAIN that the graph in this slide compares data on Penta 3 coverage from the EPI programme against HMIS data. (Note that this is not real data, but created for this example). Each point represents one district.



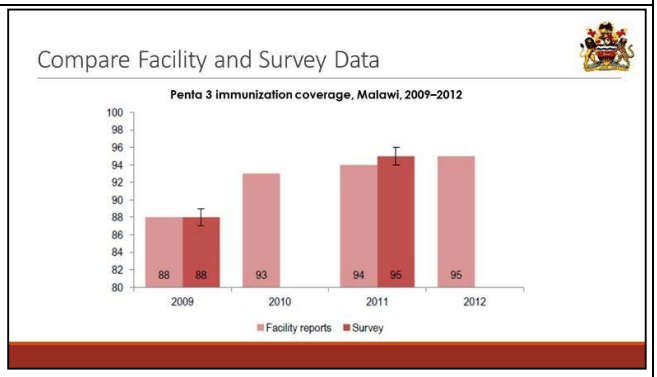
- The ideal would be good correlation between figures reported from both EPI and HMIS for each district.
- In points below the solid blue line, the results from EPI are greater than the data from HMIS.
- In points above the blue solid line, results from HMIS are greater than the EPI data.
- There is extremely poor correlation in all of the points above the green dashed line and below the red dashed line.

Another aspect that you can also look at in this graph is coverage figures above 100%. This could indicate a problem with an incorrectly estimated denominator, or a higher-than-expected numerator.

Note that, in this example, EPI data generally have higher coverage rates per district than HMIS data.

Slide 30

EXPLAIN that in this graph, we are comparing facility data to survey data. Note the colour code key.



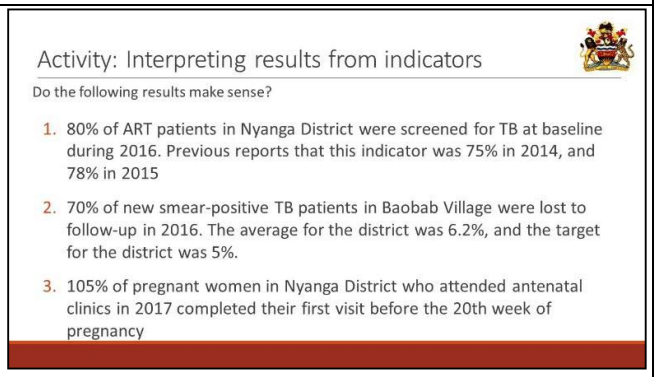
ASK participants: how would you describe the difference in data reported from these two sources? What conclusions might you draw from this?

EXPLAIN that in 2009, the coverage rates for DTP 3 in Tanzania were the same from both sources. In 2011, the survey reported higher coverage rates, but the lower confidence interval matches coverage reported by routine data in facilities. Overall, the graph shows an increasing trend for DTP 3 coverage and comparable results from routine and survey data. Because the data reported is comparable, it gives us confidence that the data are correct.

NOTE: In 2010 and 2012, survey data were not available.

Slide 31

ASK participants to work in groups of three or four to answer the questions on the slide.



GIVE them 5 minutes to complete, then **CALL ON** various participants to provide their responses and discuss their responses.

Answers:

1. *Yes, it does make sense.*
   The figure in 2016 follows the trend from previous years.
2. *Probably not. By looking at the district figure, we can see that the lost-to-follow-up rate in Baobab Village does not fit the data recorded in other parts of Nyanga District. Although levels can differ across locations, the difference between the district average of 6.2% and the 70% reported for Baobab Village is very large. Accordingly, the figure for Baobab Village should be investigated*.

3. *If we know that indicators should be less than or equal to 100%—because we are talking about a portion (numerator) of a specific population (denominator)—does the figure of 105% make sense? No! Indicators cannot be greater than 100%. When an indicator is reported as being greater than 100%, it is likely the result of either a calculation error, or a problem with the data used. For certain indicators, we must use a population estimate for the denominator, which is based on census data provided by a local statistics office. Sometimes, population estimates may under- or over-estimate the true population; this can result in indicator values greater than 100%.*

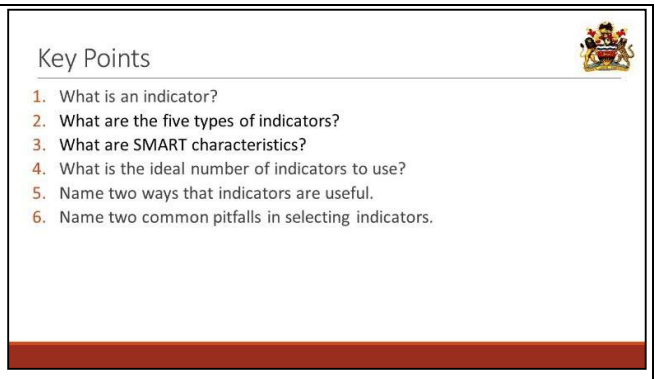
CLOSE the session with a summary of the key points on the next slide.

Trainer Instructions: Step 7 (5 minutes)

Use slide 32 and the facilitator notes to guide this step.

Slide 32

REVIEW the key points by asking the questions on the screen.



Answers:

1. *An indicator is a measure that helps quantify the achievement of a goal.*
2. *The five types of indicators are input, process, output, outcome and impact.*
3. *Specific, Measurable, Appropriate, Agreed Upon, Relevant, Realistic, Time-bound*
4. *Keep the number of indicators to the minimum that are necessary, and include only those needed for programme and management decisions or for reporting*
5. *Describe performance, achievement and accountability*
   Provide a reference point for planning, management, and reporting
   Allow managers to assess trends and identify problems
   Help monitor progress towards defined targets
   Act as early warning signals for corrective action
   Provide a yardstick to allow for comparisons
6. *Indicators not linked to programme activities*
   Poorly defined indicators
   Indicators that cannot realistically be collected
   Process indicators to measure outcomes and impacts
   Indicators that are insensitive to change
   Too many indicators

ASK participants if there are any questions before closing the session

Handout 6.4.1: Sample Indicators for Maternal, Child & Reproductive Health

INPUTS AND PROCESSES

Health financing
- expenditure per target population (children, women, etc.)

General government
- expenditure on health as a percentage of general government expenditure

Health workforce
- midwives, per 10 000 population

Governance
- presence of key policies to promote maternal and child health

Information
- births registered
- deaths registered (with cause)

OUTPUTS

Service access and readiness
- facilities that offer and meet tracer criteria for basic and comprehensive obstetric care, per 10 000 pregnant women
- caesarean section rate in rural populations
- facilities that offer and meet tracer criteria for child health services, per 1000 children

OUTCOMES

Coverage of interventions
- antenatal care
- births attended by skilled personnel
- immunization coverage
- family planning needs satisfied
- children with diarrhea receiving ORT
- children with fever receiving antimalarials
- insecticide-treated bednet use
- antiretroviral prophylaxis among HIV-positive pregnant women
- vitamin A supplementation among children
- postnatal care

Risk factors and behaviours
- contraceptive prevalence
- access to safe water
- access to improved sanitation
- low birth weight among newborns
- early initiation of breastfeeding
- children who are stunted or underweight

IMPACT

Health status
- under-5 mortality
- maternal mortality ratio
- child mortality by major cause of death, by sex and age

Financial risk protection
- out-of-pocket payments as a percentage of total health expenditure

Handout 6.4.2: Indicator Documentation Guide

Description of information included for each indicator

Unique Identifier (code)	All indicators will be assigned a code which references the programme.
Indicator name	A brief description of the indicator gives a general sense of what is being measured.
Indicator Definition	A detailed description of the indicator. After reading the definition, you should understand what the indicator is measuring and what units it uses (e.g. percent, per 1,000 live births).
Alignment (HSSP I; Global 100; SDG)	This indicates whether this indicator (or a similar one) was part of HSSP I, the WHO Global Reference List of 100 Core Health Indicators, or the Sustainable Development Goals.
Numerator	A detailed description of the numerator.
Numerator source (primary; reporting form)	Source of information for the numerator. If a survey, it should specify which one(s). If from the HMIS system, this will give both the register(s) and the reporting form(s).
Denominator	A detailed description of the denominator.
Denominator source	Source of information for the denominator.
Method of calculation	The simple description of the calculation used to produce the indicator.
Calculation (HMIS)	This is only relevant for indicators available in DHIS 2. This section states how the indicator should be calculated within DHIS 2. In many cases, there may be several data elements, stemming from parallel reporting systems, which could be chosen for each necessary variable within the calculation. This section will list the names of the preferred forms and data elements, providing consistent guidance to DHIS 2 programmers and stakeholders. This ensures indicators are programmed according to calculations, and with specific data elements, that are standard and transparent.
Lowest administrative level	This is the lowest administrative unit (health facility, district, region, national) recommended for disaggregation that should be measured as part of the national health indicator process. (Note that while facility-level data and disaggregation is possible for many coverage indicators, it may not be recommended for this process.)
Disaggregation	Aside from administrative level, how the indicator should be disaggregated, e.g. by age, by sex, etc.
Reporting frequency	The frequency with which the indicator should be measured as part of the national health indicator process. (Note: survey indicators cannot be measured more frequently than the survey is conducted; HMIS indicators may be collected monthly, but as part of the national health indicator process, it is recommended to report them annually unless there is clear reason to track them more frequently.)
Rationale	The reason this indicator is important to monitor.
Notes for interpretation	Provides information useful to understanding what the values of the indicator means. Includes quality issues and other potential biases. This is supplemented by general guidance on interpreting HMIS indicators.
Custodian of the indicator	Department or Programme responsible for the indicator. Although multiple departments/programmes may have an interest in, or contribute to, a specific indicator; the custodian has the overall responsibility to solicit feedback from all invested programmes and stakeholders and to coordinate their input, approve revisions to the indicator, and set targets. Other programmes may initiate changes through the custodian.
M&E framework level	Input, output, outcome or impact indicator.
Baseline / recent estimates	The most recent available data on an indicator. For indicators that have baseline values available from multiple sources, several sources are shown to provide more context.
Targets (2018; 2020; 2022)	Targets, set by the custodian, for the years 2018, 2020, and 2022, within HSSP II implementation. It is recommended that targets should be ambitious but achievable. *Some targets reported in the National Health Indicator handbook differ from those reported in the original HSSP II report due to updates available between the launch dates.

Handout 6.4.3: Indicator Documentation Template

Unique Identifier (Code)	
Indicator Name	
Indicator Definition	
Alignment (HSSP I; Global 100; SDG)	
Numerator	
Numerator Source (primary; reporting form)	
Denominator	
Denominator Source	
Method of Calculation	
Calculation (HMIS)	
Lowest Administrative Level	
Disaggregation	
Reporting Frequency	
Rationale	
Notes for Interpretation	
Custodian of the Indicator	
M&E Framework Level	
Baseline/Recent Estimates	
Targets (2018; 2020; 2022)	

Handout 6.4.4: Maternal Mortality Ratio

Unique Identifier (Code)	RHD01.2N
Indicator Name	Institutional Maternal Mortality Ratio (HMIS-based)
Indicator Definition	Number of maternal deaths from any cause related to or aggravated by pregnancy or its management during pregnancy or childbirth or within 42 days of termination of pregnancy, as recorded in facilities, per 100 000
Alignment (HSSP I; Global 100; SDG)	Yes; Yes; Yes
Numerator	Number of maternal deaths in health facilities/institutions
Numerator source (primary; reporting form)	Maternity Register, Gynaecology Register; Maternity Clinic Monthly Report, Gynaecology Report, Maternal Death Surveillance and Response (MDSR) Report
Denominator	Number of live births in health facilities/institutions.
Denominator Source	Maternity Clinic Monthly Report
Method of Calculation	Numerator/Denominator* 100,000
Calculation (HMIS)	*Numerator*: Maternity Monthly Report ("RHD MAT Maternal Deaths") *Denominator*: Maternity Monthly Report ("RHD MAT Survival/Survival Alive not HIV exp" + "RHD MAT Survival/Survival Alive Exp No NVP" + "RHD MAT Survival/Survival Alive NVP Started" + "RHD MAT Survival/Survival Alive unknown Exp" + "RHD MAT Survival/Survival Alive Neonatal death") OR *Denominator*: HMIS 15 ("HMIS Total # of Live births") + HMIS 17 ("HMIS 17 Live Births") (Note: This data is also available through MDSR, IDSR, and the Maternal and Neonatal Death Report. Data should be triangulated on a regular basis)
Lowest Administrative Level	District
Disaggregation	Primary Complication
Reporting Frequency	Annual
Rationale	Complications during pregnancy and childbirth are a leading cause of death and disability among women of reproductive age in Malawi. This indicator monitors deaths related to pregnancy and childbirth that occur within facilities. This is both a proxy measure for the national maternal mortality ratio and reflects the capacity of the health system to provide effective and quality health care in preventing maternal deaths.

Notes for Interpretation	As a facility-based measure, this will underestimate maternal deaths, given that many that occur during pregnancy or postpartum may take place at home or outside maternity wards. It is also important to note other data sources capturing maternal deaths, such as MDSR and maternal death notification forms, and to use these sources to verify data coming from the maternity register. The denominator, total live births, means that mothers who die during pregnancy or during/after the birth of a stillborn child will not be included in the denominator. This may lead to an overestimation of the maternal death rate. Some comparable indicators may use total deliveries. While global definitions of maternal mortality do not consider deaths from accidental or incidental causes to be maternal deaths, the HMIS system does not differentiate between true pregnancy-related deaths and deaths from accidents or injuries. As the civil registration system develops, this will become an ideal source of this indicator. Central Hospital Data (HMIS 17) currently limited within DHIS2. Deliveries in private clinics not captured in DHIS may alter estimates.* *See General Guidelines
Custodian of the Indicator	Reproductive Health Department
M&E Framework Level	Outcome
Baseline/Recent Estimates	311 per 100,000 (DHIS2, 2015; Maternity data set at 95.6% reporting rate)
Targets (2018; 2020; 2022)	Targets have not been defined. Targets may be defined in the future.

Session 6.5

Session 6.5: Information Products, Dissemination, and Use

Time: 350 minutes

Learning Objectives

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

1. Discuss the role of data visualization in decision making
2. Distinguish between the main types of data visualization
3. List the factors involved in choosing which type of data visualization to use
4. Describe design principles that contribute to effective data visualization
5. Describe two types of information products used for decision making
6. Identify decisions that can be made using information products from different e-HIS software
7. Assess different information needs
8. Determine the appropriate information product to use
9. Access and generate different information products using e-HIS software

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Facilitator presentation	Review (slides 4–7)	Flip chart, markers, tape, LCD
3	75 minutes	Interactive lecture, practical application, individual activity	Types of Data Visualizations and Their Use (slides 8-–35)	Flip chart, markers, tape, LCD, Handout 6.5.1, Handout 6.5.2
4	45 minutes	Interactive lecture, individual activity	Design Principles (slides 36–52)	Flip chart, markers, tape, LCD, Handout 6.5.3
5	15 minutes	Interactive lecture	Maps (slides 53–58)	Flip chart, markers, tape, LCD
6	55 minutes	Interactive lecture, practical application, case studies, demonstration	Reports (slides 59–67)	Flip chart, markers, tape, LCD
7	120 minutes	Interactive lecture, discussion,	Dashboards (slides 68–80)	Flip chart, markers, tape, LCD, Handout 6.5.4, Handout 6.5.5, Handout 6.5.6

Step	Time	Method	Content	Resources
8	5 minutes	Facilitator presentation	Key points (slide 81)	LCD

Resources Needed

- Flip chart, paper, marker, and tape
- LCD or overhead projector

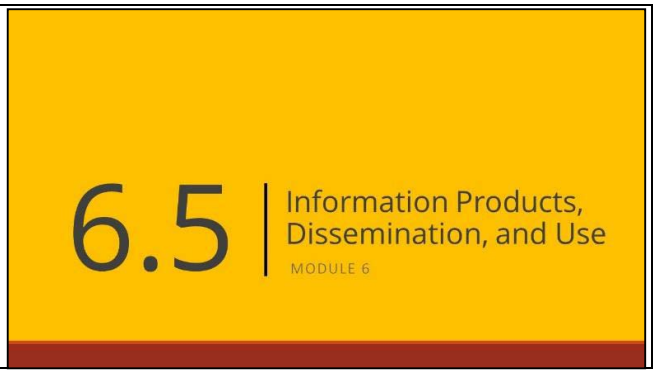
Handouts

- Handout 6.5.1: Types of Charts
- Handout 6.5.2: Creating Graphs and Charts
- Handout 6.5.3: Using Design Principles with Graphs
- Handout 6.5.4: e-HIS Reports and Dashboards
- Handout 6.5.5: Pivot Tables and Charts in DHIS2
- Handout 6.5.6: Case Study: Using Reports and Dashboards

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2

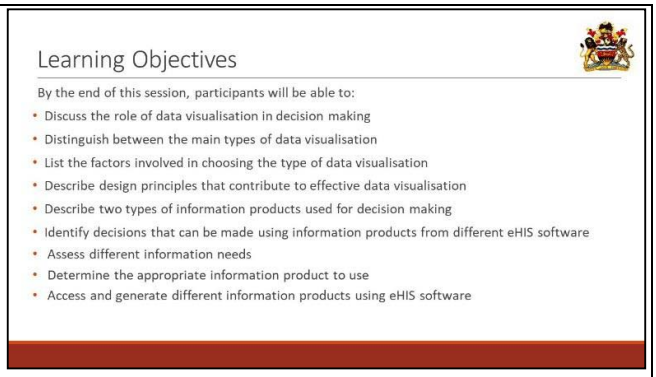


Slide 3

REVIEW the learning objectives for this session.

EXPLAIN that this session will focus on three aspects of information products, dissemination, and use:

1. Data visualization
2. Reports
3. Dashboards



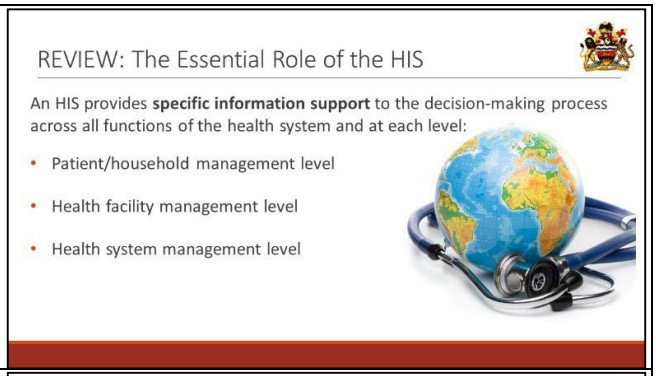
HIGHLIGHT that the session will include practical activities for creating data visualizations—both by hand and by using the electronic HIS software that participants used earlier in the training (specifically the EMR and DHIS2)

Trainer Instructions: Step 2 (10 minutes)

Use slides 4-7 and the facilitator notes to guide this step.

Slide 4

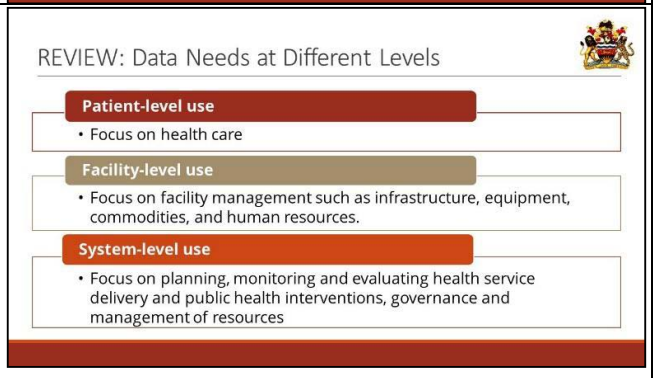
RECALL that this course began with the essential role of the HIS in the health system: to provide specific information support for decision making at each level of the health system.



Slide 5

REMIND participants that data from different sources are used for multiple purposes at different levels of the health system.

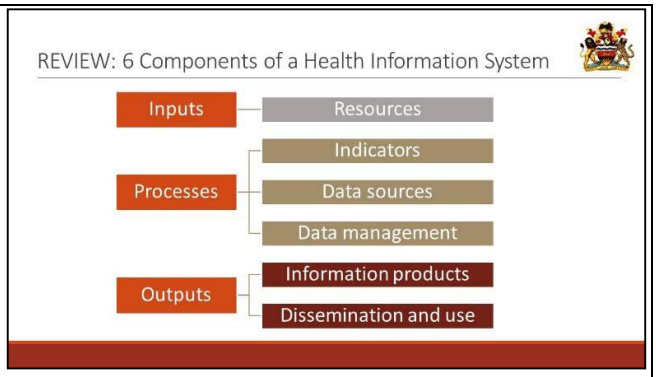
EMPHASIZE that the more data are used at lower levels of the system, the better the quality of the entire HIS, which in turn leads to better outcomes for the health system as a whole.



EMPHASIZE that different levels of the health system make different decisions, and therefore have different information needs.

Slide 6

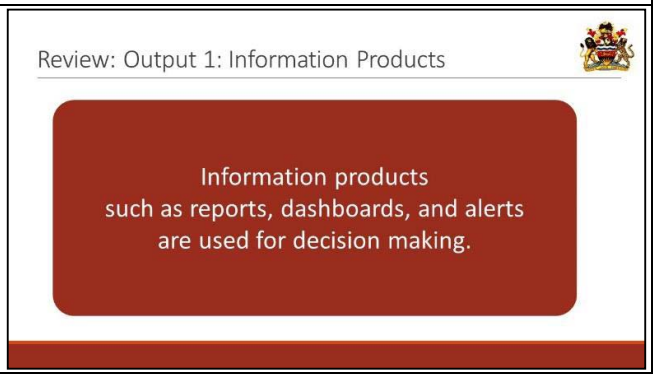
EXPLAIN that at this point in the training, participants have already learnt about the inputs and processes shown here on the slide. This module has looked at indicators, data sources, and how data analysis provides information that can be used.



EXPLAIN that this session will look closely at the **INFORMATION PRODUCTS** from some of the electronic HIS systems that were introduced in Module 4. This session will look at how these information products can be presented and disseminated for use.

Slide 7

EXPLAIN that information products are an output of the HIS. The results of transforming data into information are compiled into reports, dashboards, and alerts that can be used for decision making to improve health care.

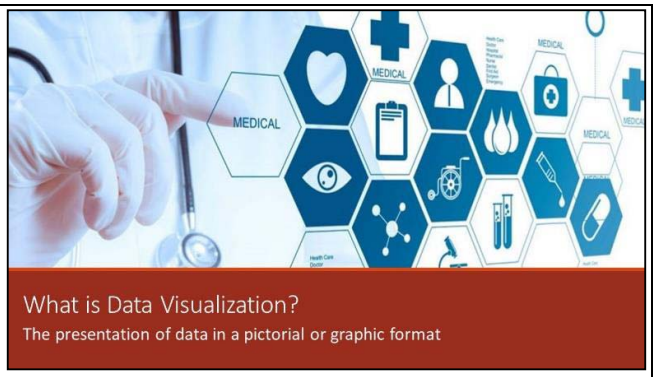


Trainer Instructions: Step 3 (75 minutes)

Use slides 8–35 and the facilitator notes to guide this step.

Slide 8

EXPLAIN that data visualization is a way of making data more accessible to decision makers. Examples of data visualization include charts and graphs. These can be included in reports or as part of a dashboard.



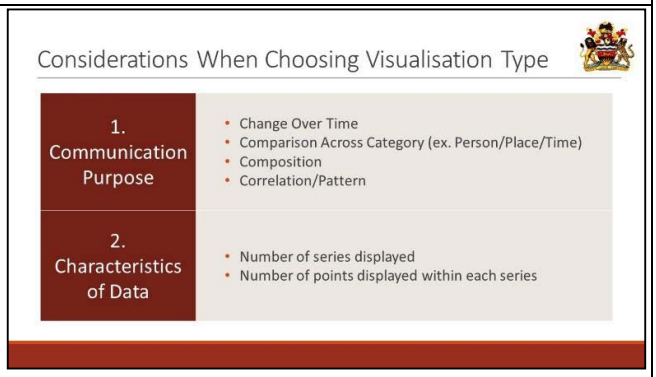
EXPLAIN that using electronic systems, such as DHIS2 and the EMR that we looked at earlier in this training, makes creating data visualizations easy.

ASK participants why would we choose to present data in a pictorial or graphic format instead of using words?

ALLOW a brief discussion, and then **EXPLAIN** that the human brain processes information faster when looking at charts and graphs than when reading long spreadsheets or reports. Your choice of visualization to get your message across can be a powerful tool. The next part of this session will look at how to choose the best way to visualize data, based on the data you have.

Slide 9

EXPLAIN that there are two key considerations for choosing a type of visualization: the purpose behind the communication, and the characteristics of the data.



Communication has four basic purposes:

- **Change**: creating growth/decline in values for different times/age periods
- **Comparison**: showing differences in values based on a categorical breakdown
- **Composition**: deconstructing a total into subgroups
- **Correlation**: showing the relationship between different variables

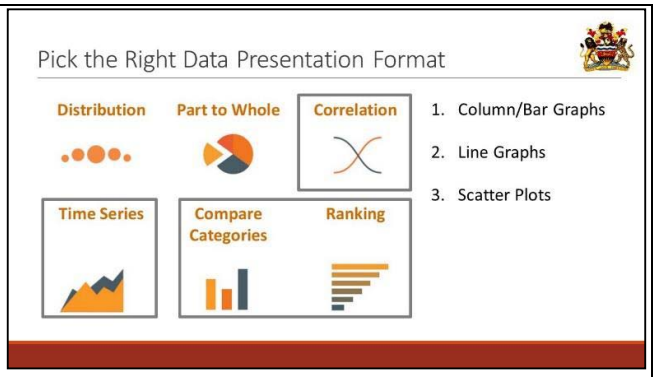
The number of series and points per series will influence the type of graph you select or how you present a graph. These concepts can be difficult to understand, but we will go through them in detail, using examples. What constitutes a 'good' visualization type also depends on the type of data being displayed. What may be effective for showing three data points may not be effective for showing 30.

Slide 10

NOTE: This slide is animated.

GIVE an overview of the different types of charts that can be used to present data.

REFER participants to **Handout 6.5.1: Types of Charts,** which provides descriptions of the different types of graphs.



HIGHLIGHT that in this session we will focus on the main four or five types of graphs that are used most.

CLICK on the slide to **HIGHLIGHT** that we will focus on *Column/Bar Graphs* that compare categories and ranking.

CLICK again on the slide to **HIGHLIGHT** the focus on *Line Graphs* to show changes over time.

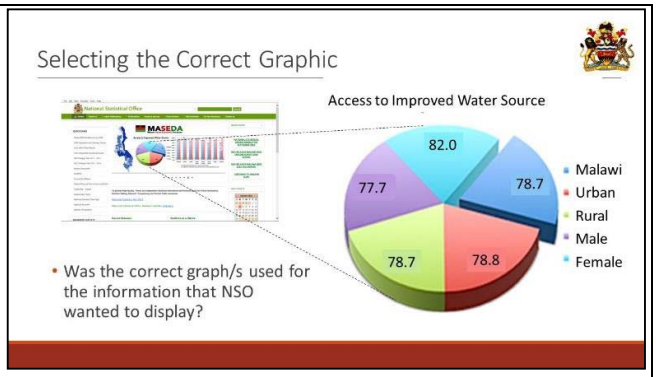
CLICK again to **HIGHLIGHT** the focus on *Scatter Plots* to show relationships or correlations between two different things.

Slide 11

EXPLAIN that this is an example of a pie chart from the homepage of the National Statistical Office website on 4 January 2016.

ASK participants to interpret the pie chart.

ASK: Was the correct graph(s) used for the information that the NSO wanted to display?



Answers:

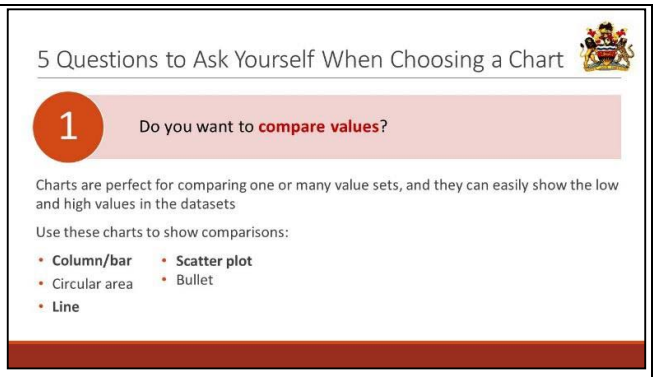
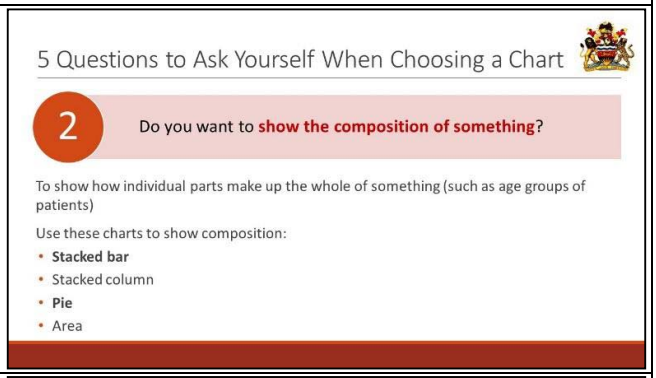
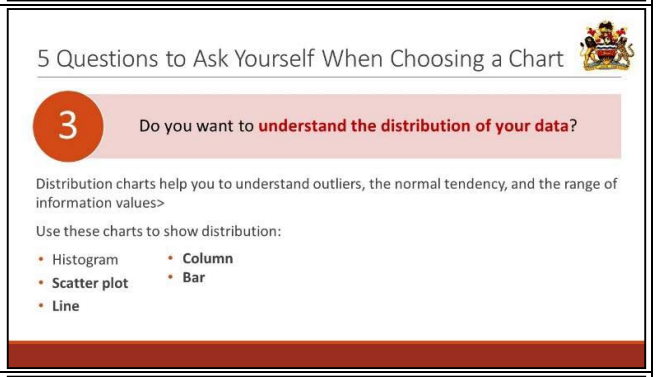
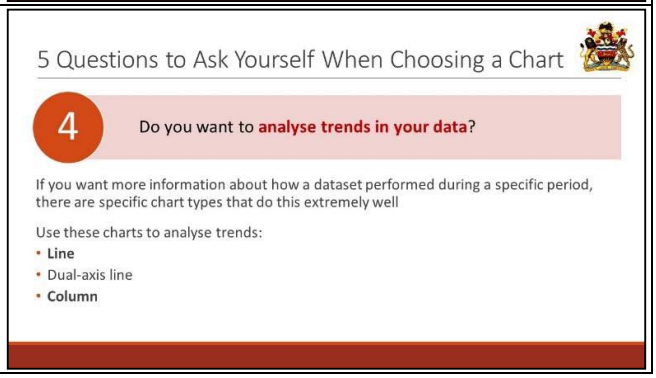
- *A general rule is that the sum of any pie chart 'slices' should be 100%. The pie represents the WHOLE; the objective of a pie chart is to identify the parts of the whole.*
- *In this pie chart, they're graphing the percentage of 1) Malawi, 2) urban, 3) rural, 4) males and 5) females, that have access to improved water sources—but this information does not belong in a pie chart.*
- *First, with about 80% of each group having access to water, all you see is five equally sized 'pieces' of pie—not informative.*
- *Second, the sum of the five pieces comes to around 420%—further evidence this is not pie chart material.*
- *Lastly, these groups are not even unique—they overlap—so you have the same people represented by more than one piece of the pie (e.g., women who live in urban areas, which are also a part of Malawi), meaning the essence of the 'whole' is lost.*

ASK: How might you make a pie chart on this topic of Access to Improved Water Sources?

Answer:
If participants wanted to make a pie chart on this topic, one good idea would be to graph the following:

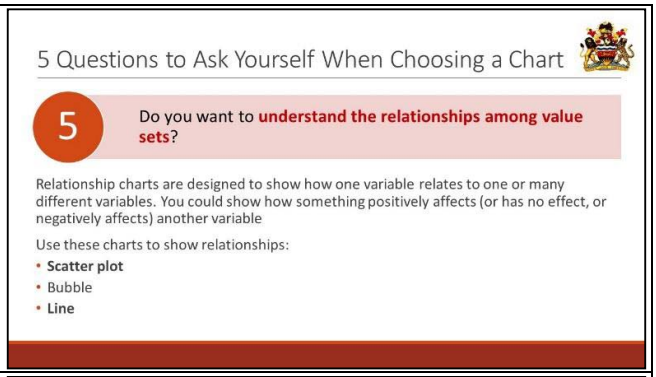
1) *Percentage of those with access to improved water sources only*
2) *Percentage of those with access to improved sanitation sources only*
3) *Percentage of those with access to both improved water and sanitation sources*
4) *Percentage of those with access to neither improved water nor improved sanitation sources*

EXPLAIN First, you'll see that these groups are unique—nobody would be captured in more than one group—and therefore the sum of these percentages would be 100, making this appropriate for a pie chart. And, because it's unlikely that each group would account for around 25%, it would make for an interesting and informative graphic.

Slide 12	**EMPHASIZE** that it is important to carefully choose the graphic to use. **EXPLAIN** that five questions can be used to help choose the right graph or chart your data and purpose. **USE** this slide and the following four slides to review these questions.	
Slide 13		
Slide 14		
Slide 15		

Slide 16

EXPLAIN that now we will look at a few of the key graphs in more detail.

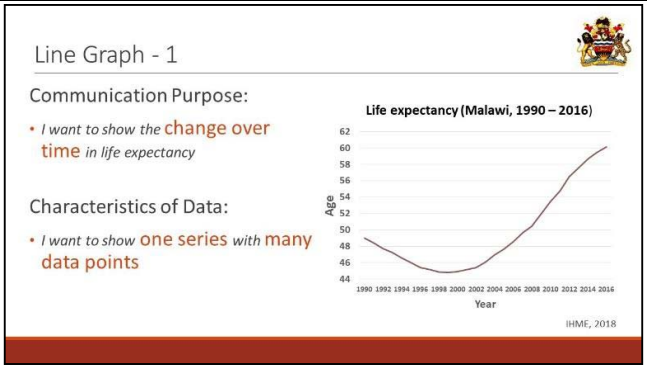


Slide 17

NOTE: This slide is animated.

EXPLAIN that now we will look at some common graphs and charts in greater detail.

REFER participants to page three of **Handout 6.5.1: Types of Charts**. This handout includes the graphs and charts shown on these slides.



EXPLAIN that line charts are best used to show change(s) in value(s) over time. In this case, we want to look at the change in life expectancy over time. In addition, we will how only one series of data (e.g., for one country), but for many points of time.

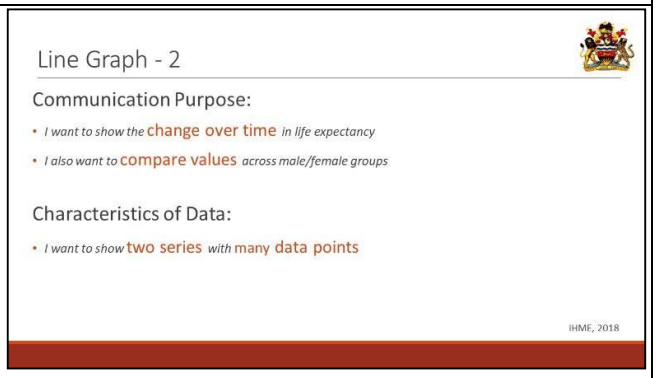
ASK if there are any questions before moving on.

Slide 18

NOTE: This slide is animated.

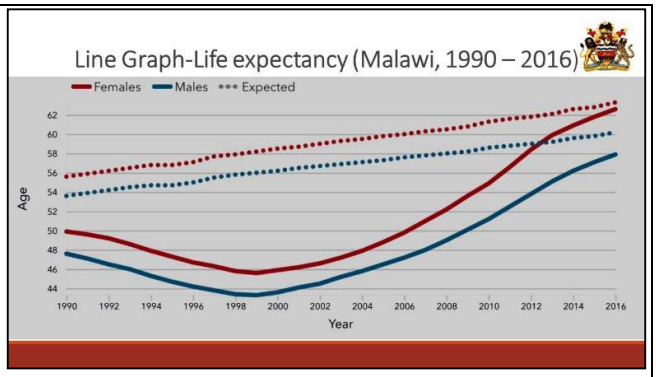
EXPLAIN that this time we want to not only show change over time in life expectancy, but also to compare it across different sex groups (male and female).

ASK: Does showing more than one series change the type of chart you would select?



Slide 19

CLICK and **EXPLAIN** that this graph shows the changes in life expectancy for males and females in Malawi from 1990 to 2016.



ASK participants to interpret the graph.

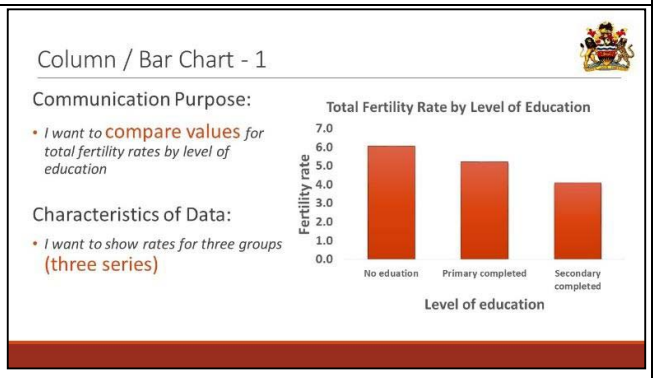
Answer: *Life expectancy for both males and females declined from 1990 to 1999, and then increased thereafter. Female life expectancy was higher throughout, with the gap getting slightly bigger from 2012 on.*

ASK if there are any questions before moving on.

Slide 20

NOTE: This slide is animated.

EXPLAIN that column and bar charts are most effective for comparing across groups.



CLICK and **EXPLAIN** that in this case, we want to compare total fertility rates for women by level of education: no education, primary education, and secondary education.

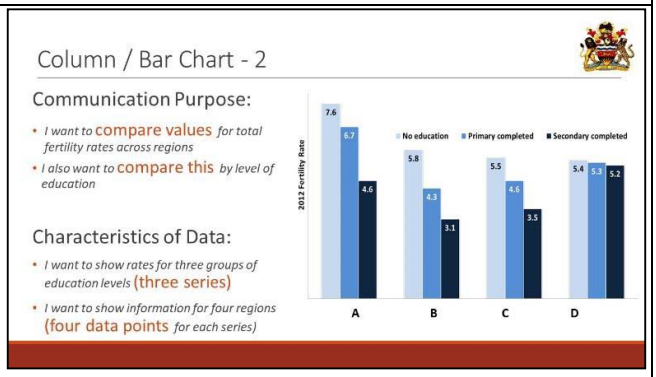
ASK participants to interpret the graph.

Answer: *The fertility rate decreases as level of education increases.*

NOTE that a **column chart** may also be called a **vertical bar chart** (with a bar chart referred to as a **horizontal bar chart**). ['Column' and 'bar' are the names used by Microsoft Excel.]

Slide 21

EXPLAIN that here we want to look at how total fertility rates differ by region. In this bar chart, the four regions are labelled A, B, C, and D.



NOTE that when creating bar charts, this is probably the maximum number of groups you should compare. This graph compares fertility rates across regions and education levels.

ASK participants to interpret the graph.

Answer:

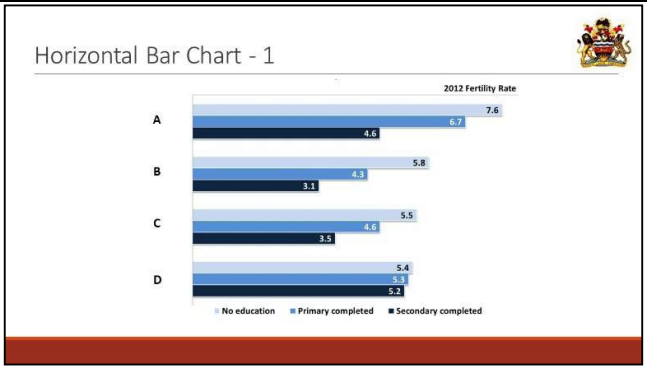
- *The total fertility rate is highest among those with no education, and lowest among those with secondary education.*
- *However, the difference is very small in region D.*
- *The difference in fertility rates between those with no education and those with primary education was greatest in region B.*
- *The difference in fertility rates between those with primary education and those with secondary education was greatest in region A.*
- *The fertility rate was highest among those with no education in region A, and lowest among those with secondary education in region B.*

ASK: Now that we understand the information that this graph is conveying, what would you want to explore next to learn more about the issue of fertility in these regions?

Answers may include*: Other factors that may contribute to the differences in fertility rates by level of education in these regions.*

Slide 22

EXPLAIN that we can show similar information in a horizontal bar chart.



ASK: Is it easier or harder to see the pattern across education levels in the column chart or in the bar chart?

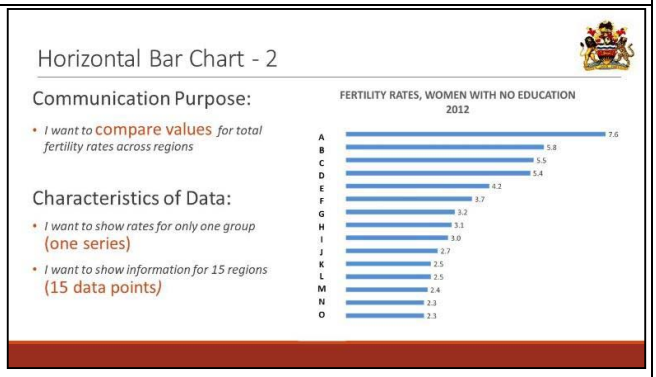
NOTE:

- Column and bar charts show comparisons across categories, looking for either 'equal' or 'unequal' results.
- Pattern recognition is easier when we are scanning from left to right (as in the column chart) than when we are scanning from top to bottom (as in the bar chart).

Slide 23

NOTE: This slide is animated.

EXPLAIN that this time, instead of comparing fertility rates across four regions (and three levels of education), we want to show data for 15 regions, but only one series within the region.



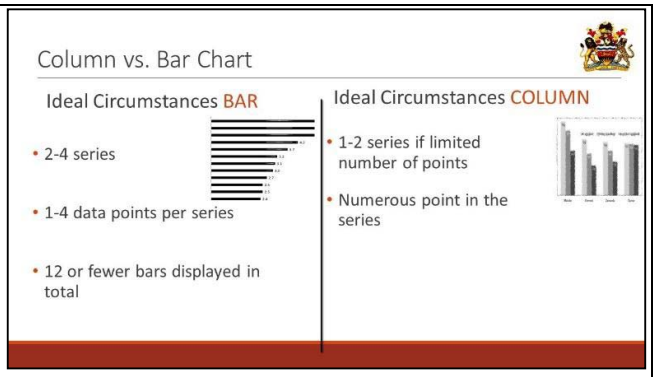
CLICK and **EXPLAIN** that a horizontal bar chart is a better choice than a column [vertical bar] chart for showing rankings of a longer list of items.

NOTE that to make the comparison clearer, it is useful to organize the regions in order from highest value to lowest.

Slide 24

EXPLAIN that although there are clear situations where one format should be the preferred visualization type, there are other circumstances in which neither may be ideal.

EMPHASIZE that exploring different formats to display the same data is often necessary before the best option can be determined.

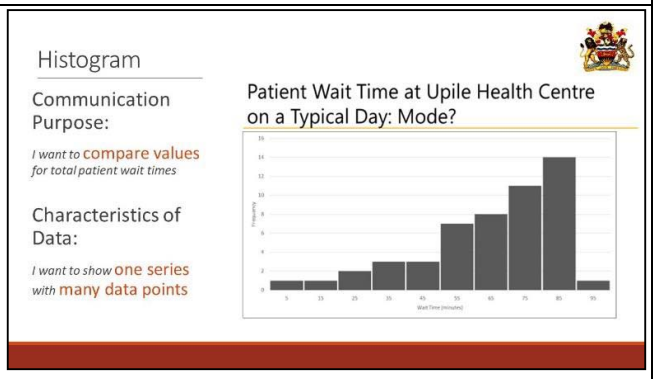


Slide 25

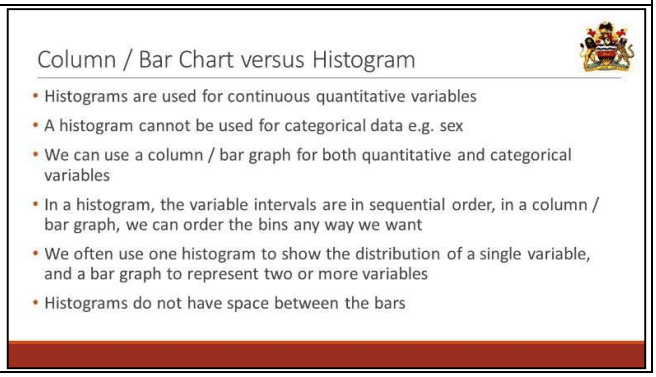
NOTE: This slide is animated.

CLICK and **EXPLAIN** that histograms are typically used for moderate-to-large data sets. The values are divided into **intervals**, or **bins**.

The vertical axis shows either frequency (the specific count of observations) or relative frequency (percentage or proportion of observations).



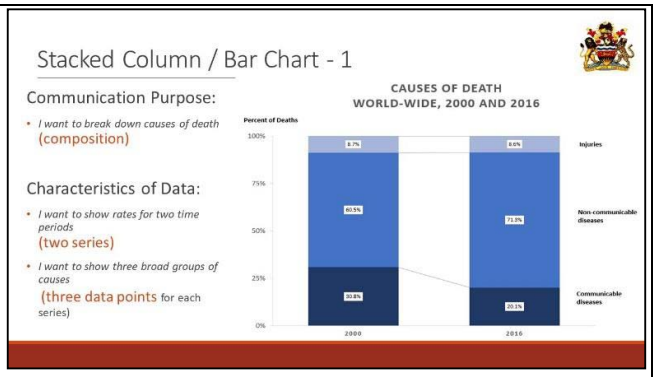
Slide 26



Slide 27

NOTE: This slide is animated.

CLICK and **EXPLAIN** that a stacked bar or column chart is ideal for showing the composition of something—in this case, a breakdown of causes of death. Here we want to compare the composition (broken into three broad cause-of-death categories) across two time periods.



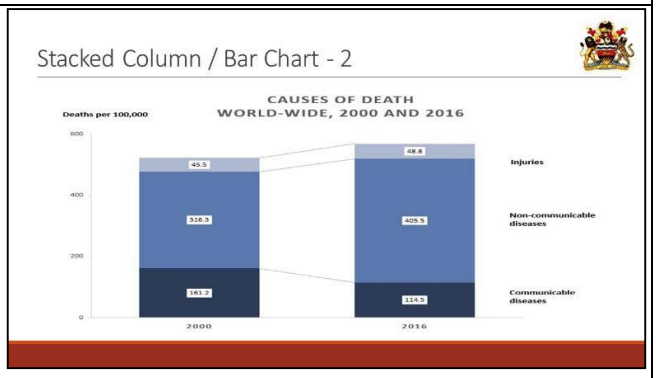
NOTE that this chart shows the change over time in causes of death globally. Each stacked bar adds up to 100%, with the different causes of death occupying the corresponding percentage of the bar.

ASK: What do you learn from this graph? What is missing?

Answer: *From 2000 to 2016, NCDs are responsible for a greater proportion of deaths worldwide, while the percentage of deaths due to injuries and communicable disease have declined. Participants may come up with a number of things that are missing from the graph—e.g., no breakdown of information by sex—all of which may be correct. One of the key pieces of information that is missing in this form of graph is that the mortality rate cannot be ascertained.*

Slide 28

EXPLAIN that another type of stacked column chart adds up to the total number of deaths rather than to 100%.



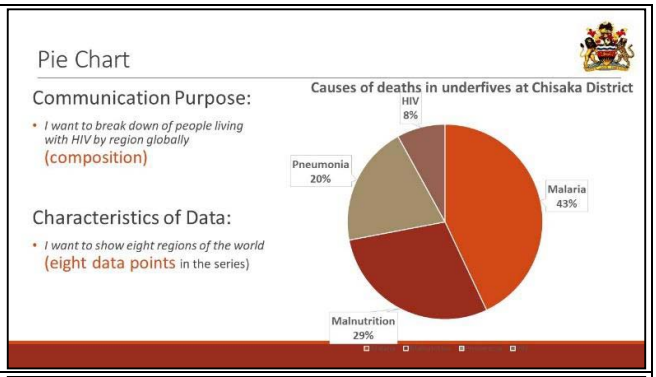
ASK: In addition to displaying the relative proportion of deaths by cause, what other findings can be derived from the second version?

ASK: In what circumstances would you want to use the 100% chart? The chart showing actual values?

- *If composition is the main purpose plus relatively small differences in actual value → 100% chart*
- *If major changes in actual values are essential to understand differences in composition → value chart*

Slide 29

EXPLAIN that pie charts are circular statistical graphs that are divided into slices to illustrate numerical proportion. Pie charts are the best choice when you are trying to compare parts of a whole; they do not show changes over time.



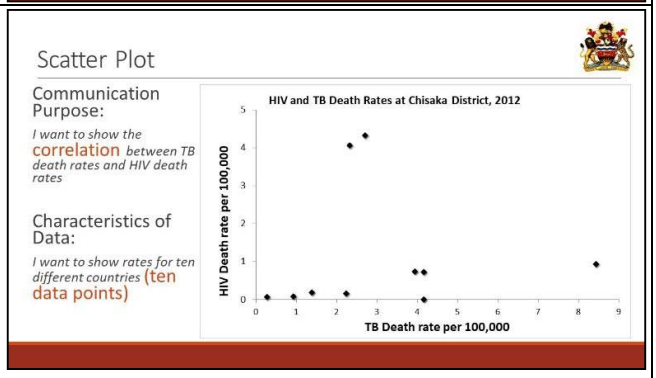
Slide 30

NOTE: This slide is animated.

EXPLAIN that scatter plots are best used to showing correlations between two variables.

NOTE that a **scatter plot** may also be called an **XY chart**.

CLICK and **EXPLAIN** that in this example, we are showing the correlation between death rates of two diseases (TB and HIV) that are often linked. For each dot, the x value is the TB death rate, and the Y value is the HIV death rate. We plan to look at data for 10 different countries (if you have only a few data points, a scatter plot is not very useful).



NOTE that it may be more useful to look at the correlation between death rates and data from non-vital statistics data sources such as risk factors, etc.

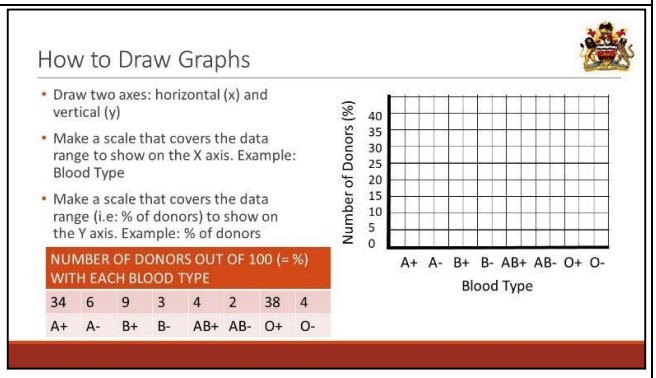
ASK: Based on this graph, do you think there is a robust relationship between TB and HIV death rates in eastern Europe?

Answer: *No.*

Slide 31

NOTE: This slide and the following two slides are animated. The animations simulate the steps for drawing a graph.

EXPLAIN that it is easier to understand a graph once you have created one yourself.



EXPLAIN that computer software programs like Excel and the other e-HIS we saw earlier produce graphs automatically. We will see how those work later in the session. For now, we will go through how to manually create a graph.

EXPLAIN that we are going to use the data on blood donors that is provided on the table displayed here.

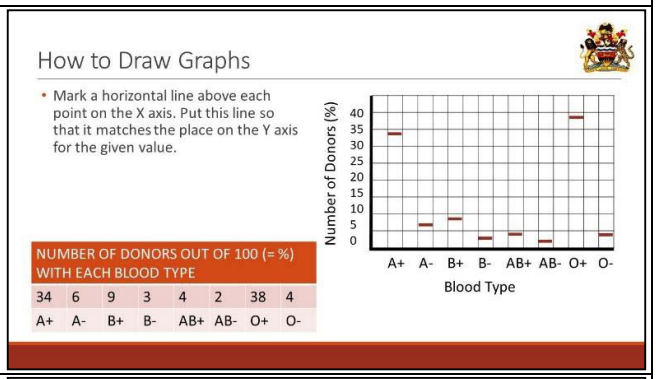
REVIEW the steps for making a graph as shown on the slide.

CLICK after each step to have the X axis, Y axis, and scales for each axis appear.

Slide 32

CONTINUE to review the steps for making a graph as shown on the slide.

CLICK to show how to make horizontal marks for each data point provided in the table. Each **CLICK** will display a mark.

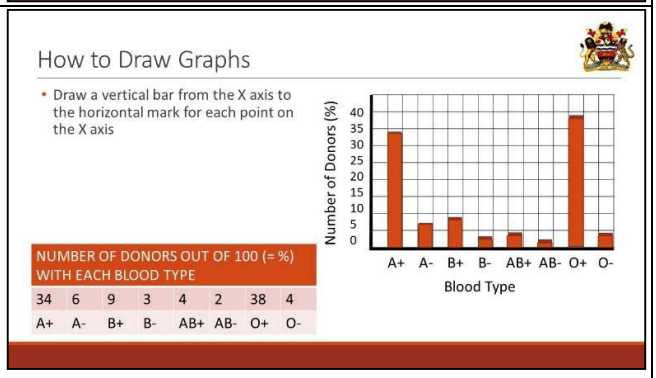


Slide 33

CONTINUE to review the steps for making a graph as shown on the slide.

CLICK to show how to fill vertical bars up to the horizontal marks for each data point provided in the table. Each **CLICK** will display a vertical bar.

ASK participants if they have any questions about making a bar graph.

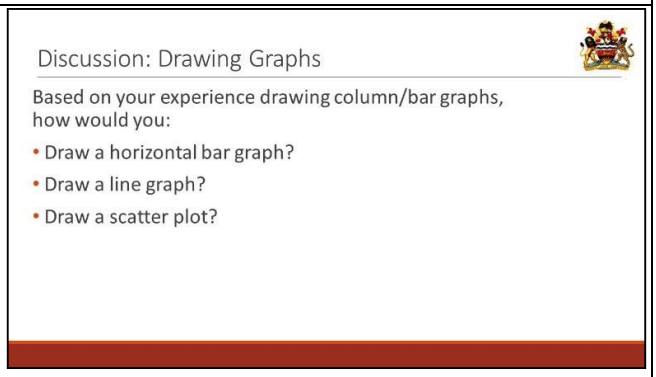


Slide 34

ASK: How would you draw a horizontal bar graph?

Answers:

- *Choose different axes*
- *Plot vertical marks instead of horizontal ones*
- Fill horizontal bars instead of vertical bars



ASK: What would you do differently if you wanted to draw a line graph?

Answers:

- *Use a circular mark instead of a horizontal line to plot each data point.*
- *Join each mark using a line instead of drawing a vertical or horizontal bar.*

ASK what about a scatter plot?

Answers:

- *Mark each of your data points.*
- *Once you have marked your data points, you can decide if you want to also draw a 'line of best fit'*
- *Use a ruler or other straight edge and find the line that is as close as possible to all points. You want to have as many points above the line as below.*

Slide 35

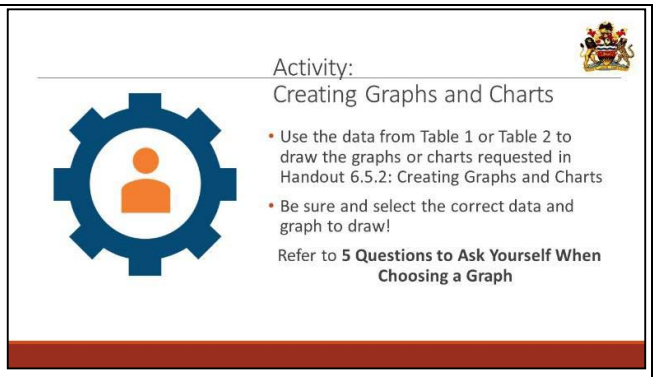
15 minutes

EXPLAIN that participants will now have an opportunity to draw their own graphs or charts.

REFER participants to **Handout 6.5.2: Creating Graphs and Charts**.

REVIEW the instructions.

ASK if participants have any questions.



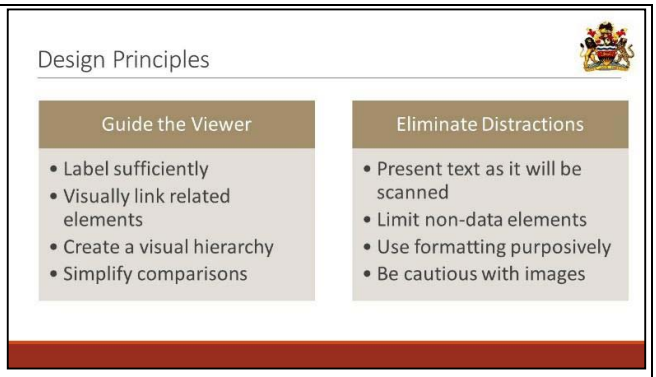
GIVE participants 20 minutes to complete the exercise. **MONITOR** their progress.

Trainer Instructions: Step 4 (45 minutes)

Use slides 36–52 and the facilitator notes to guide this step.

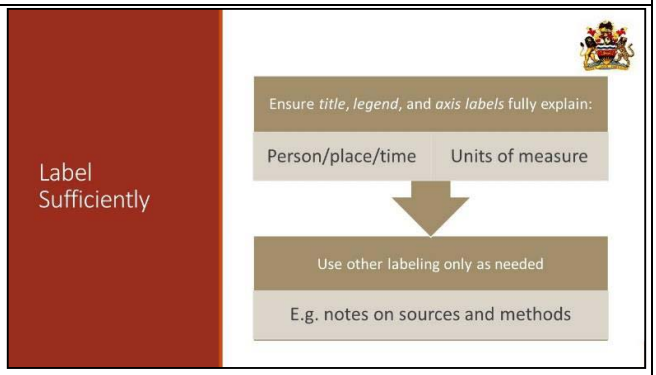
Slide 36

EXPLAIN: Now that you know how to choose the type of visualization that will best convey your message, we will consider some of the design principles that apply to all types of data visualization. By actively guiding the viewer, a designer can help the viewer see the message the designer wants to emphasize. By eliminating distractions (unnecessary information), a designer can keep the viewer's focus on the intended message.



Slide 37

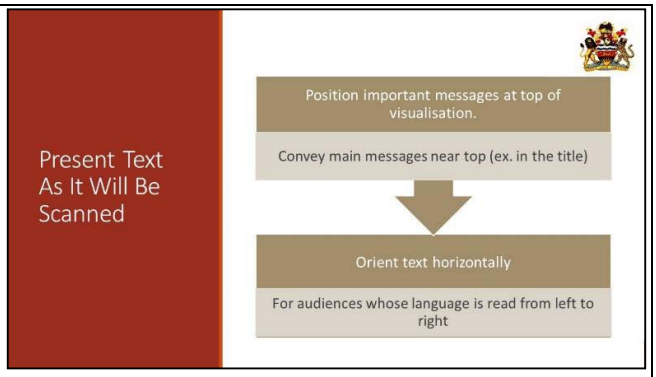
EXPLAIN that the main text elements (title, legend, and axis labels) should provide enough information for the viewer to interpret the content of the visualization.



- It is not necessary to repeat information. For example, if a title already includes a unit of measure, then the axis does not need to be labelled with that unit.
- Obvious elements, such as years, do not need labels.
- 'Sufficient' is a subjective term; visualization should provide information based on the intended audience's definition of 'sufficiency'.

Slide 38

EXPLAIN that as viewers read through, or scan, a document, they pay more attention to the top of a page, and lose focus as they scan farther down.



ASK: How, then, might you ensure that the viewer receives the most important message?

Answer: *Put the most important message towards the top—for example, directly in the title.*

ASK: When you scan or read a page, do you do so from right to left or left to right?

Answer: *In Malawi, most people read from left to right.*

ASK: Then what else might you do to ensure that a viewer received the most important message?

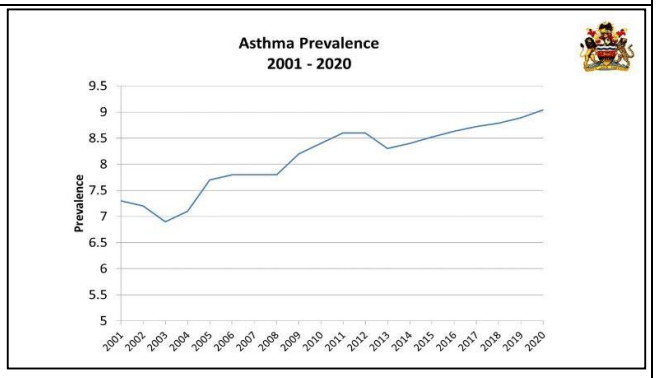
Answer: *Orient the text from left to right.*

Slide 39

ASK: Is what is being displayed in this visualization clear? If not, what is unclear?

ASK: Are certain data points 'different' than other data points? Does the visual display illustrate the fact that some data points are related to each other?

ASK: Are the text elements of this visualization presented effectively?

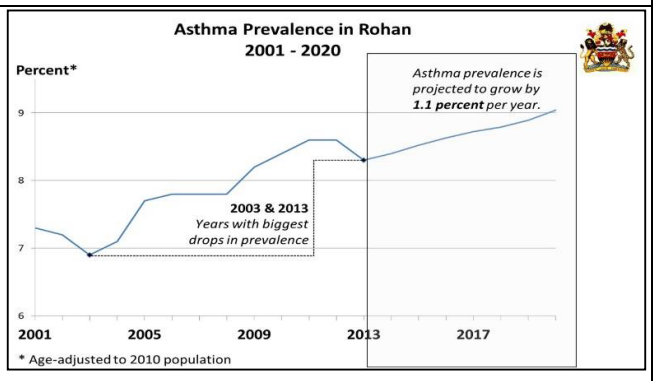


Slide 40

EXPLAIN that this another version of the same graph.

ASK: Do you think this version is clearer? Why or why not?

Note that some participants may not agree.

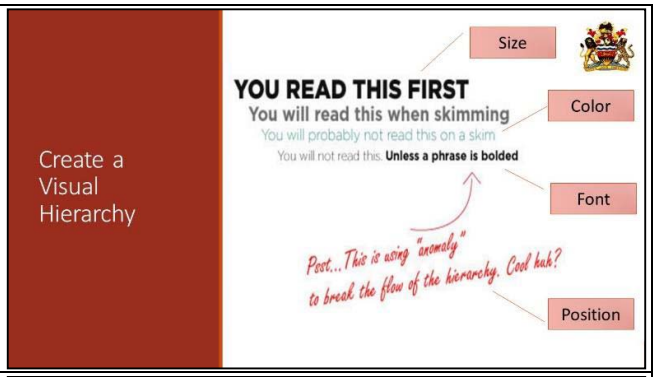


EXPLAIN: In this graph we have made a lot of changes to the graph from the previous slide:

- Prevalence is more specifically defined as percentage.
- The location is included in the title.
- Future data points are grouped.
- Key findings are highlighted.
- The orientation of labels has been shifted.

Slide 41

EXPLAIN that some format choices—particularly size, colour, font, and position—cause some elements to 'pop' more than others. Hierarchy does not apply only to text. Format choices also can create a hierarchy of data elements.

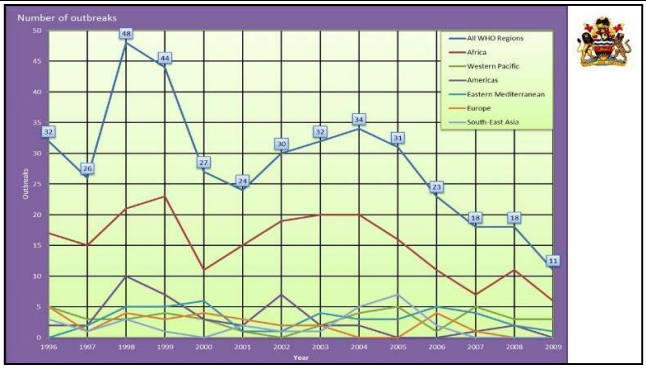


Slide 42

ASK: What is this graph trying to show?

ASK: Can you identify which text or data elements are the most important based on their formatting?

ASK: What elements should recede or be elevated in prominence?



Slide 43

EXPLAIN: Here is another version of the same graph.

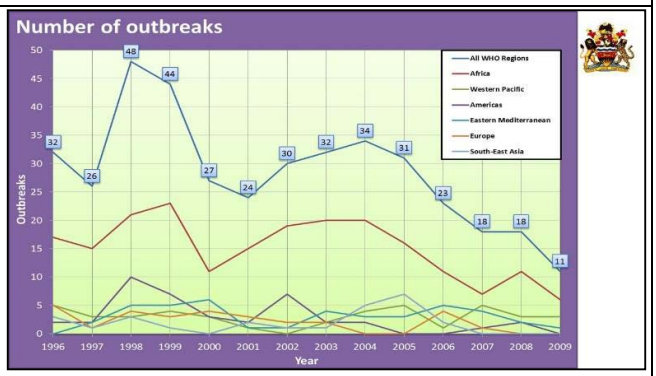
ASK: Do you think this version is easier to read? Why or why not?

Note that some participants may not agree.

EXPLAIN that here only three small changes. We have:

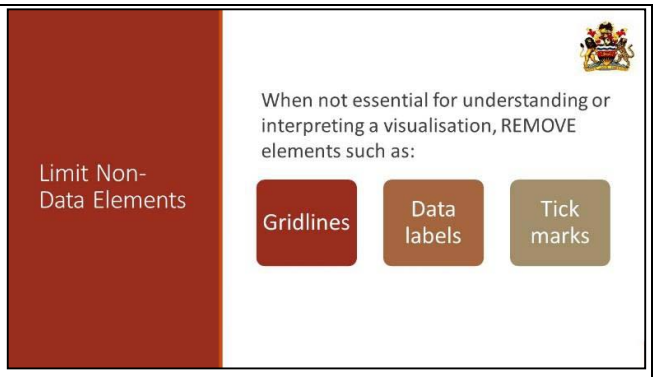
- Lightened the gridlines.
- Changed the background colour of the legend to white.
- Made the text in the title and along the axes bigger and brighter.

ASK: How else might you guide the viewer or eliminate distractions?



Slide 44

EXPLAIN that horizontal gridlines help the viewer to judge values; vertical gridlines help define specific time periods or subgroups. Both are often overused.

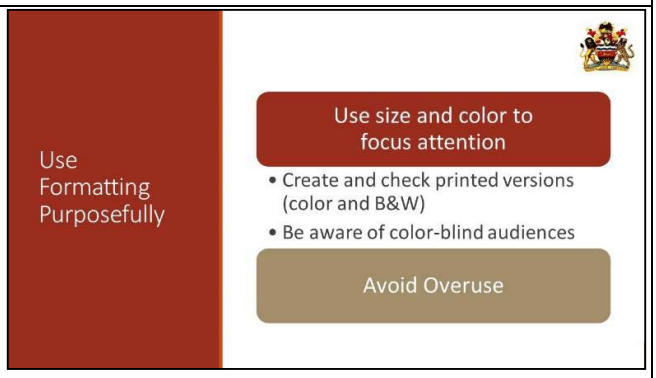


NOTE:

- You can achieve the same results by inserting one or two lines for important values/dividing lines.
- Data labels and gridlines are redundant (both help viewer judge amount(s)).
- Using labels only for 'notable' values increases their impact.

Slide 45

EXPLAIN that because it attracts visual focus, colour should be used sparingly to direct eye to important visual elements.

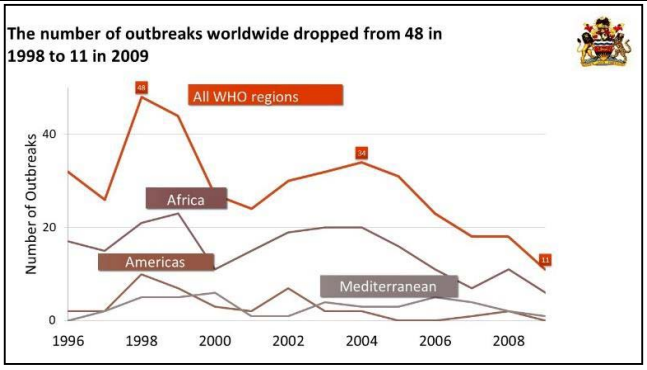


NOTE:

- Screen elements (such as formatting effects) may not appear the same in print.
- Always print both colour and black-and-white versions to check how a visualization will look when printed.
- A colour-blind viewer may not recognize colour distinctions. Eight per cent of men and 0.5% of women are colour blind. Colour blindness usually affects the ability to distinguish red from green.

Slide 46

ASK: Do you recognize this graph? What changes were made?



Possible answers include:

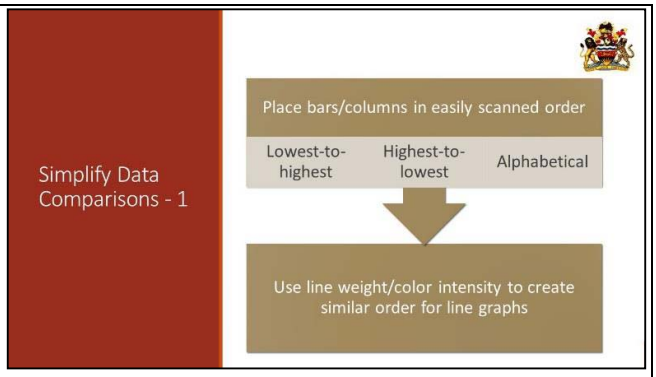
- *Decorative use of colour eliminated*
- *Gridlines significantly reduced*
- *Unnecessary axis label eliminated*
- *Y-axis label more clear*
- *Visual hierarchy of data created*
- *Total line heavier than all others*
- *Regions with limited number of outbreaks dropped*
- *Data labels used only for highest and lowest values*
- *Legend replaced by labels placed in proximity to series*

ASK: Do you think this is easier to read and understand?

Slide 47

EXPLAIN the following:

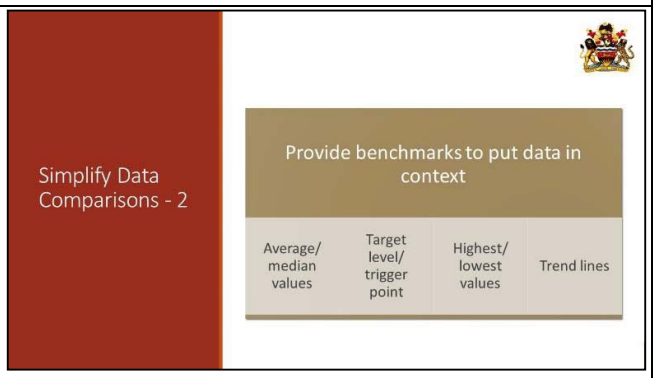
- Comparisons are most easily made between items in close proximity to each other.
- Arranging items from lowest to highest or highest to lowest reduces the size of gaps that viewer must visually estimate.
- If a large number of items are being shown (e.g., values for the top 50 largest municipalities), putting items in alphabetical order allows the viewer to more easily look for a particular item.
- Separating the focal point of the graphic can add emphasis.



Slide 48

EXPLAIN that in some cases, some external data points (i.e. data not explicitly shown in the data series being presented) are necessary to help interpret the visualization.

ASK: What are some examples of external data points that may be needed to interpret a graph or chart?



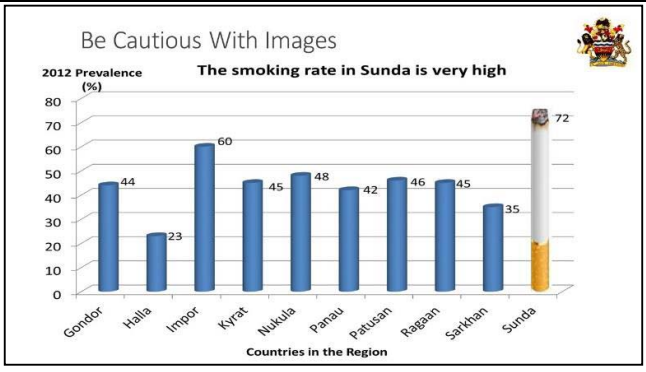
- *Average values (for either the data being presented or the broader population)*
- *Target level (i.e., established objective for improvement or a general accepted standard)*
- *High/low values*
- *Trend line (particularly when a large number of data points are being presented)*

Slide 49

EXPLAIN that images in data visualizations are often distracting.

However, research indicates that when used well, images can improve viewer recall of a visualization.

REFER participants to **Handout 6.5.3: Using Design Principles in Graphs** to view the same graphs as displayed on this slide and the following slides.



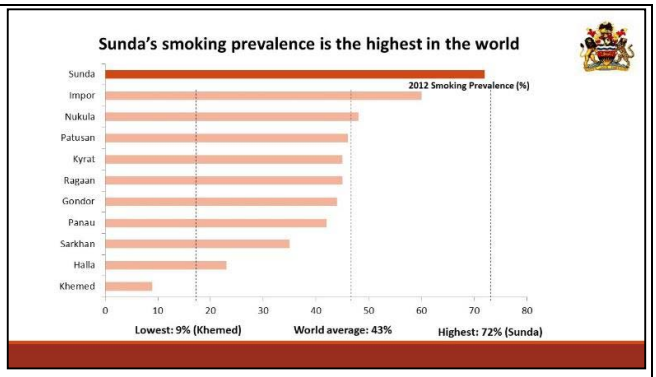
ASK: What are some ways you could improve the visualization based on any of these principles we have discussed?

Slide 50

EXPLAIN that here is another version of the graph from the previous slide.

ASK: Do you think this version is easier to read? Why or why not?

Note that some participants may not agree.



EXPLAIN that in this version we have:

- Eliminated the image and 3-D effect.
- Intensified the colour of the bar for Sunda (highest prevalence).
- Shifted from column to bar chart.
- Sorted the countries in order of smoking prevalence.
- Included reference points.
- Strengthened the message by changing the title.

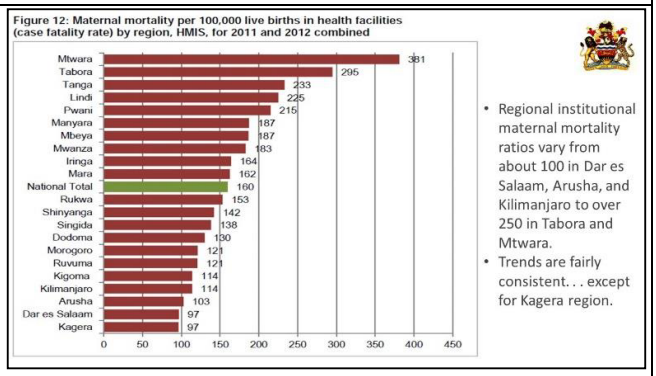
Slide 51

EXPLAIN that here is another example with some best practices.

ASK: Can you identify any of the best practices we've discussed?

Possible answers:

- *Use colour to HIGHLIGHT your message.*
- *Presentation of institutional maternal mortality*



- *As noted, this is a case fatality rate. It is as much an indicator of the quality of services as it is an indicator of health status.*
- *Disaggregation by regions, to examine geographical equity*
- *Title: What, where, when, data source*
- *Written interpretation of key findings and limitations*
- *Discussion of any inconsistencies from review of trends over time*

Source: (from Tanzania's Midterm Analytic Review, 2013)

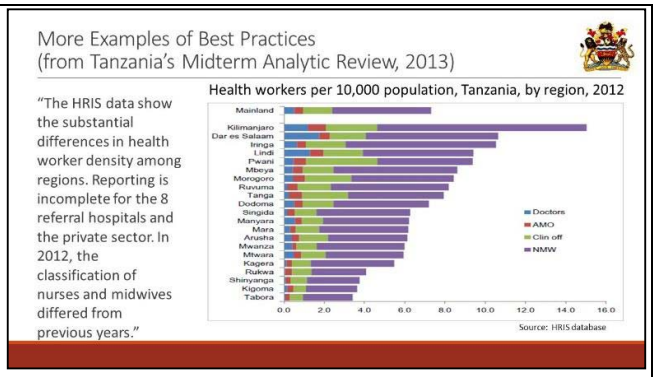
Slide 52

EXPLAIN that here is another example with some best practices.

ASK: Can you identify any of the best practices we've discussed?

Possible answers:

- *Presentation of health worker density*
- *Disaggregated by core cadres*
- *Title: Where, when, data source*
- *Written interpretation of key findings and limitations*
- *Discussion of completeness*
- *Discussion of changes in classification and how this affects trend analysis; specification of the data source*



ASK: Do you have any other ideas for improving this graph?

Possible answers include: *The note for the graph could indicate whether or not data from the major referral centres have been excluded*.

Trainer Instructions: Step 5 (15 minutes)

Use slides 53–58 and the facilitator notes to guide this step.

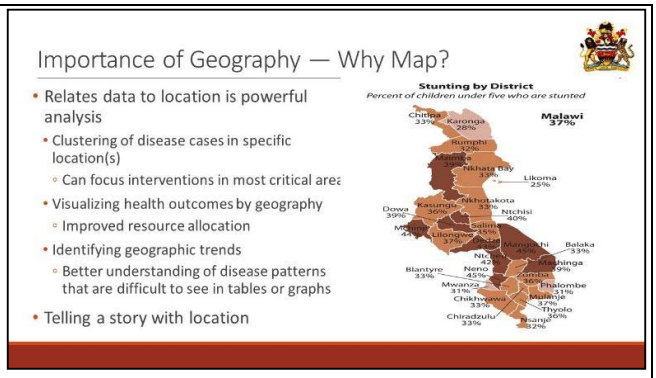
Slide 53

NOTE: This slide is animated.

ASK: Why would we use maps to convey our messages?

Answers:

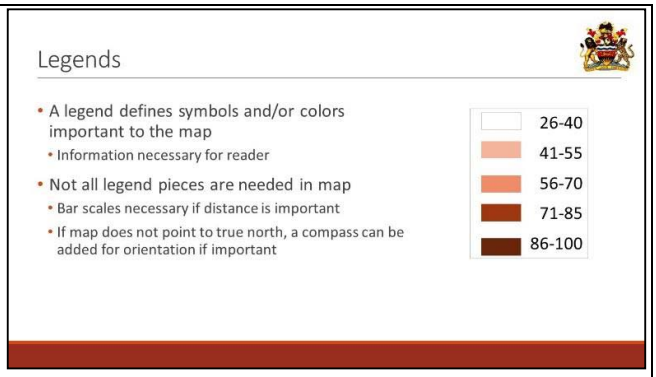
- *We map because relating data to location can be a powerful analytic tool.*
- *We can visualize the clustering of disease cases in specific locations to focus interventions.*
- *We can visualize health outcomes by geography to improve resource allocation.*
- *We can identify geographical trends to better understand disease patterns that are difficult to see in tables or graphs*



CLICK to reveal answers on the slide.

Slide 54

EXPLAIN that a map legend defines symbols and/or colours used in the map. This is information necessary for the reader to understand the map. For example, a choropleth map without a legend showing the values for each of the categories would not be as useful in conveying its information.

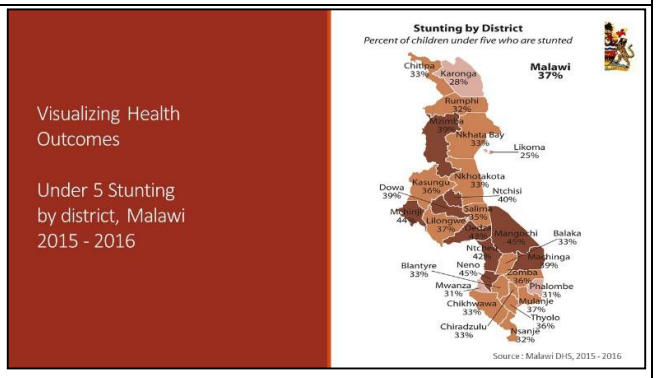


NOTE that not all legend pieces are needed in maps. For example, bar scales, which are used to show actual distance, are necessary only if distance is important. Additionally, if a map does not point to true north, a compass can be added for orientation if it will help the reader.

Slide 55

EXPLAIN that we have seen this graph before. Here we see a map of the prevalence of under-five stunting by district in Malawi. The prevalence of stunting ranges from up to 28% to 45%. We can see that the prevalence of stunting varies across the country.

ASK: Is there a legend here?

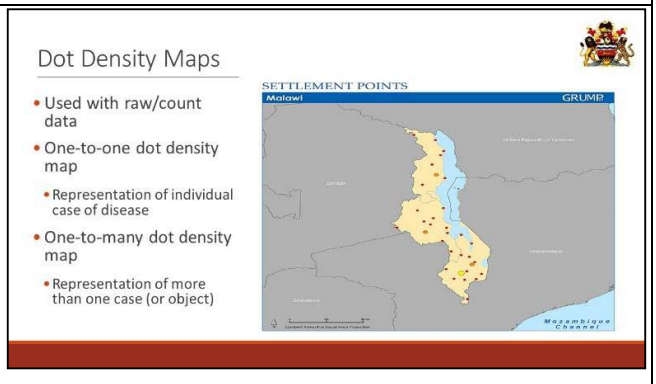


Answer: *No. So, although we can see the lowest and highest values presented by different colours, we do not know the exact percentage breakdown for each colour. In some cases this works, and in other cases it doesn't.*

For example, the DHS 2015–2016 presents a number of maps using the same colour breakdown (shades of brown); although the indicator changes for each graph, legends are not provided. This can make interpretation of the graphs more confusing.

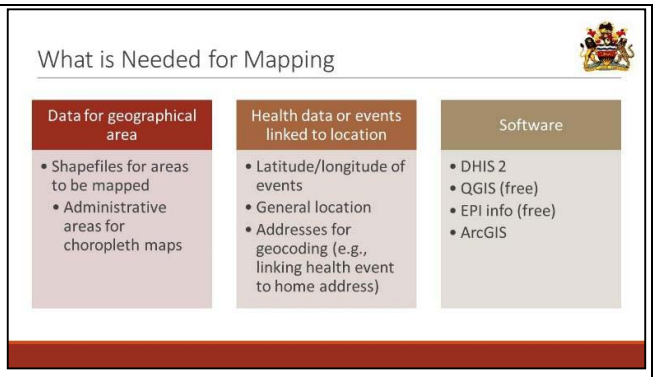
Slide 56

EXPLAIN that another type of map is a dot density map. Dot density maps use raw or count data. In one-to-one dot density maps, an individual case (for example, of a highly infectious disease) or data point is represented on a map. In one-to-many dot density maps, each dot can represent more than one case or data point.



Slide 57

EXPLAIN that before you can make a map, there are several things that are necessary.



First, you must have data for the geographical area. This is usually in the form of what are known as shapefiles, computer files that store the location, shape, and attributes of a geographical area. For a choropleth map, you would specifically need to have shapefiles for administrative areas.

Second, you must have health data or events linked to location. This includes the latitude/longitude of health events, the general location (the region) of events, and the addresses for geocoding (linking health events to a specific location, such as a street address).

Lastly, you must have software that can work with geographical files. This includes programmes like DHIS2, QGIS and ArcGIS, that are specifically designed to handle geographical files and produce maps.

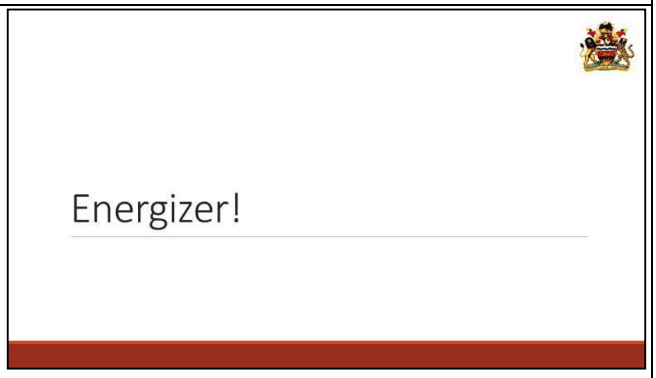
Slide 58

HAVE participants get up and walk around the room for a minute.

After one or two minutes, **BRING** them back to their seats.

INSTRUCT participants to draw the map of Malawi with their hands.

INSTRUCT participants to draw a map of their district with their hips.



Trainer Instructions: Step 6 (55 minutes)

Use slides 59–67 and the facilitator notes to guide this step.

Slide 59

EXPLAIN that any data visualization draws from data that have been collected, stored, and aggregated. This could be data from paper forms and reports or from an electronic database or data warehouse.

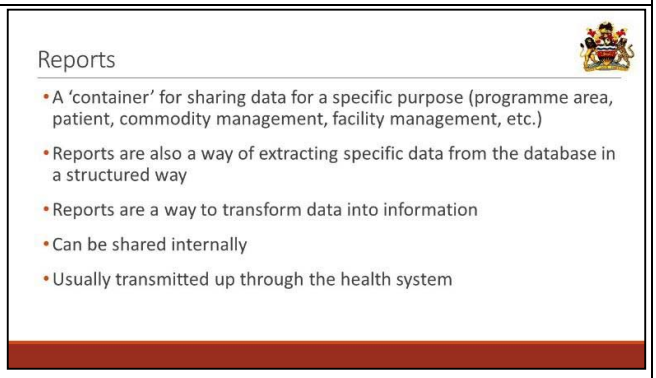
EXPLAIN that the remainder of this session will look at the reports and dashboards that you can access and use from some of the e-HIS software used during this training.

REVIEW the definition of reports on the slide.

HIGHLIGHT that there are a number of methods available for transforming data collected from patients into information products that can be used for decision making by clinicians, the facility in-charge, or other administrators at the facility (or at the county and national levels). Electronic information systems commonly provide data and information through reports and dashboards. Most participants are familiar with reports.

ASK participants to name some reports that they are already familiar with.

Slide 60



EXPLAIN that reports are a specific way of transforming the individual data entered into an EMR, LIMS, or DHIS2 into information that can then be used for decision making.

Most of the time, reports aggregate data for specific indicators. This could be data collected throughout the facility that is aggregated and then used to improve facility performance, or that is aggregated at the district, regional, or national level to inform resource allocation, or national policies or programmes.

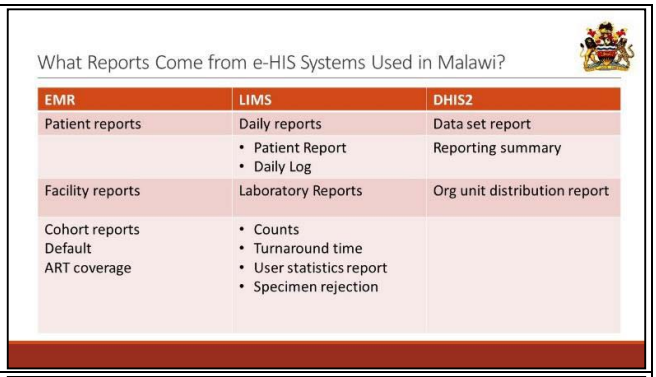
HIGHLIGHT that reports are also a way of pulling data out of the database.

ASK participants to think of the reports they are familiar with.

ASK: What data does each report summarize? Who is each report intended for?

Slide 61

USE this slide to summarize the reports that are currently available in three of the e-HIS software currently used in Malawi.

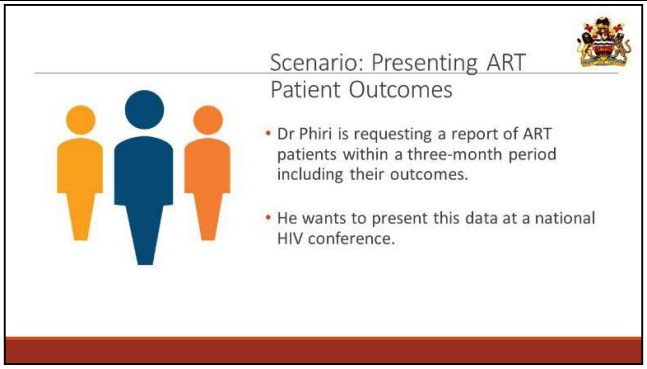


Slide 62

EXPLAIN that data in these reports can be used in different ways.

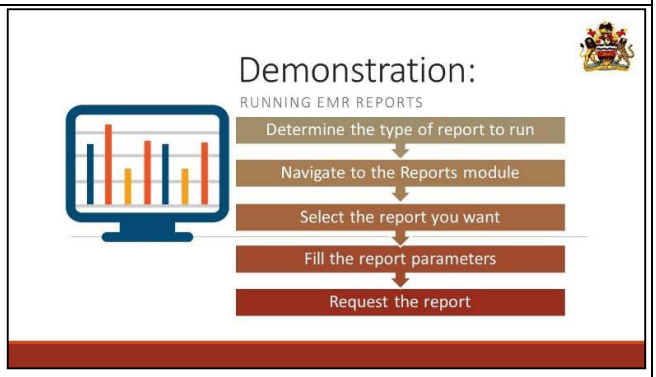
GIVE participants a moment to read this scenario.

ASK: What data and information does Dr Phiri need to answer this question? Where does this data come from? Patient or aggregate data?



Slide 63

REVIEW these steps for running EMR reports. Then facilitate the demonstration using the instructions displayed on the slide and in the Demonstration instructions:



Using Dashboards and Reports

GO TO system dashboard and click on reports.

SELECT the report you need to run or dashboard to view.

SELECT quarter and **CLICK** finish.

VIEW the report

Slide 64

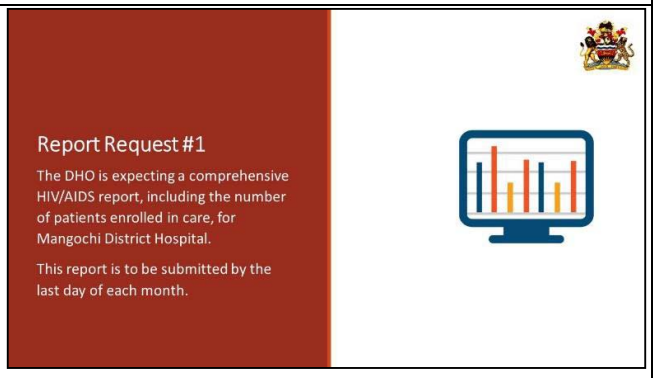
ORIENT participants to this case study from Mangochi District Hospital by using the information presented on the slide.

EXPLAIN to participants that they will look at four different scenarios at Mangochi District Hospital. In each scenario, a report is requested; their task is to answer each of the questions just discussed:

- How frequently does the facility run this report?
- What type of report is being requested?
- What EMR report(s) should be run?
- Are all of the data needed for this request available in the report?
- What additional manipulation, if any, is needed?

Slide 65

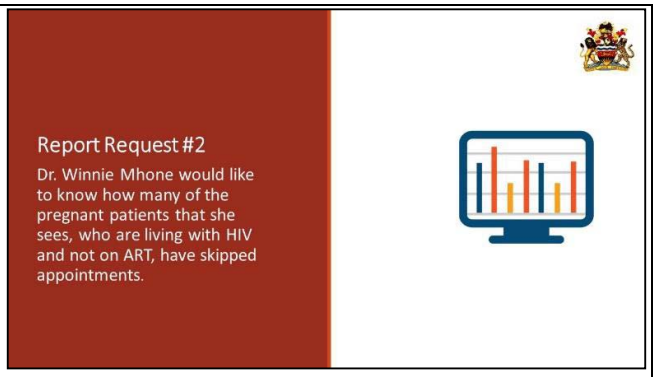
GIVE participants a moment to read this first scenario, then **ASK** participants:



- How frequently does the facility run this comprehensive report?
  - *Monthly*
- What type of report is being requested?
  - *A general report—this could be a standard report that is transmitted up the administrative levels of Malawi's health system.*
- Do you believe that all of the data needed for this request are available in a single report?
- What report(s) would you run?
  - *Write the name of the report to run on the flip chart paper once participants have had an opportunity to provide a response.*
- Is any additional manipulation of the data needed?
  - *No, this is a routine, standard report.*

Slide 66

GIVE participants a moment to read this second scenario, then **ASK** the following questions:



- How frequently does the facility run this comprehensive report?
  - *Answer: This report is requested by a clinician and may not be routinely requested.*
- What type of report is being requested?
  - *Answer: This request uses reports that are used for general facility management and a report related to MCH services*
- Do you believe that all of the data needed for this request are available in a single report? What report(s) will help Dr Mhone?
  - *Answer: Write the name of the report to run on the flip chart paper once participants have had an opportunity to provide a response.*
- Is any additional manipulation of the data needed?

Slide 67

NOTE that participants will be using the EMR system to generate the reports that they have identified as the best fit for each request Chimwemwe has received.

REMIND participants what these reports are by referring to the flip charts completed earlier.

ASK participants if they have any questions about the exercise. **HIGHLIGHT** that they are to work on their own, and that the facilitator will be able to monitor what reports they run by looking at the page for each report.

GIVE participants 10 minutes to complete and run the reports. **CHECK** their progress by looking at the report histories.

After participants have completed the exercise, **ASK** them to turn off their computer monitors or close laptops, and then **MOVE ON** to the next slide

DEBRIEF the case study by asking participants:

- What was easy about this activity?
- What challenges did participants encounter during this activity?

During the discussion of challenges, **NOTE** which ones are related to generating the reports, sending the emails, or any software messages/alerts/error messages received during the activity.

For each type of challenge, **HAVE** participants describe how they responded to the challenge, and what the final outcome was.

Trainer Instructions: Step 7 (120 minutes)

Use slides 68–80 and the facilitator notes to guide this step.

Slide 68

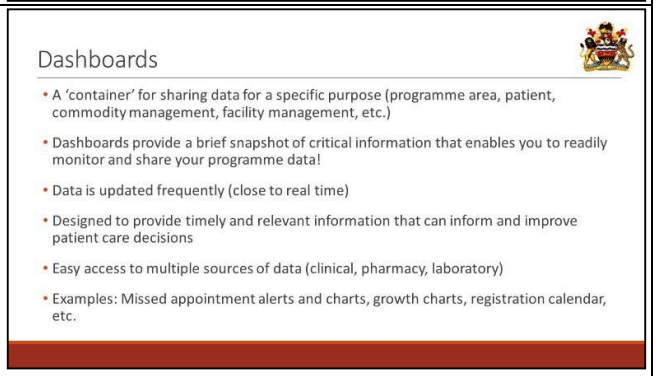
REVIEW the definition of dashboards on the slides. A dashboard simply organizes and presents information in a way that is easy to read.

ASK participants to name some dashboards that they are already familiar with.

Slide 69

NOTE that reports and dashboards can contain the same data. The primary difference is that reports are generated at a single point in time, and are therefore static. Dashboards are updated frequently, and in real time.

REVIEW the remaining advantages of dashboards shown on the slide. **HIGHLIGHT** that there is no need to wait to a report to come from someone else.



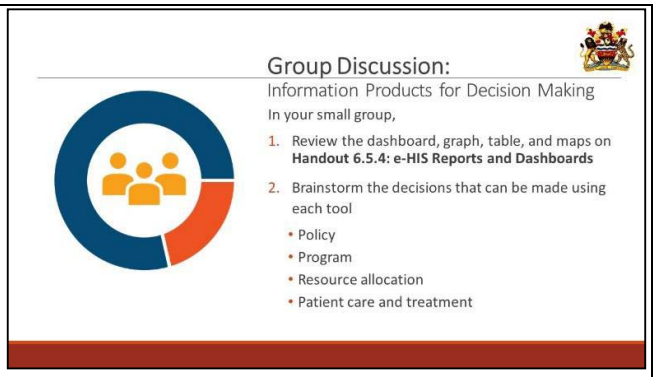
EXPLAIN that dashboards provide clinicians with snapshots of key patient data. They often include messages or alerts that can help them with clinical decision making.

For example, a dashboard may help a provider determine whether a particular appointment has missed an appointment. Data on missed appointments by patients at the facility can be aggregated, and then presented on a chart that shows missed appointments over the course of a week or a month.

Slide 70

EXPLAIN that each group will use **Handout 6.5.4: e-HIS Reports and Dashboards** to review dashboards, graphs, tables, and maps that were generated from some of the e-HIS systems that we saw earlier.

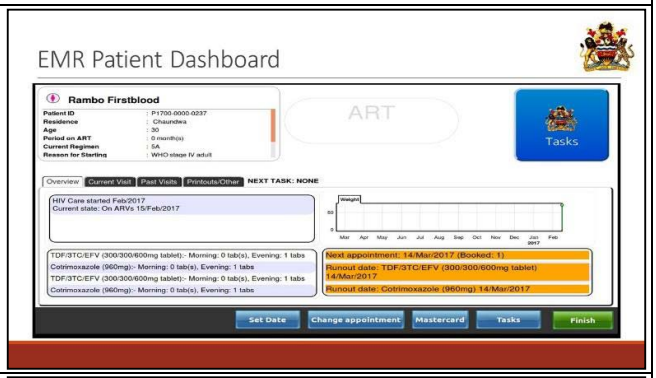
EXPLAIN that each group will be given 10 minutes to review these tools and brainstorm as many different decisions they can make using the data available to them.



After 10 minutes, **USE** the following slides to show to all participants as each group shares the results of their brainstorming activity.

Slide 71

POINT OUT and **EXPLAIN** the features relevant to this discussion.



Slide 72

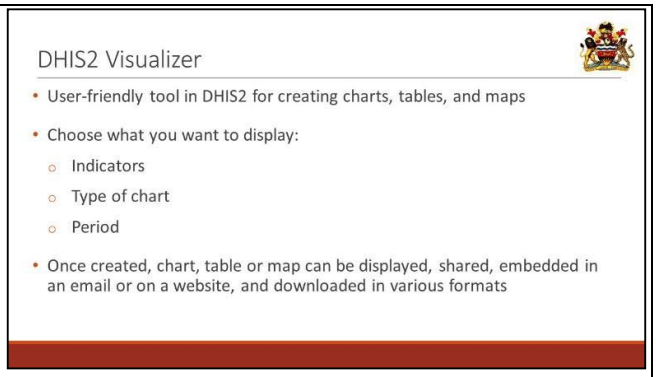
EXPLAIN that there are dashboards in both DHIS2 and the EMR. This slide shows a DHIS2 dashboard.

EXPLAIN that dashboards are updated regularly, and may pull data from various sources. Dashboards use all sorts of visualizations to provide this snapshot. Real-time monitoring reduces the hours of analysing and long lines of communication that previously challenged the sector.

Slide 73

EXPLAIN that you can have the following items appear on a DHIS2 dashboard:

- Graphs
- Pivot tables
- Maps



EXPLAIN that these items must first be created before they can appear on the dashboard. These items can be either static or dynamic (self-updating).

EXPLAIN that DHIS2 has a data visualizer tool that enables users to create charts, tables, and maps.

EXPLAIN that there are many options for displaying data—several different charts, pivot tables, and GIS maps.

Once a chart is created, you can display it, share it, embed it in an email or on a website, and download it in various formats.

Slide 74

EXPLAIN that DHIS2 is user-friendly. The point-and-click functionality of DHIS2—of the data visualizer tool in particular—does most of the work for you. Even users who are uncomfortable or unfamiliar with other forms of data visualization will find the DHIS2 data visualizer easy to use.

There are many different options for charts you can create. It is easy to choose your indicators, the type of chart you want, the period you want to display, etc.

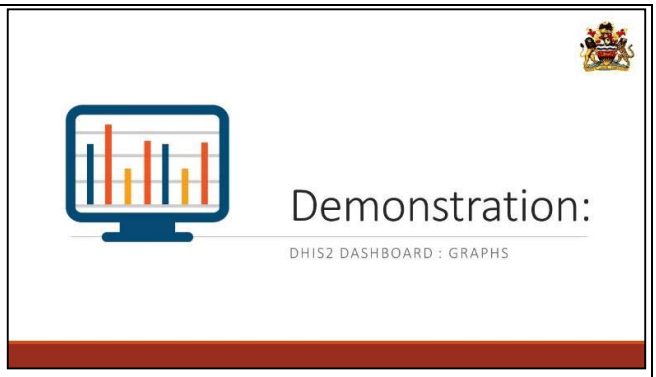
https://www.dhis2.org/data-management

Slide 75

NAVIGATE AWAY from PPT and **PROJECT** DHIS2 onto the screen.

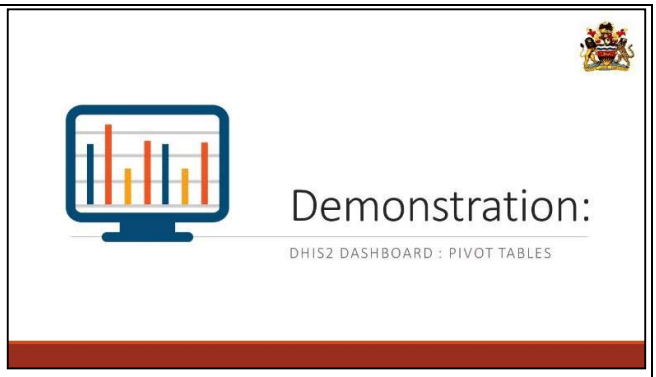
SAY that this demonstration will focus on creating graphs in DHIS2. **REFER** participants to **Handout 6.5.5: Pivot Tables and Charts** in DHIS2.

FOLLOW the demonstration guidance below:



- **GO TO** Apps, then search with keyword **VISUALIZER** or scroll through the list of applications until you see **DATA VISUALIZER**.
- **SELECT** what you want to have in the analysis. (This is the 'what' dimension)
  - Indicators
  - Data elements
  - Data sets
  - Event data items and programme indicators (these are for tracker programmes)
- **NOTE** that the 'when' dimension can be fixed or relative.
- **CLICK** on Period and **SELECT** the period type**.** The type of period selected and the year appear on the left.
- **CLICK** on Previous Year or on Next Year to change the period.
- **CLICK** on a period and then on the **>** to select the period clicked, or the **>>** to select all the periods under consideration.
- The selected period will be seen to the right.
- To select a relative period, **CLICK** on the period of your choice. (The default is the last five years.)
- Do not mix fixed and relative periods.
- **SELECT** the organization unit for which you are analysing data.
- **CLICK** on Organization Units in the left panel.
- **CLICK** on the cog (gear) and then select the mode.
- **SELECT** the applicable:
  - individual org units
  - level
  - group that you want
- Once you have the dimensions (what, when, and where) selected, **CLICK** on **UPDATE**.

Slide 76



EXPLAIN that a pivot table represents data in a table format. It has rows and column.

You can make the contents of columns to be in rows and vice versa—hence a **pivot table**. In pivot tables you can have indicators, data elements, data sets (reporting rates etc.), event data items and programme indicators.

RECALL that once you have data in a table format, you can make any number of graphs and charts.

SAY that this demonstration will focus on creating pivot tables in DHIS2.

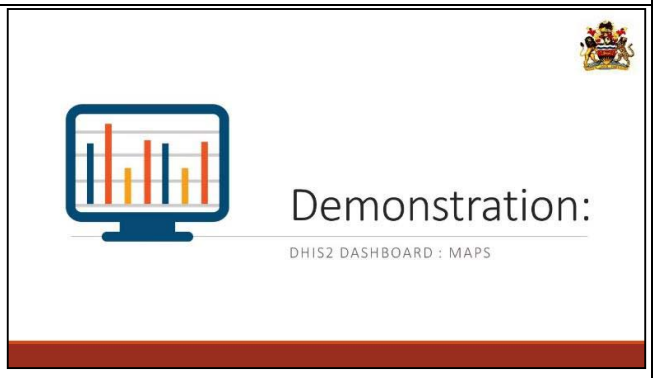
NAVIGATE AWAY from PowerPoint and **PROJECT** DHIS2 onto the screen. **REFER** participants to **Handout 6.5.5: Pivot Tables and Charts in DHIS2**.

FOLLOW the demonstration guidance below:

- Go to apps then search with keyword **pivot** or scroll through the list of applications until you see pivot tables.

The steps in selecting the data dimensions (What, When and Where) are followed from the previous slide.

Slide 77



EXPLAIN that GIS is an app in DHIS2 that allows visualization of data by associating it with the actual location of the organization unit on which the data was collected.

The data can consist of **data elements**—e.g., the number of pregnant women starting ANC during the first trimester (0–12 weeks).

The data can also consist of **indicators**—e.g., the percentage of children under 1 year of age who are fully immunized.

DHIS2's GIS features are extremely user-friendly. The GIS functionality enables users to create thematic maps, view facilities based on various classifications, and visualize catchment areas. You can also overlay features with Google Maps/Google Earth.

Displaying data geographically is becoming increasingly important, as many programmes encourage countries to prioritize and target based on location. While GIS software can be difficult to use, DHIS 2's functionality, though not advanced, is easy to use.

SAY that this demonstration will focus on creating maps in DHIS2.

NAVIGATE AWAY from PowerPoint and **PROJECT** DHIS2 onto the screen.

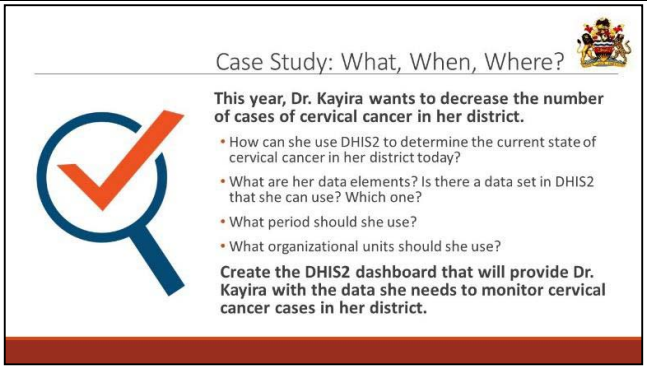
FOLLOW the demonstration guidance below:

- Go to Apps, then search with keyword **GIS** or scroll through the list of applications until you see GIS.

The steps in selecting the data dimensions (what, when, and where) are followed as highlighted in slides 6 to 8.

Slide 78

LEAD a group discussion using the questions on this slide.



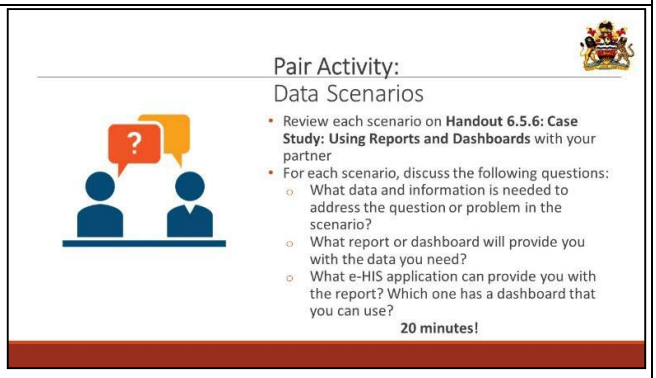
ASK the following questions:

- What are the data elements?
  Answer: *Number of screenings for cervical cancer*
- What period should she consider?
  Answer: *September 2018*
- What organizational units should she use?
  Answer: *District*

CLICK on the slide to reveal the practical activity component. **INSTRUCT** participants to log on to DHIS2 and create a dashboard that will give them the data they need to track progress.

Slide 79

DIVIDE participants into pairs. Each pair should **DISCUSS** each scenario on **Handout 6.5.6: Case Study: Using Reports and Dashboards** and answer these questions:

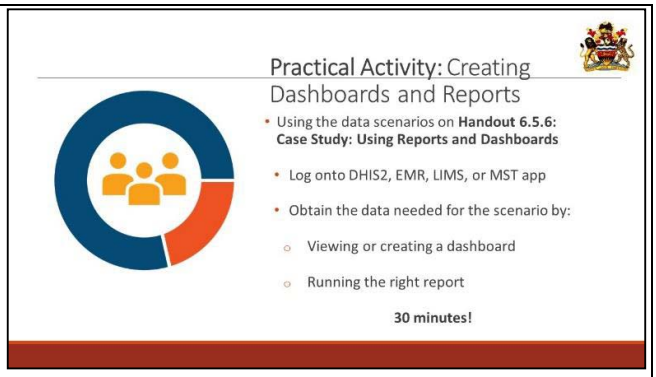


- What data and information are needed to address the question or problem in the scenario?
- What report or dashboard will provide you with the data you need?
- What e-HIS application can provide you with the report? Which one has a dashboard that you can use?

GIVE participants 20–30 minutes to complete, then bring everyone back together to **DEBRIEF** the scenarios.

Slide 80

EXPLAIN that each group will use **Handout 6.5.6: Case Study: Using Reports and Dashboards** and the results of their discussion to decide which e-HIS application has the report or dashboard containing the data needed to resolve the issue given in the scenario.



EXPLAIN that each group will be given 20 minutes to come up with the data they need.

After 20 minutes, **BRING** the group back together and **DEBRIEF** the activity.

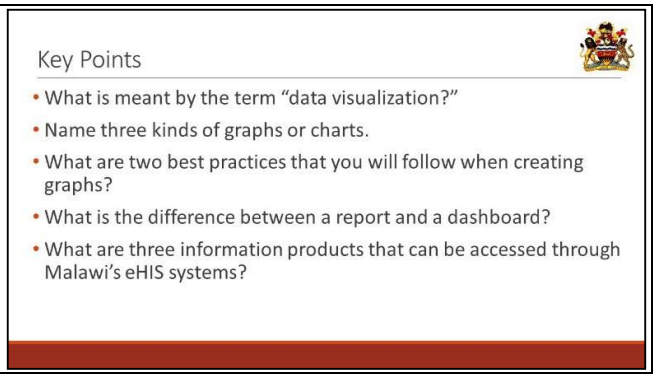
Trainer Instructions: Step 8 (5 minutes)

Use slide 81 and the facilitator notes to guide this step.

Slide 81

ASK participants the questions on the slide to review the session.

ASK if there are any questions before closing the session.



Handout 6.5.1: Types of Charts

Below are the most commonly used types of charts, many of which can be created using Excel.

Bar graphs are used to compare quantities, usually at one point in time. There are several variations:

Vertical Bar Graph (Column Chart)
This type of bar graph is used to compare quantities between categories or groups.

Clustered Bar Graph
This type of bar graph is used to compare quantities for multiple categories for multiple groups.

Horizontal Bar Graph
This type of bar graph is particularly good for clearly presenting text, in the form labels associated with each bar.

Stacked Bar Graph
This type of bar graph shows how individual quantities relate to a whole.

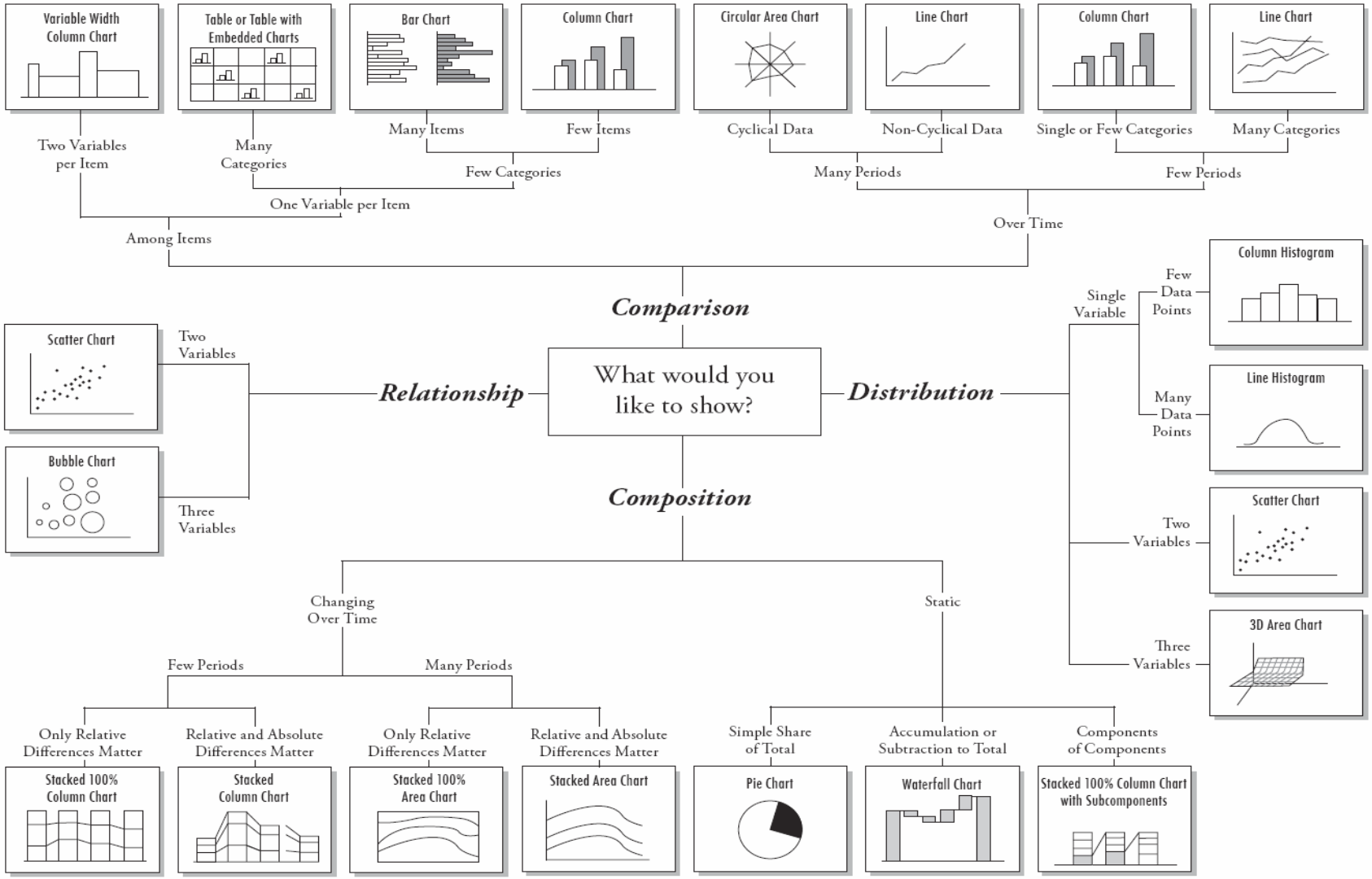
Pie Chart
Pie charts are good for comparing groups or segments as parts of a whole.

Line Graph (Line Chart)
Line graphs are used to show changes over time.

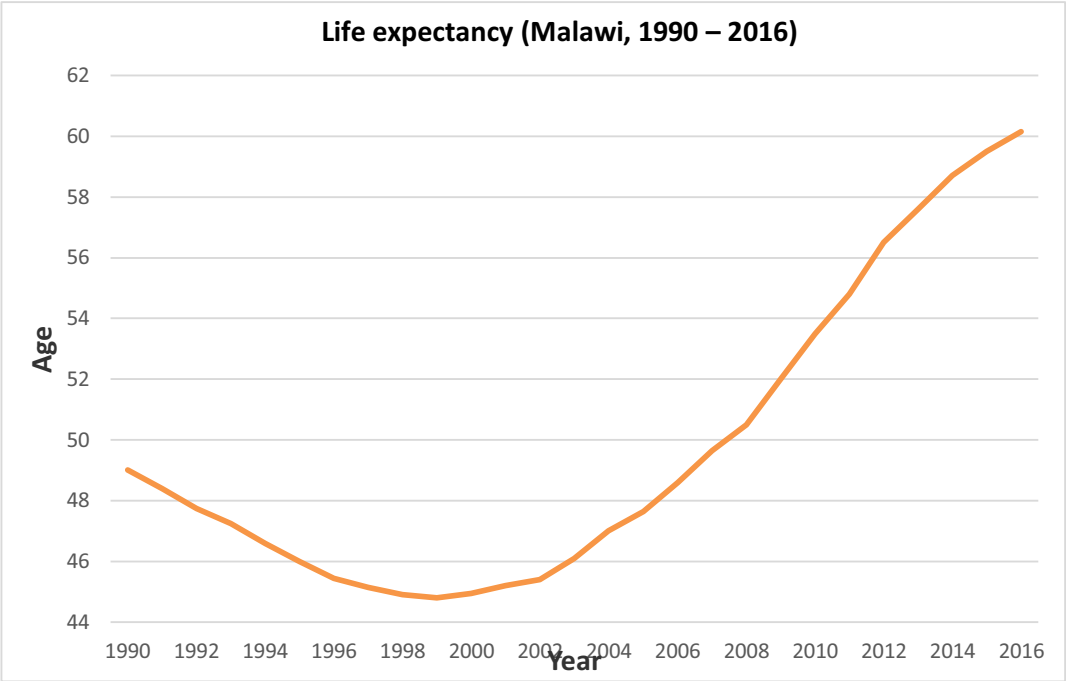
Area Graph
This type of graph is similar to a stacked bar graph, but is best for showing change over time.

Scatter Plot (XY Chart)
A scatter plot shows the relationship between two different things; one quantity is presented on the X axis, the other quantity on the Y axis.

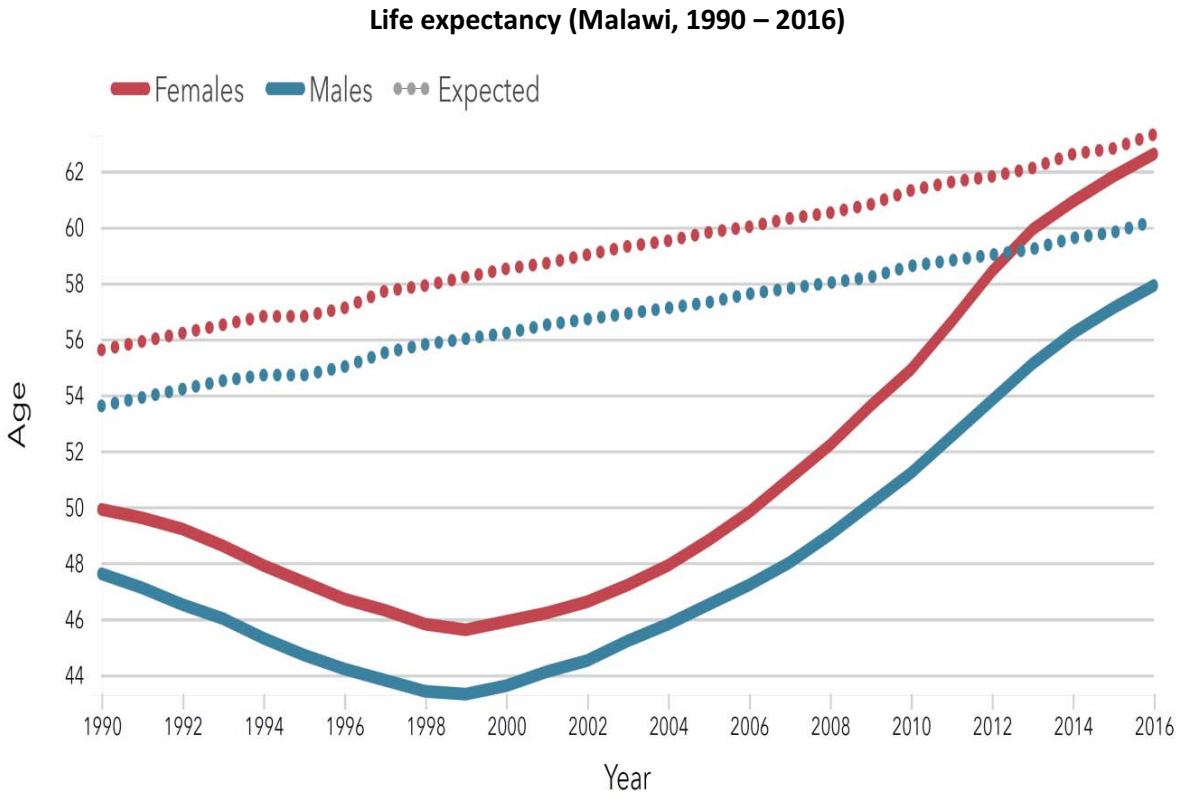
Bubble Chart
A variation of a scatter plot in which the size of each bubble represents another aspect of the data related to that point.


What would you like to show?
Comparison
Relationship
Distribution
Composition
Variable Width Column Chart
Table or Table with Embedded Charts
Bar Chart
Column Chart
Circular Area Chart
Line Chart
Column Chart
Line Chart
Two Variables per Item
Many Categories
Many Items
Few Items
Cyclical Data
Non-Cyclical Data
Single or Few Categories
Many Categories
Few Categories
Many Periods
Few Periods
One Variable per Item
Over Time
Among Items
Scatter Chart
Two Variables
Bubble Chart
Three Variables
Single Variable
Few Data Points
Many Data Points
Two Variables
Three Variables
Column Histogram
Line Histogram
Scatter Chart
3D Area Chart
Changing Over Time
Static
Few Periods
Many Periods
Only Relative Differences Matter
Relative and Absolute Differences Matter
Only Relative Differences Matter
Relative and Absolute Differences Matter
Simple Share of Total
Accumulation or Subtraction to Total
Components of Components
Stacked 100% Column Chart
Stacked Column Chart
Stacked 100% Area Chart
Stacked Area Chart
Pie Chart
Waterfall Chart
Stacked 100% Column Chart with Subcomponents

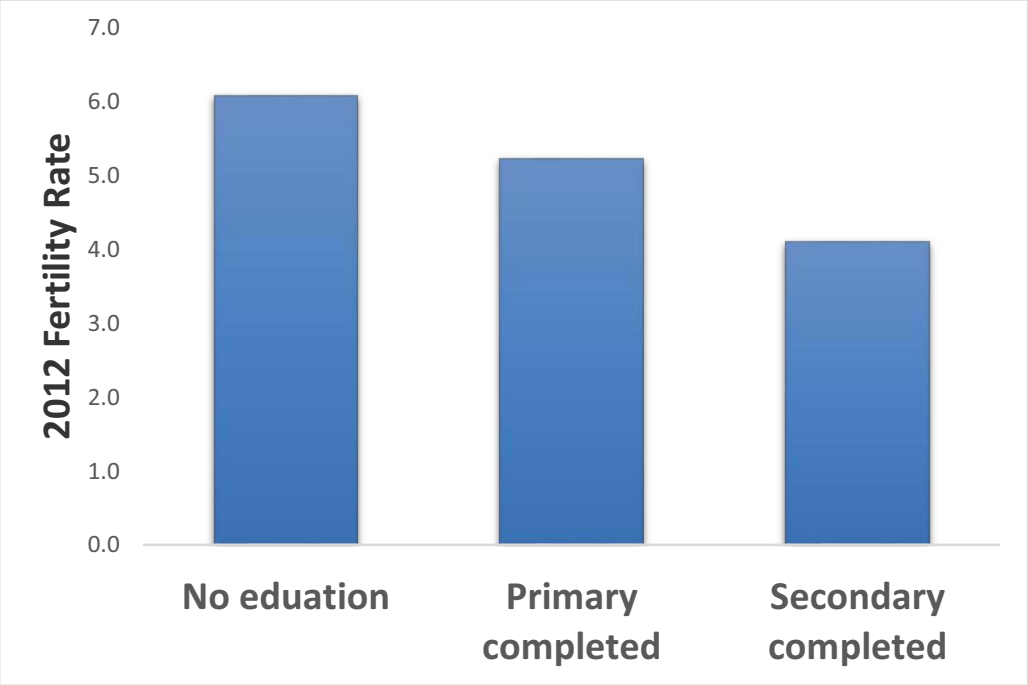
Line Graph – 1



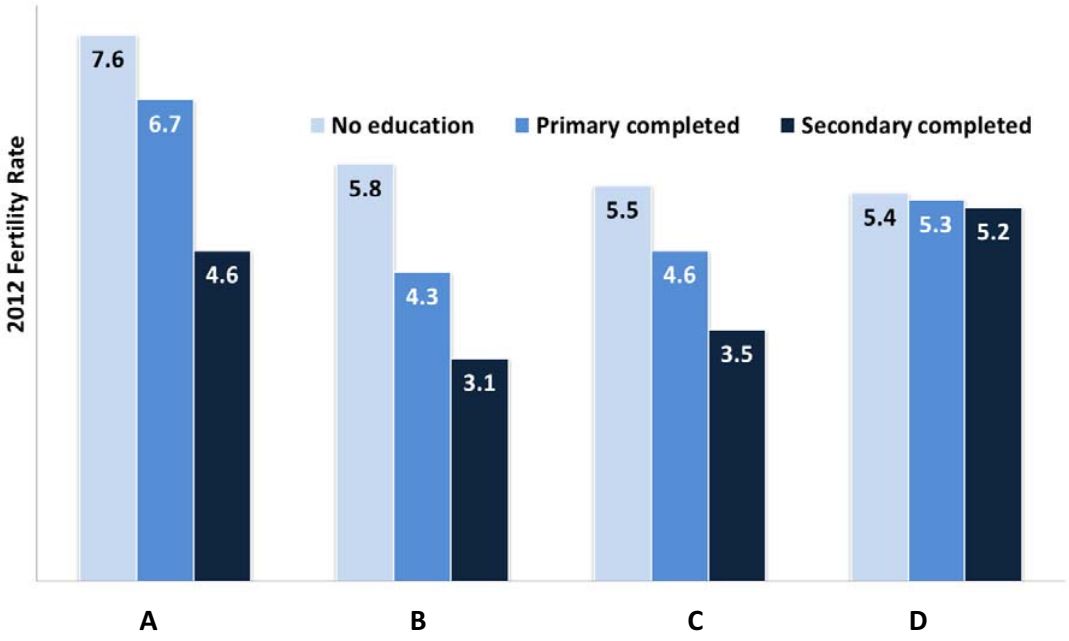
Line Graph – 2



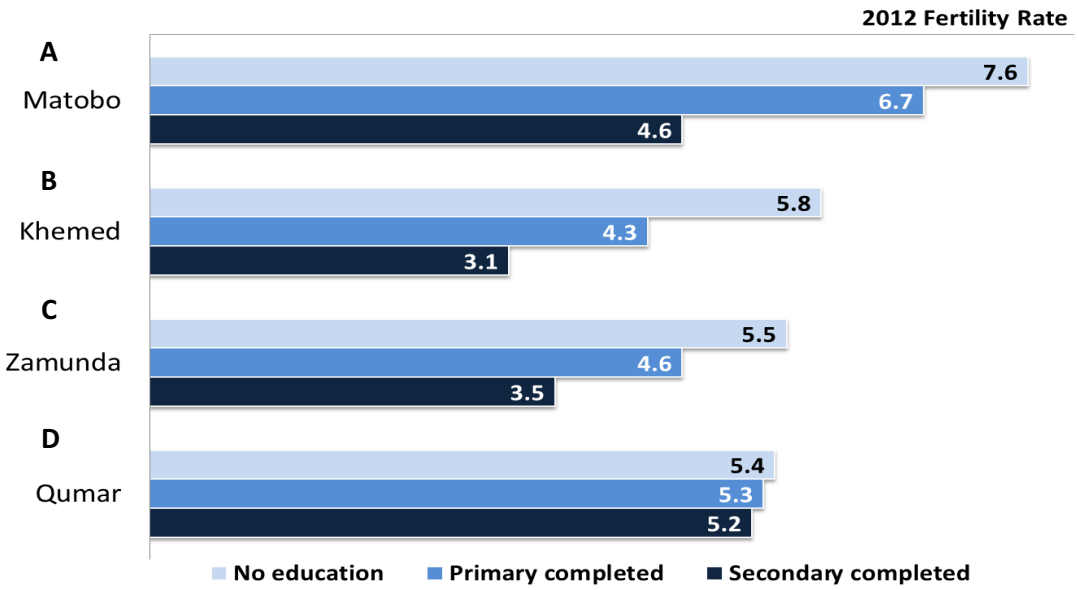
Column/Bar Chart – 1



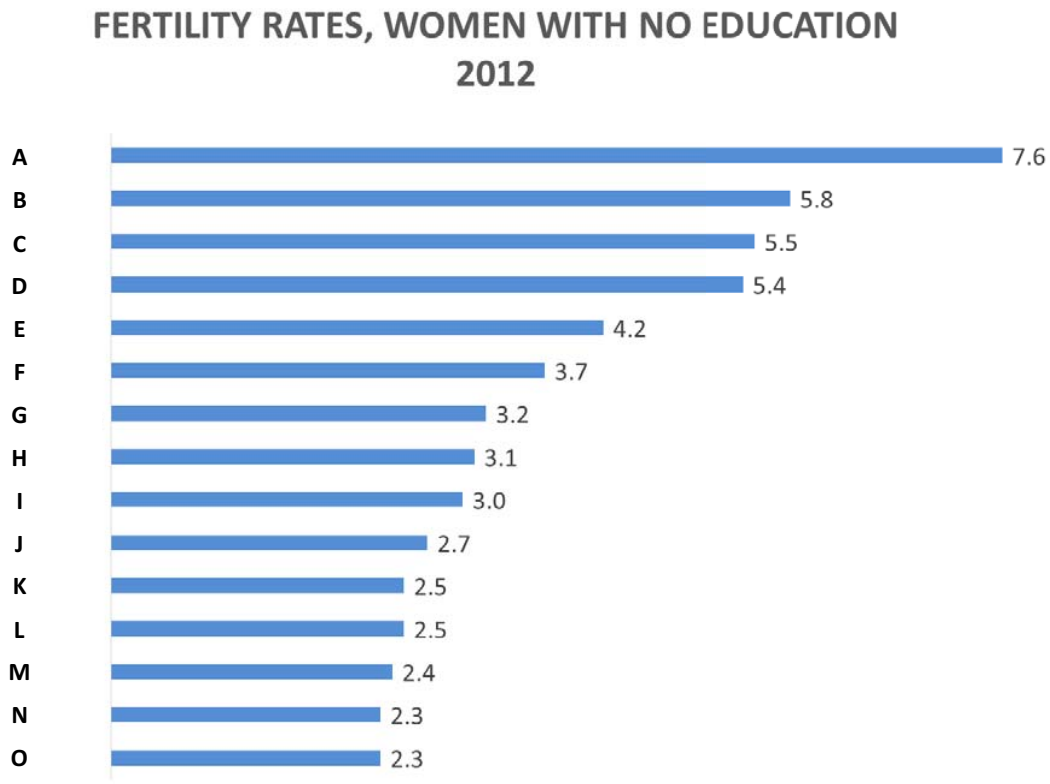
Column/Bar Chart – 2



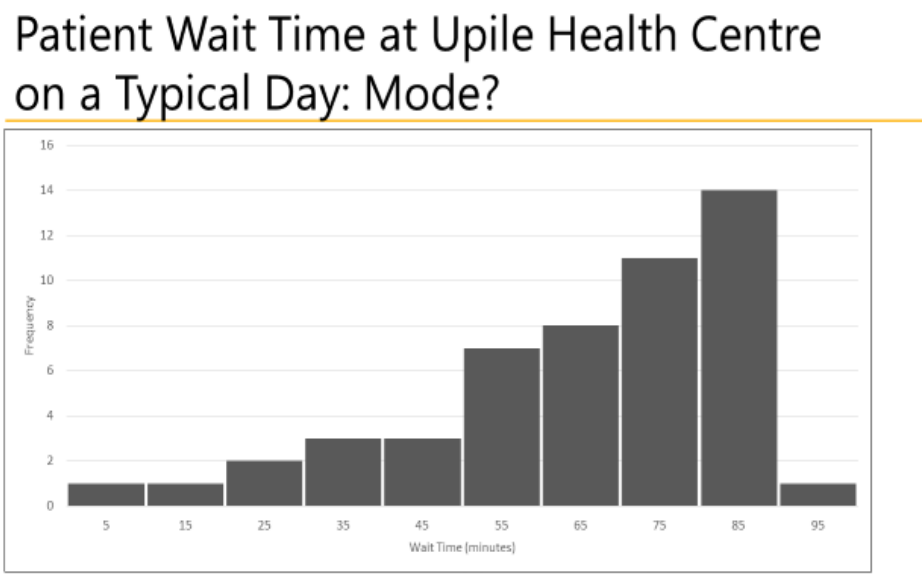
Horizontal Bar Chart – 1



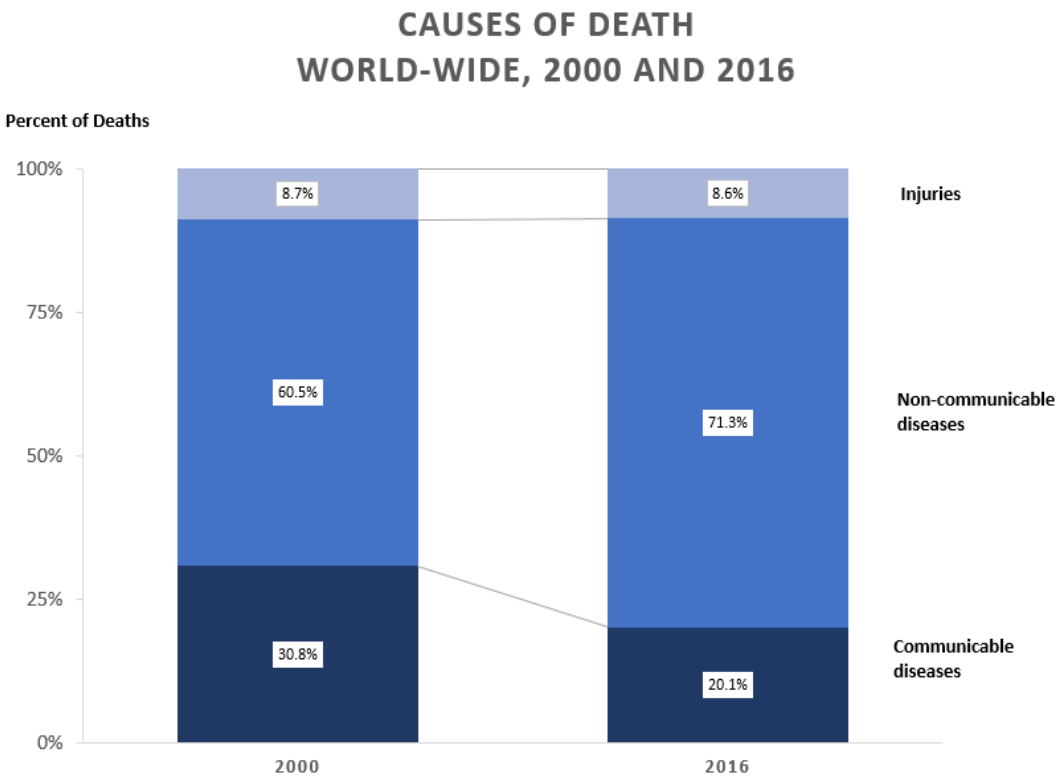
Horizontal Bar Chart – 2



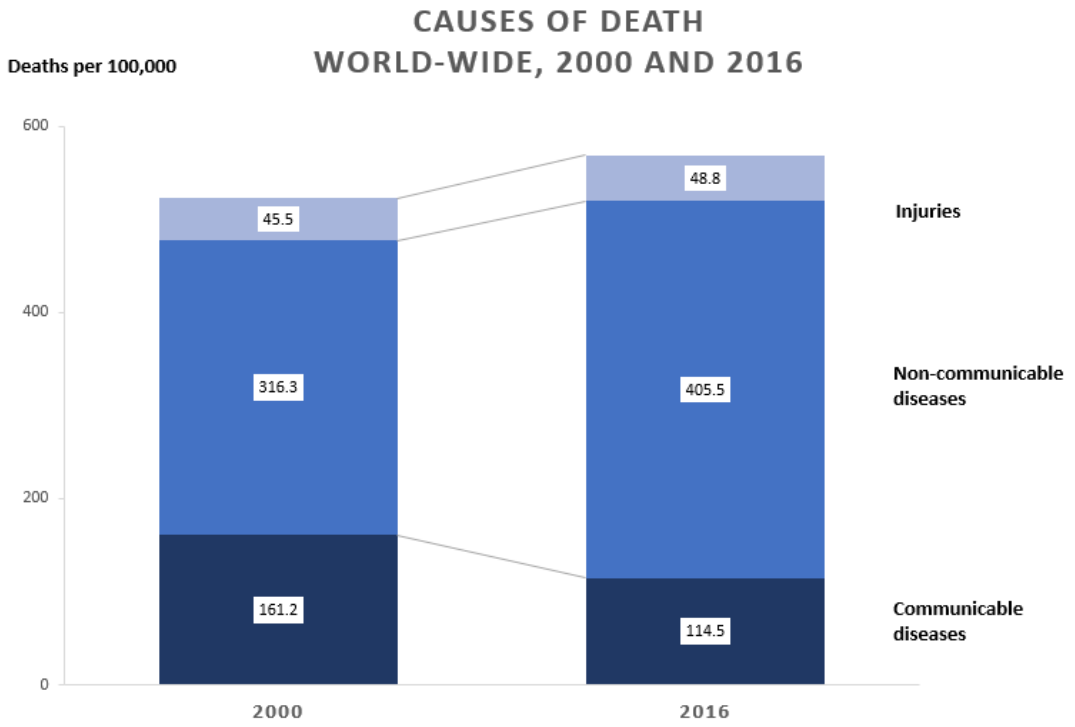
Histogram



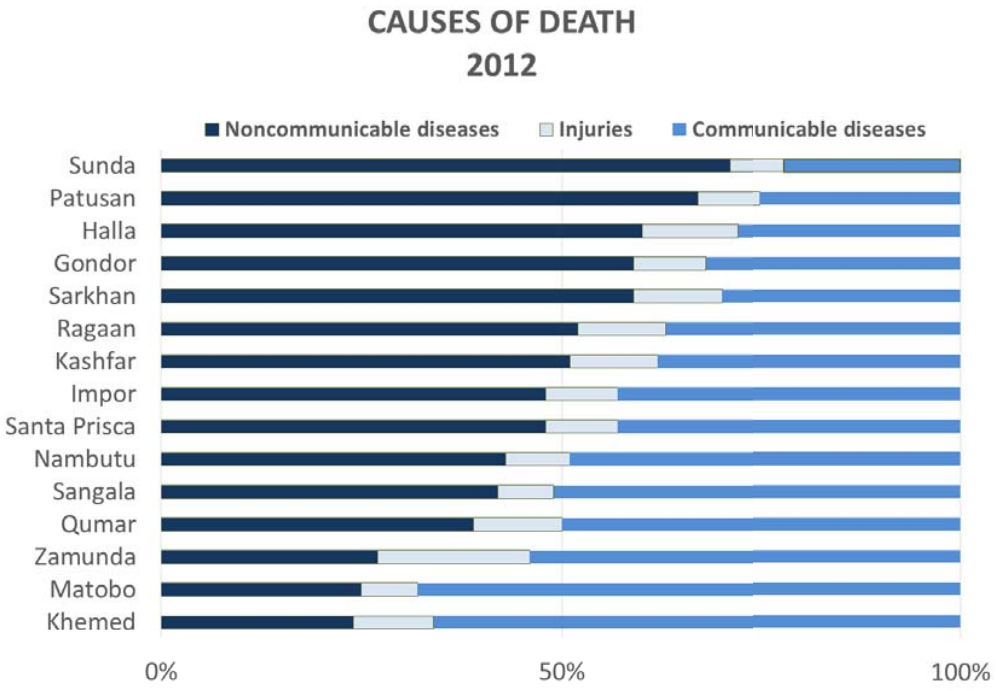
Stacked Column/Bar Chart – 1



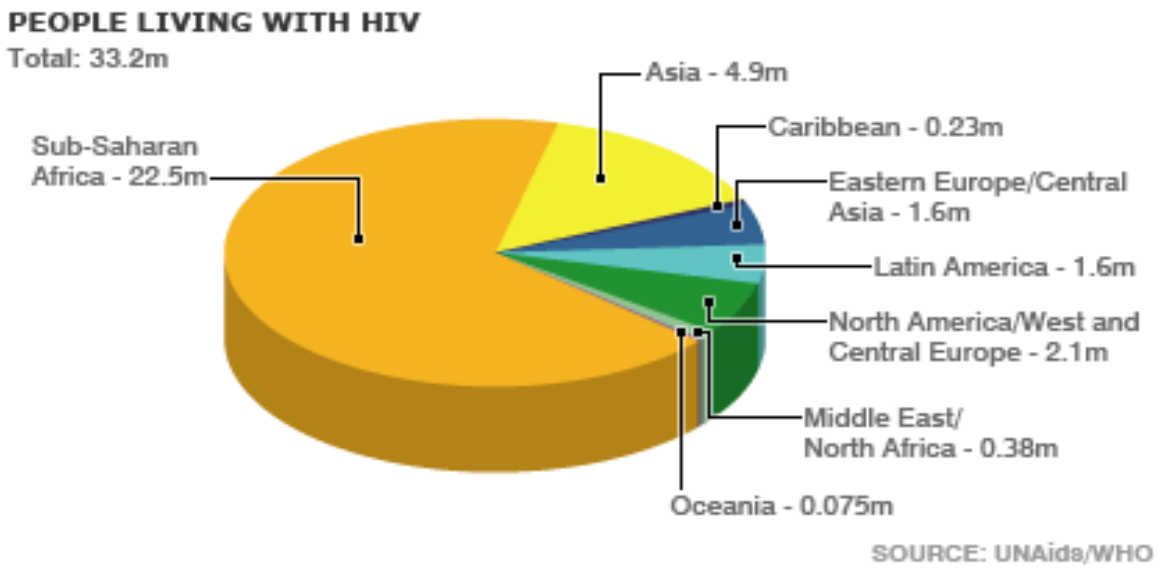
Stacked Column/Bar Chart – 2



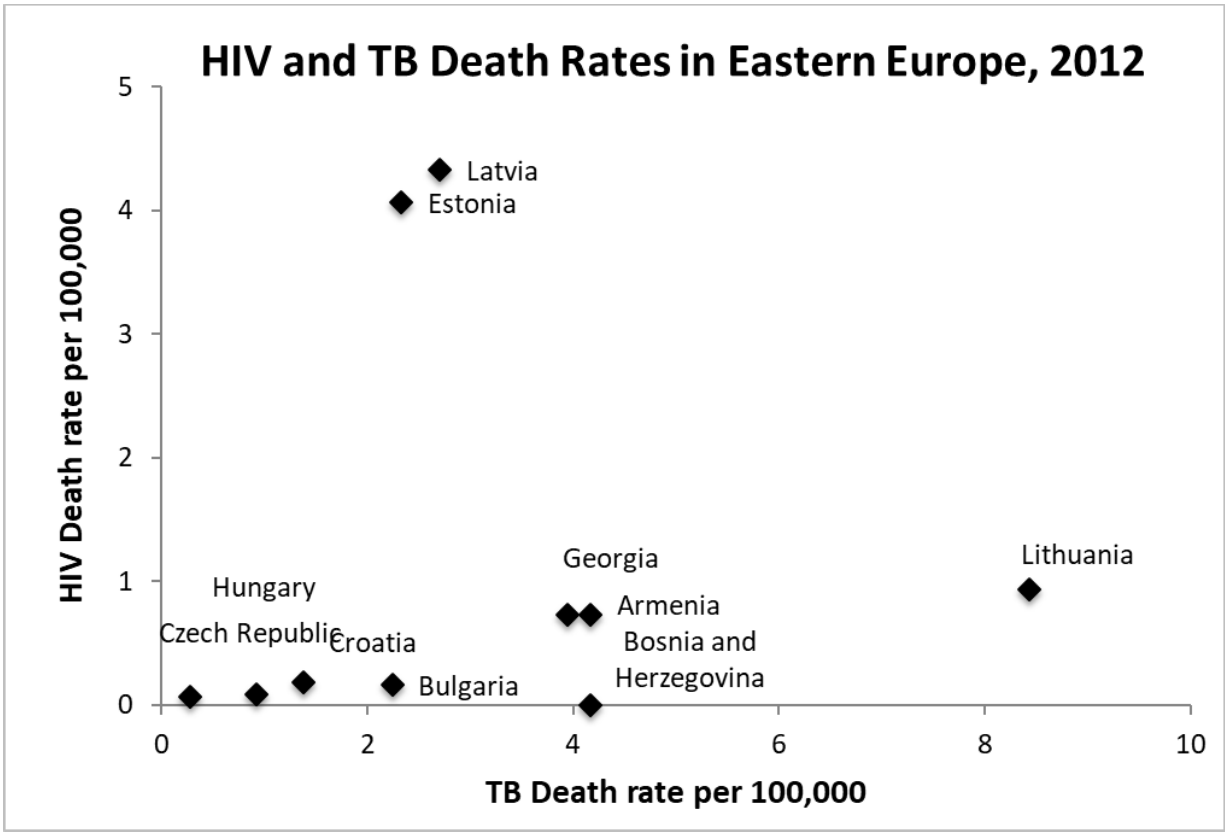
Horizontal Stacked Bar



Pie Chart



Scatter Plot



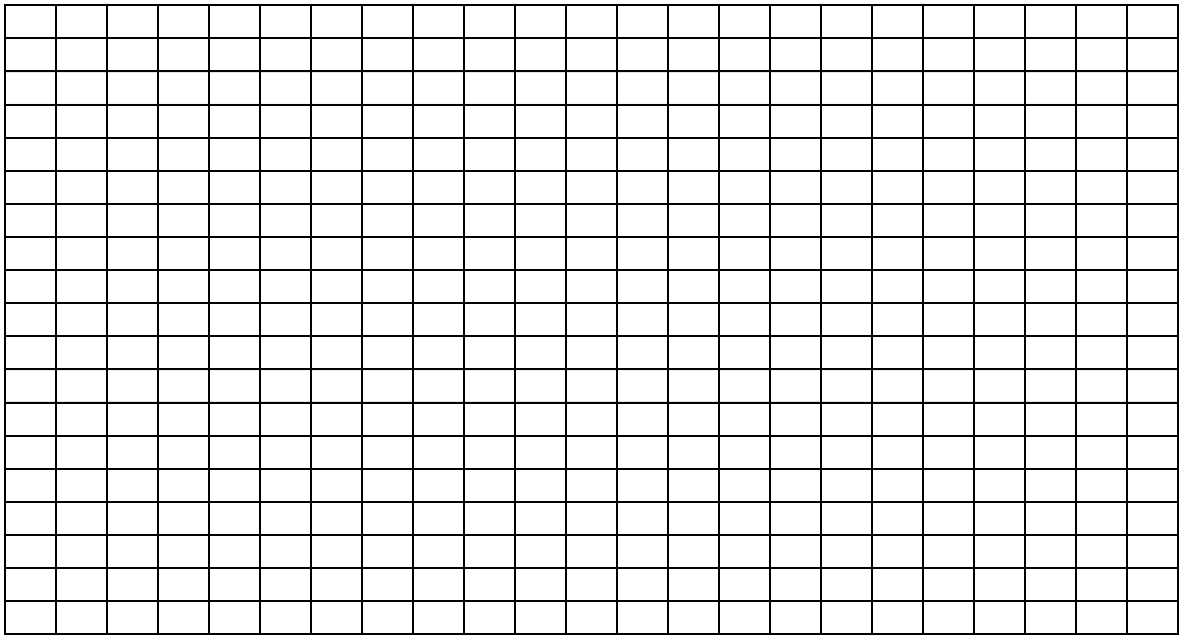
Handout 6.5.2: Creating Graphs and Charts

Use the data from Table 1 or Table 2 to draw the graphs or charts requested below. Unless clearly stated, you will need to select the correct data and graph to draw. Refer to the **5 Questions to Ask Yourself When Choosing a Graph** as needed.

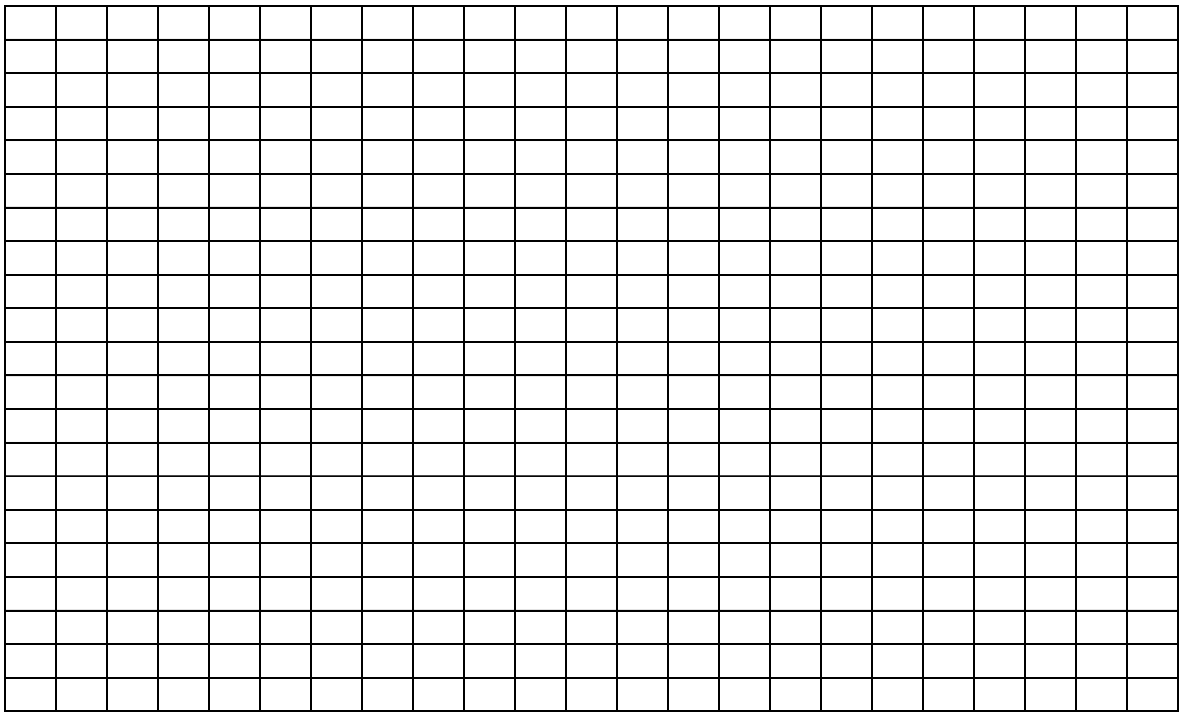
Table 1							
Indicator	**1995**	**1996**	**1998**	**1999**	**2001**	**2003**	**2005**
HIV prevalence estimated from sentinel surveillance	13.8%	13.2%	16.2%	15.0%	15%	14.4%	14.0%
Prevalence among pregnant women aged 15–24 years	18.5%	18.1%	19.1%	23.1%	17.1%	18.3%	14.3%
Proportion of rural women in the sample	20.8%	23.2%	13.1%	16.6%	18.7%	21.0%	26.3%

Table 2			
Geographical Location	Women	Men	Total
Urban areas	13.3%	0.3%	7.2%
Rural	8.2%	2.5%	5.8%
North	9%	0.7%	5.5%
Central	3.9%	1.2%	2.7%
Southern	13.4%	3.2%	8.8%
Total	9.1%	2.1%	6%

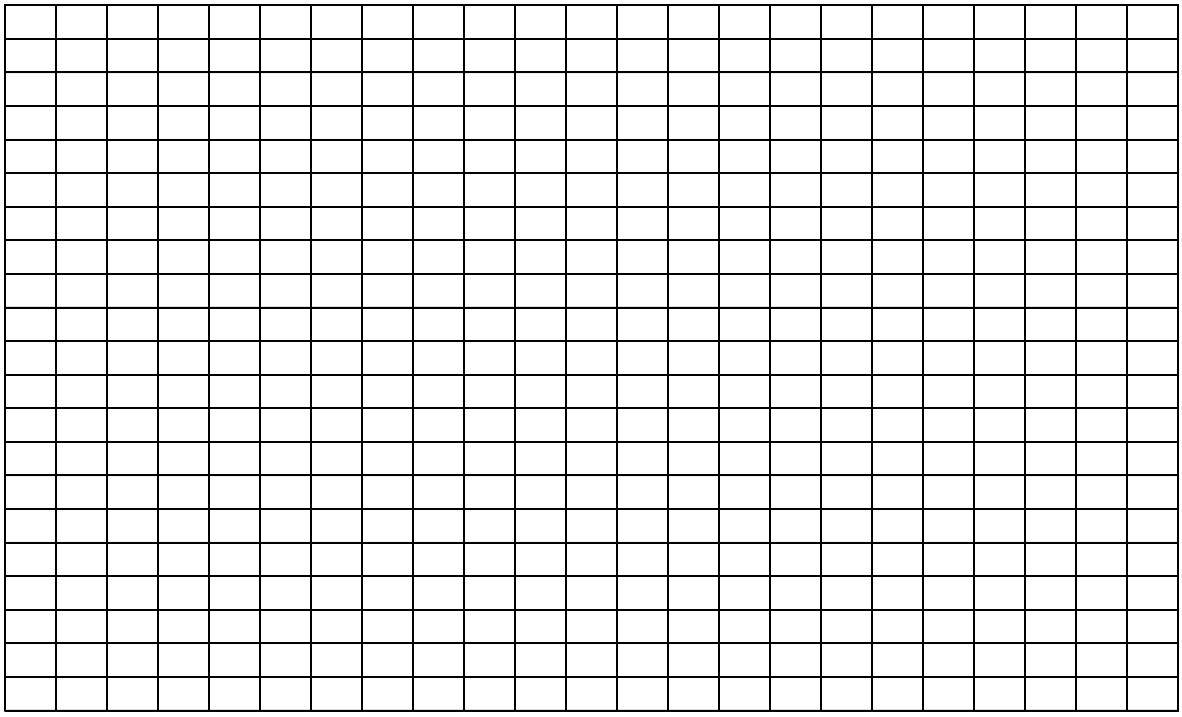
1. In the space provided below, create a bar graph showing the prevalence among pregnant women aged 15-24 years using the data in Table 1.

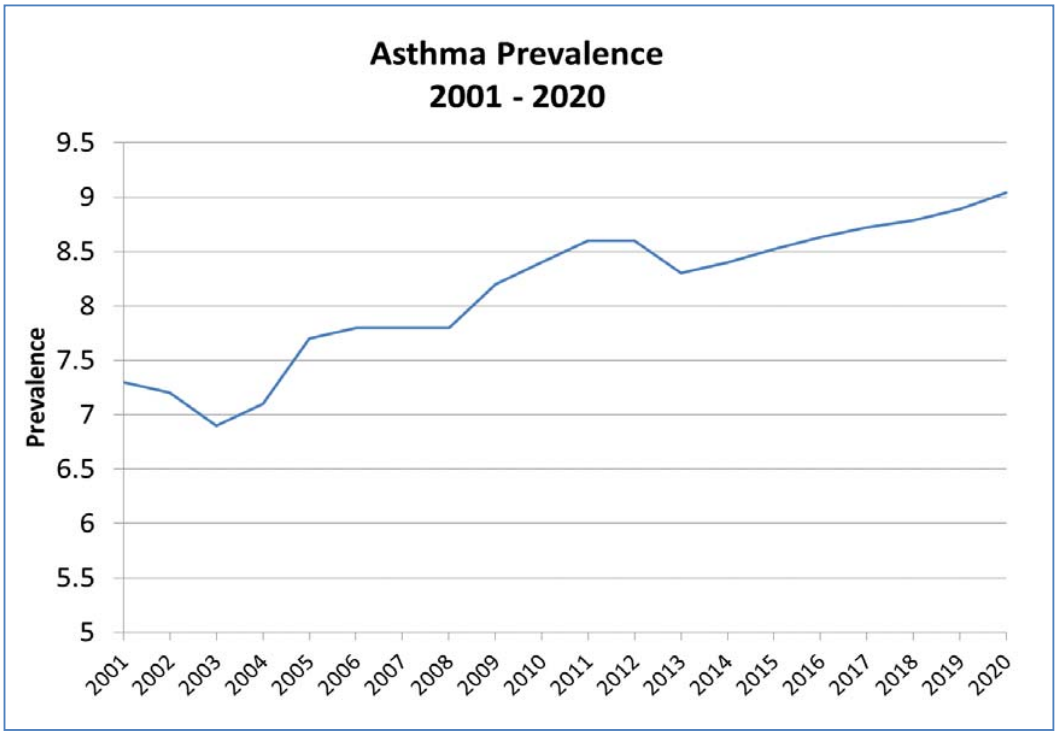


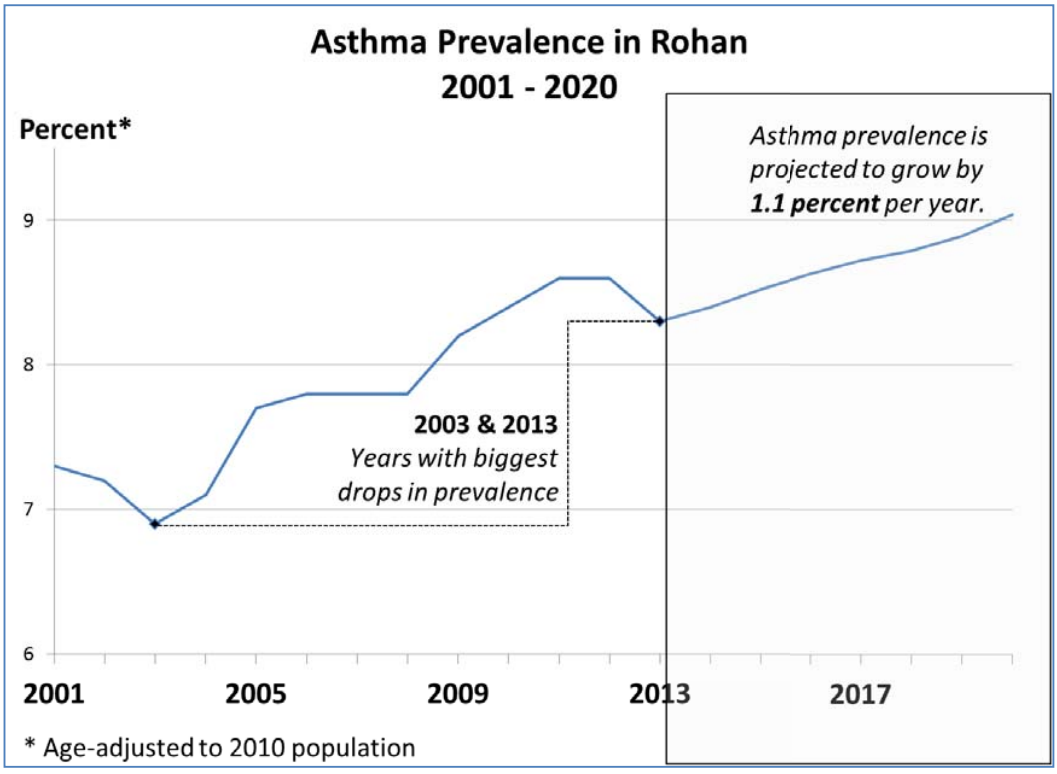
2. In the space provided below, create a line graph comparing HIV prevalence among women and men in different geographical locations.

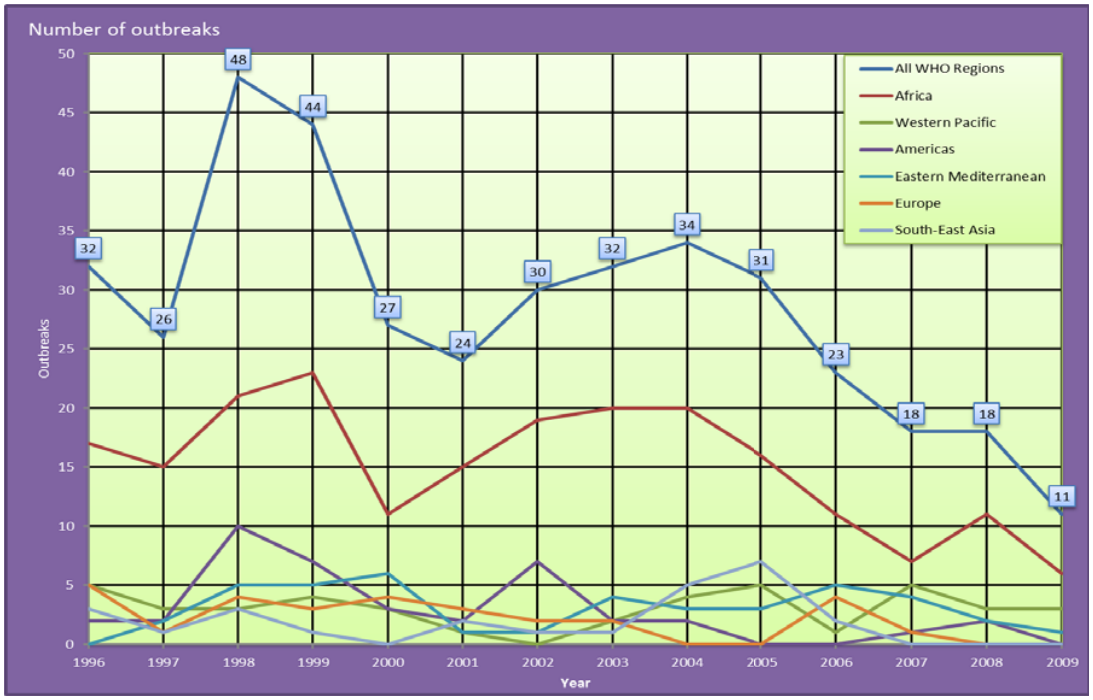


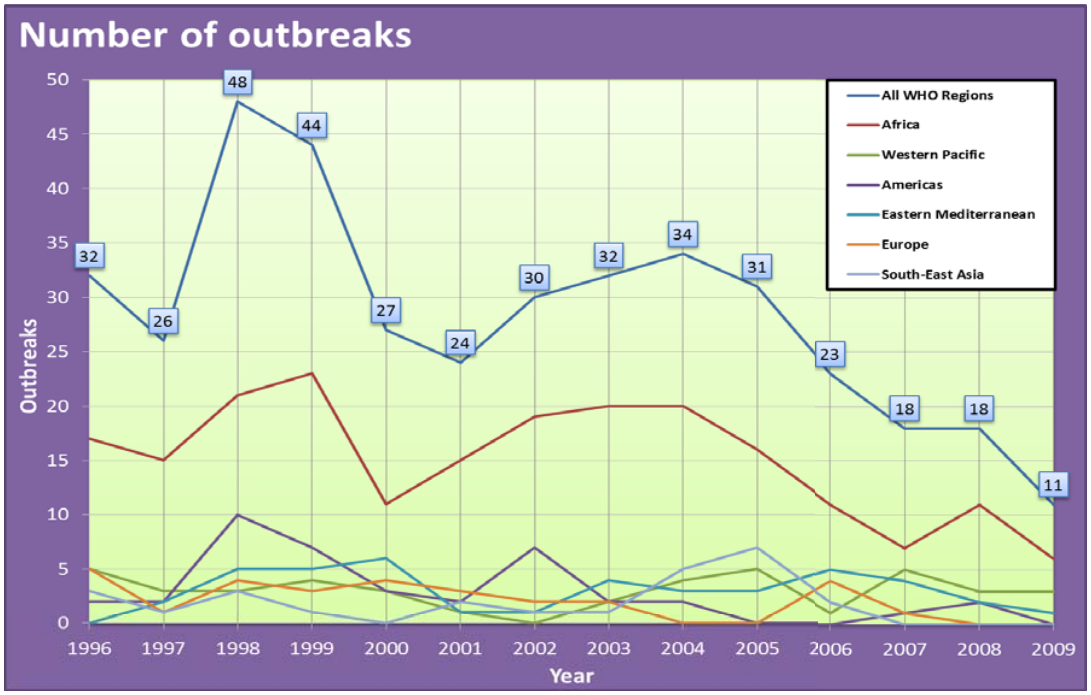
3. Select and draw the correct graph in the space provided below to display some or all of the data in Table 2.

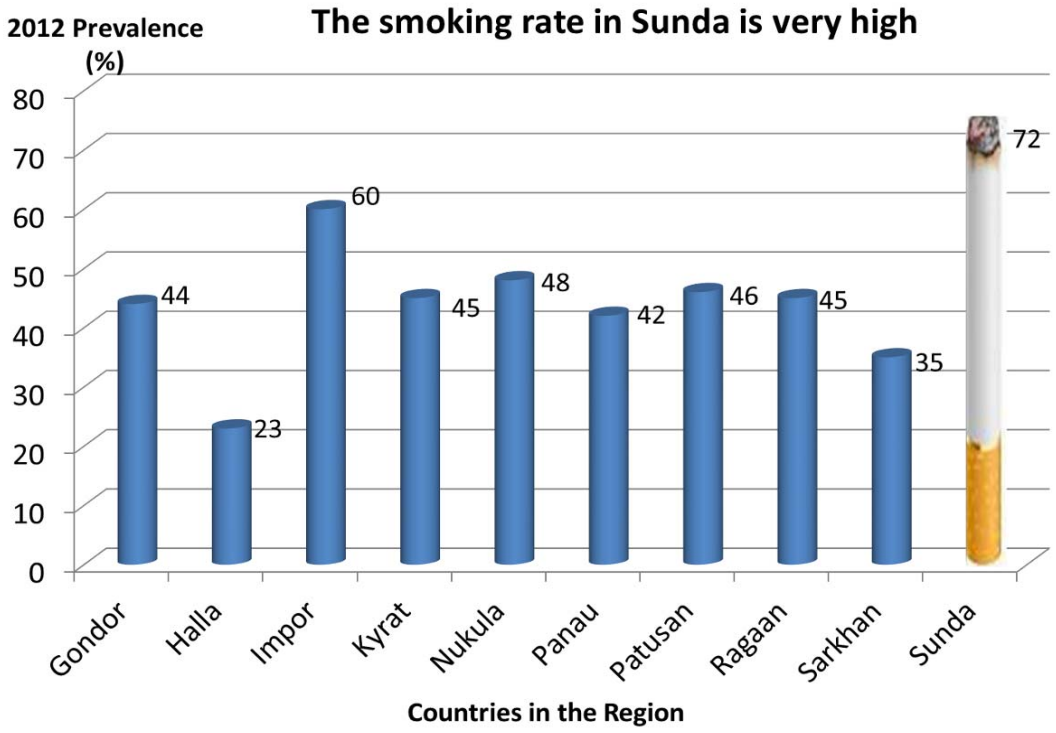



Asthma Prevalence
2001 - 2020
Prevalence
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020


Asthma Prevalence in Rohan
2001 - 2020
Percent*
Asthma prevalence is projected to grow by 1.1 percent per year.
2003 & 2013
Years with biggest drops in prevalence
9
8
7
6
2001
2005
2009
2013
2017
* Age-adjusted to 2010 population


Number of outbreaks
Outbreaks
Year
All WHO Regions
Africa
Western Pacific
Americas
Eastern Mediterranean
Europe
South-East Asia
0
5
10
15
20
25
30
35
40
45
50
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
32
26
48
44
27
24
30
32
34
31
23
18
18
11


Number of outbreaks
Outbreaks
Year
All WHO Regions
Africa
Western Pacific
Americas
Eastern Mediterranean
Europe
South-East Asia
0
5
10
15
20
25
30
35
40
45
50
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
32
26
48
44
27
24
30
32
34
31
23
18
18
11


The smoking rate in Sunda is very high
2012 Prevalence (%)
80
70
60
50
40
30
20
10
0
44
23
60
45
48
42
46
45
35
72
Gondor
Halla
Impor
Kyrat
Nukula
Panau
Patusan
Ragaan
Sarkhan
Sunda
Countries in the Region

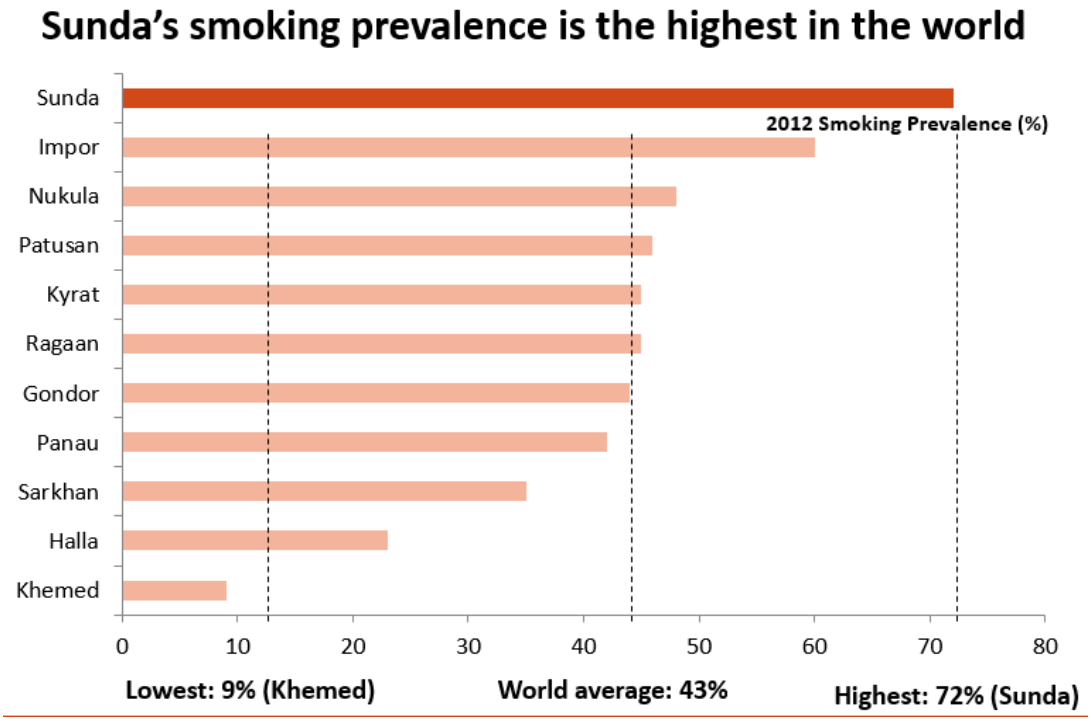
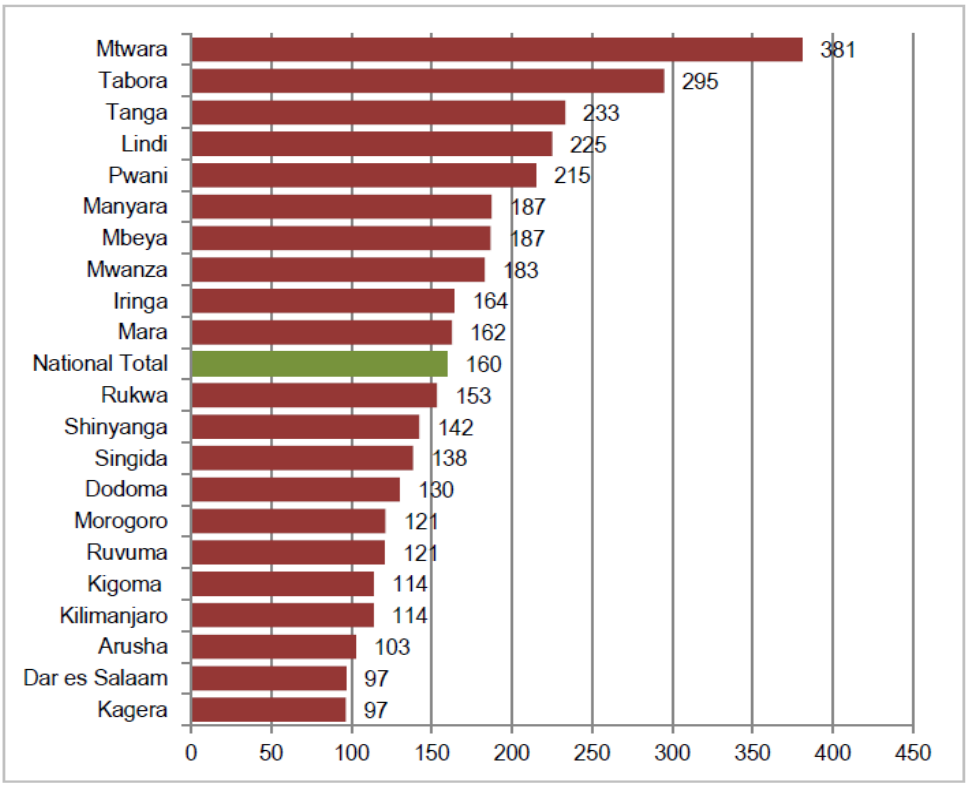
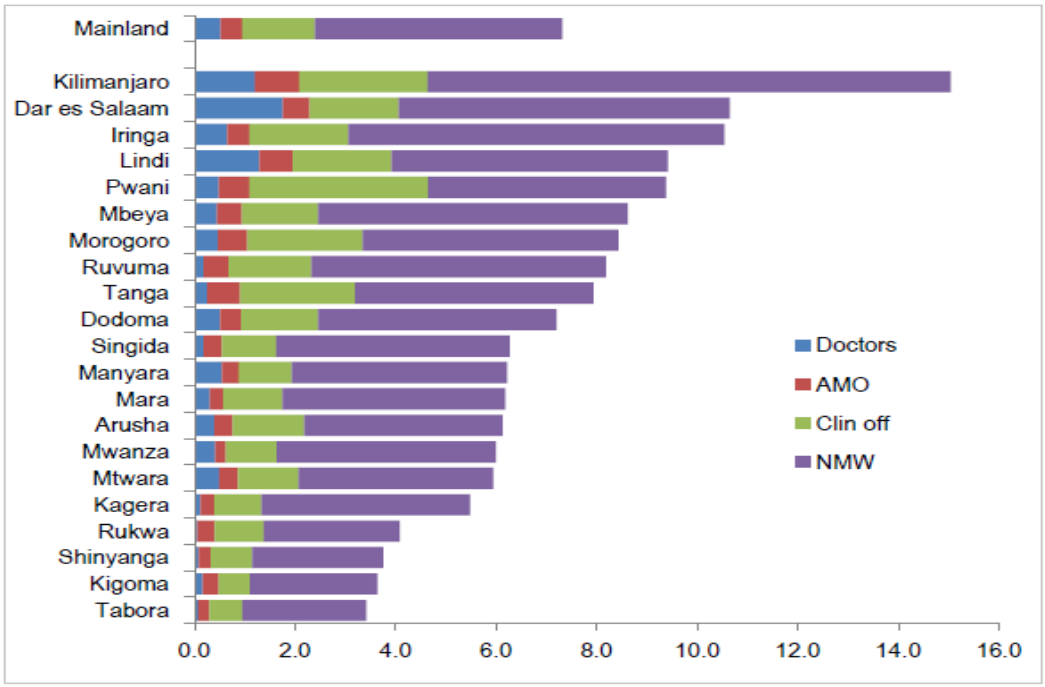

Sunda's smoking prevalence is the highest in the world
Sunda
Impor
Nukula
Patusan
Kyrat
Ragaan
Gondor
Panau
Sarkhan
Halla
Khemed
2012 Smoking Prevalence (%)
0
10
20
30
40
50
60
70
80
Lowest: 9% (Khemed)
World average: 43%
Highest: 72% (Sunda)

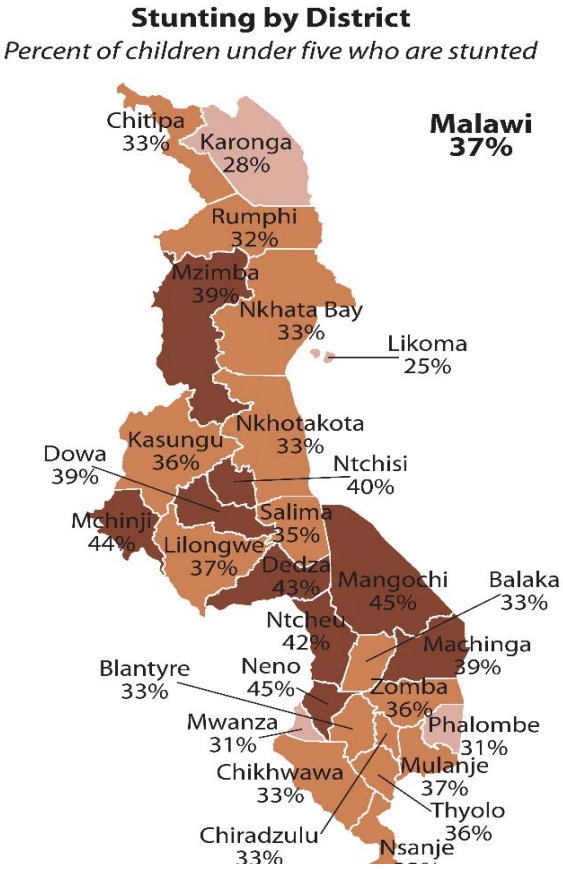
Figure 12: Maternal mortality per 100,000 live births in health facilities (case fatality rate) by region, HMIS, for 2011 and 2012 combined



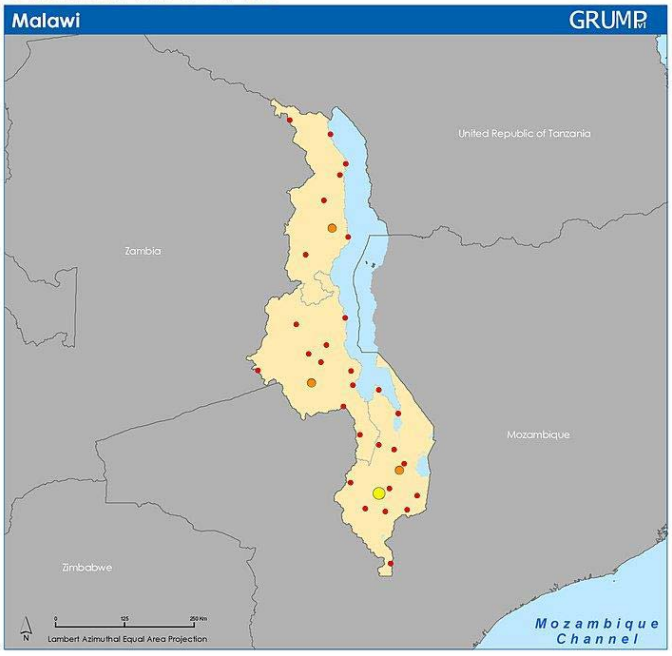
Health workers per 10,000 population, Tanzania, by region, 2012

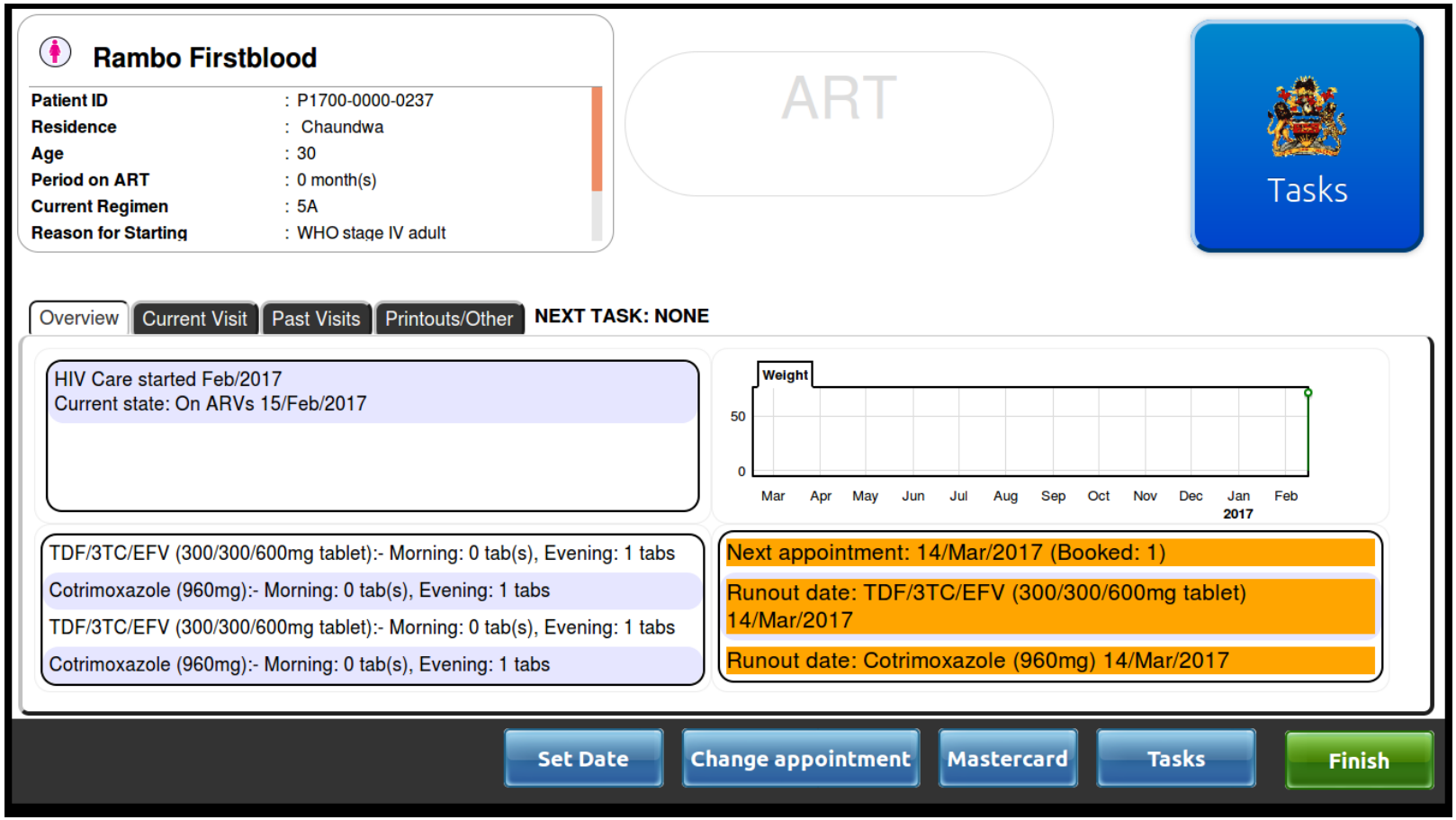


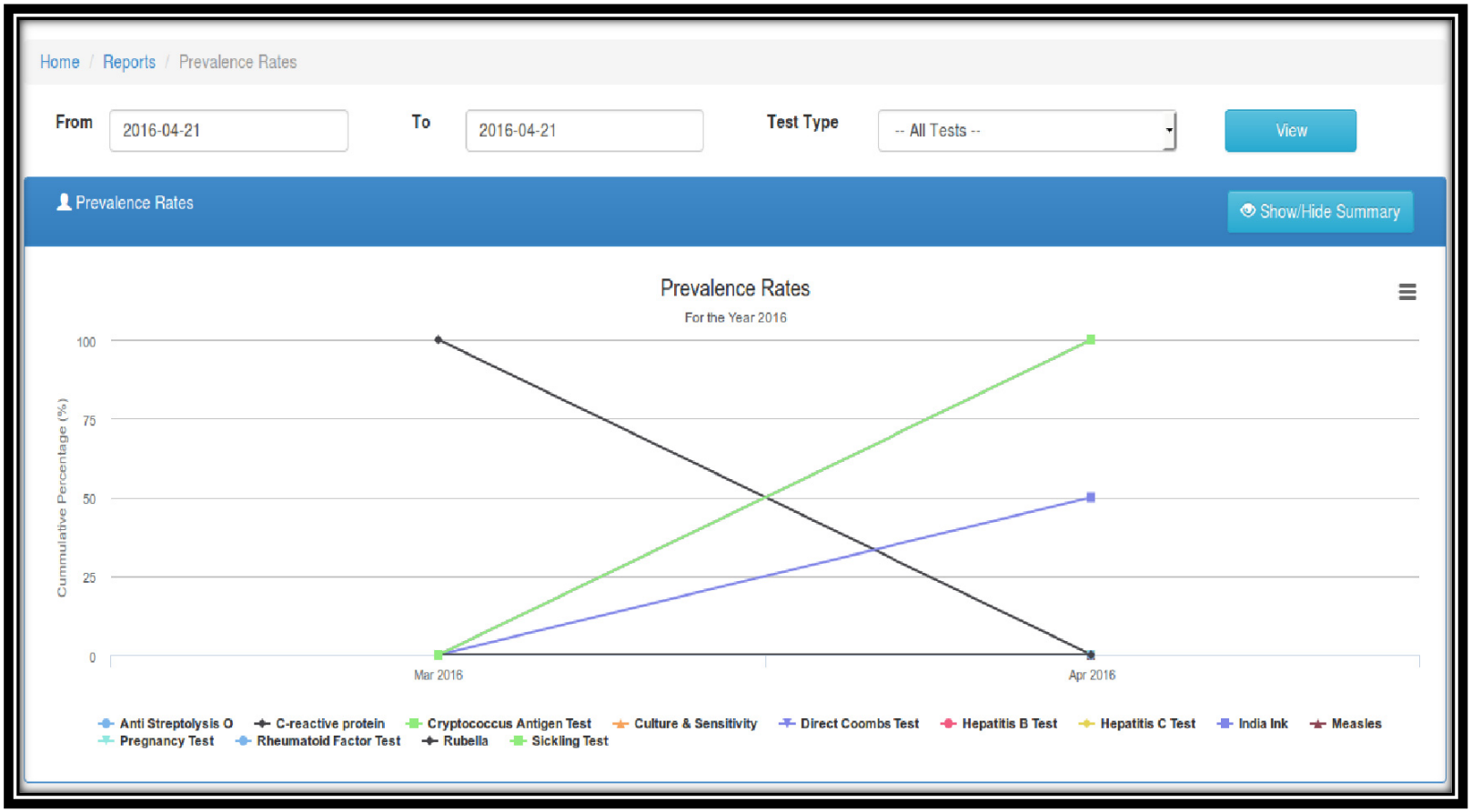
Maps



SETTLEMENT POINTS




Rambo Firstblood
Patient ID : P1700-0000-0237
Residence : Chaundwa
Age : 30
Period on ART : 0 month(s)
Current Regimen : 5A
Reason for Starting : WHO stage IV adult
ART
Tasks
Overview
Current Visit
Past Visits
Printouts/Other
NEXT TASK: NONE
HIV Care started Feb/2017
Current state: On ARVs 15/Feb/2017
Weight
50
0
Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb
2017
TDF/3TC/EFV (300/300/600mg tablet):- Morning: 0 tab(s), Evening: 1 tabs
Cotrimoxazole (960mg):- Morning: 0 tab(s), Evening: 1 tabs
TDF/3TC/EFV (300/300/600mg tablet):- Morning: 0 tab(s), Evening: 1 tabs
Cotrimoxazole (960mg):- Morning: 0 tab(s), Evening: 1 tabs
Next appointment: 14/Mar/2017 (Booked: 1)
Runout date: TDF/3TC/EFV (300/300/600mg tablet) 14/Mar/2017
Runout date: Cotrimoxazole (960mg) 14/Mar/2017
Set Date
Change appointment
Mastercard
Tasks
Finish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For the Year 2016
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Mar 2016
Apr 2016
Anti Streptolysis O
C-reactive protein
Cryptococcus Antigen Test
Culture & Sensitivity
Direct Coombs Test
Hepatitis B Test
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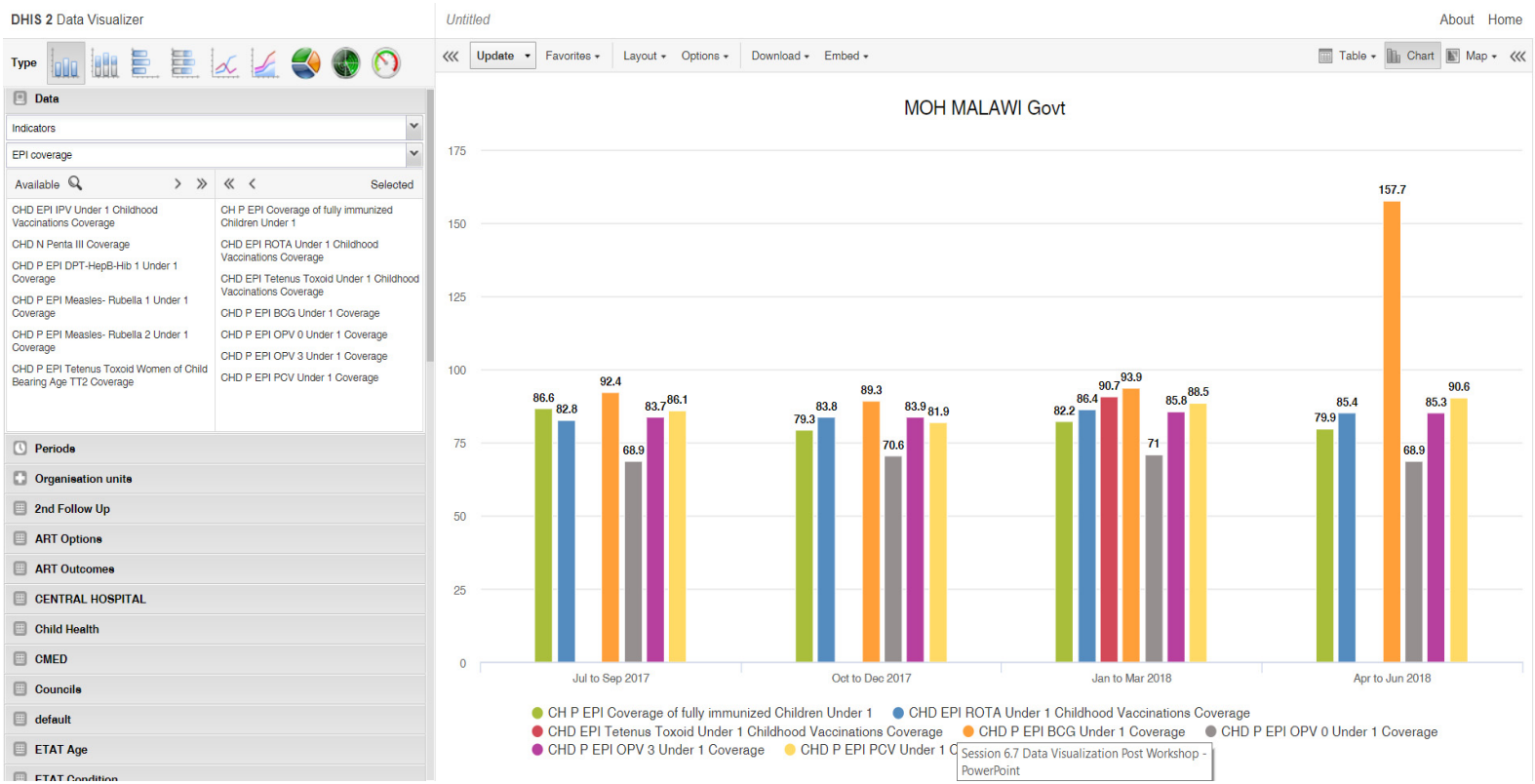
DHIS 2 Data Visualizer
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CHD P EPI Measles- Rubella 1 Under 1 Coverage
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CHD P EPI Tetenus Toxoid Women of Child Bearing Age TT2 Coverage
CH P EPI Coverage of fully immunized Children Under 1
CHD EPI ROTA Under 1 Childhood Vaccinations Coverage
CHD EPI Tetenus Toxoid Under 1 Childhood Vaccinations Coverage
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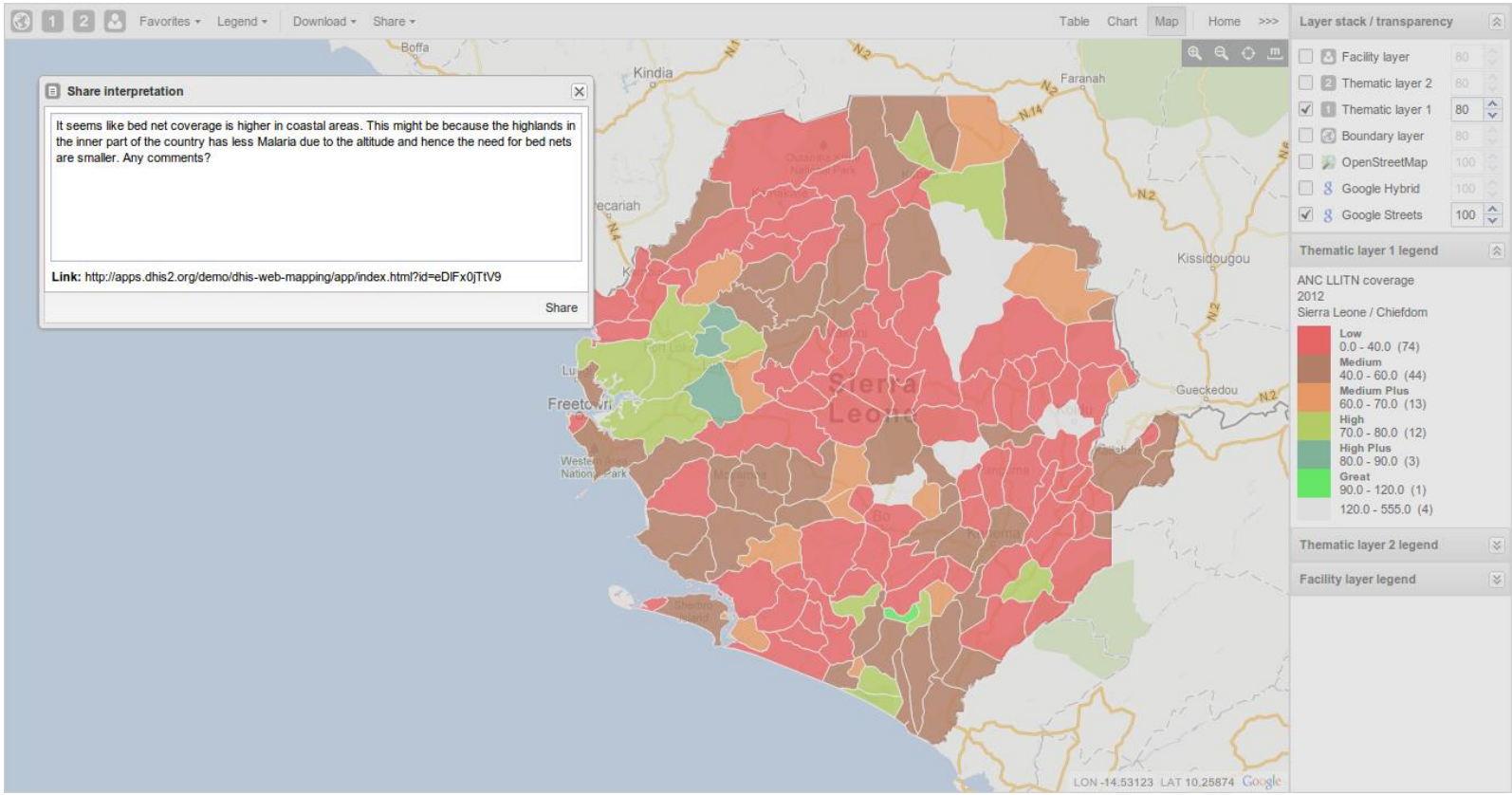
Session 6.7 Data Visualization Post Workshop - PowerPoint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Share interpretation
It seems like bed net coverage is higher in coastal areas. This might be because the highlands in the inner part of the country has less Malaria due to the altitude and hence the need for bed nets are smaller. Any comments?
Link: http://apps.dhis2.org/demo/dhis-web-mapping/app/index.html?id=eDlFx0jTtV9
Share
Boffa
Kindia
Faranah
Kissidougou
Gueckedou
Freetown
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Facility layer
Thematic layer 2
Thematic layer 1
Boundary layer
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Google Hybrid
Google Streets
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Medium Plus
60.0 - 70.0 (13)
High
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High Plus
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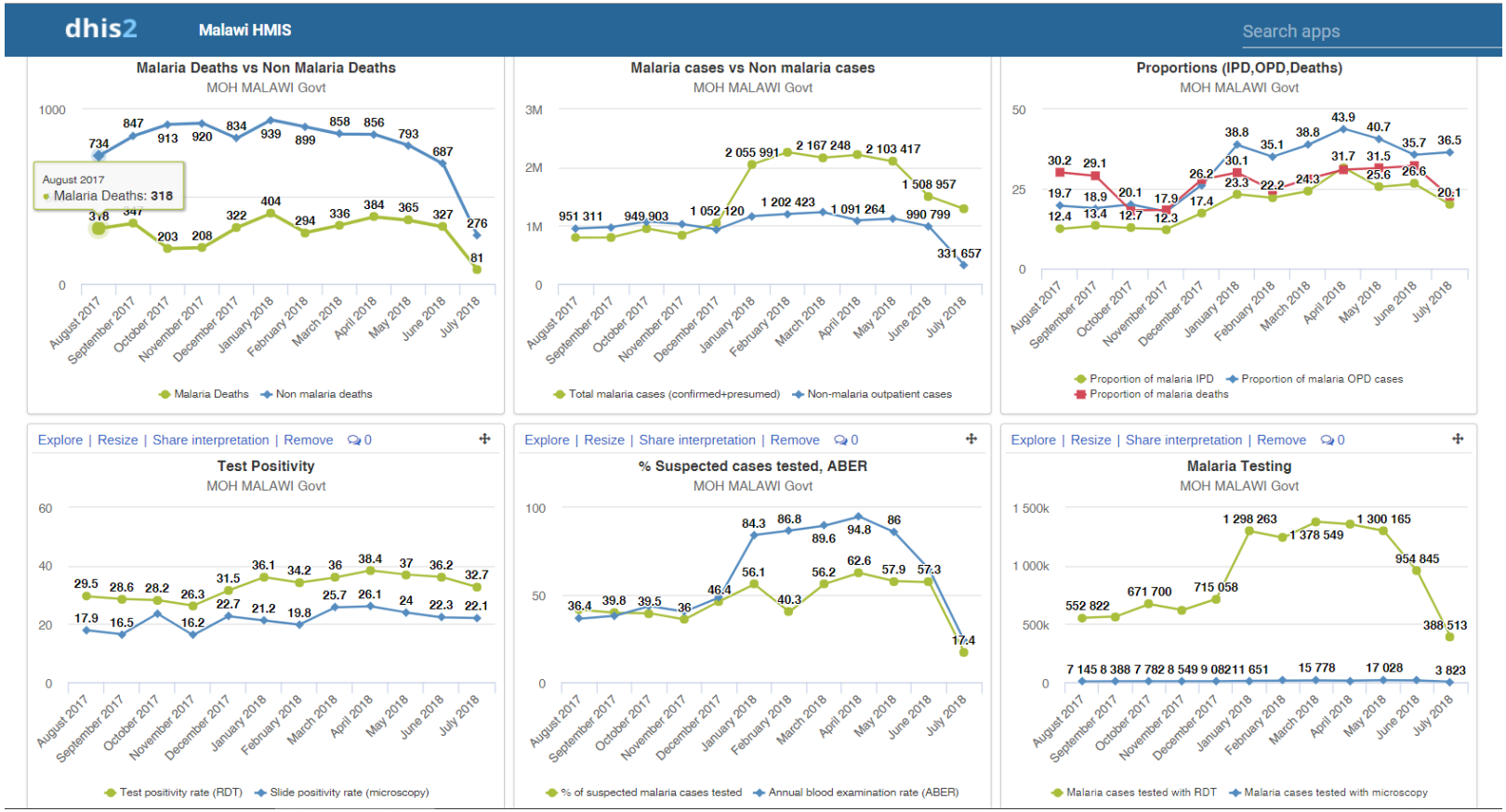
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Malawi HMIS
Search apps
Malaria Deaths vs Non Malaria Deaths
MOH MALAWI Govt
August 2017
Malaria Deaths: 318
Malaria Deaths
Non malaria deaths
Malaria cases vs Non malaria cases
MOH MALAWI Govt
Total malaria cases (confirmed+presumed)
Non-malaria outpatient cases
Proportions (IPD,OPD,Deaths)
MOH MALAWI Govt
Proportion of malaria IPD
Proportion of malaria OPD cases
Proportion of malaria deaths
Explore | Resize | Share interpretation | Remove 0
Test Positivity
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Test positivity rate (RDT)
Slide positivity rate (microscopy)
Explore | Resize | Share interpretation | Remove 0
% Suspected cases tested, ABER
MOH MALAWI Govt
% of suspected malaria cases tested
Annual blood examination rate (ABER)
Explore | Resize | Share interpretation | Remove 0
Malaria Testing
MOH MALAWI Govt
Malaria cases tested with RDT
Malaria cases tested with microscopy

Handout 6.5.5: Pivot Tables and Charts in DHIS2

PIVOT TABLES

Create a Pivot Table

a. In the Apps menu, click Pivot Table.
b. In the menu to the left, select the dimension items you want to analyse—for example, data elements or indicators.
c. Click Layout and arrange the data dimensions as columns, rows, and filters. You can keep the default selection if you want.
d. Click Update.

Modify a Pivot Table

a. Click Layout in the top menu to open the layout screen.
b. In this screen you can position your data dimensions as table columns, rows, or filters by clicking and dragging the dimensions from the dimensions list to the respective column, row, and filter lists.
c. Set any number of dimensions in any of the lists.
   For example, you can click on Organisation units and drag it to the row list in order to position the organization unit dimension as table rows.
d. Click Update.

CHARTS

Create a Chart

a. In the Apps menu, click Data Visualizer.
b. Select a chart type.
c. In the menu to the left, select the metadata you want to analyse. You must select one or more elements from all of the three dimensions—data (indicators, data elements, reporting rates), periods (weekly, monthly, bimonthly, quarterly, semi-annual, annual, biannual) and organization units (national, district or health facility level). Last 12 Months from the period dimension and the root organization unit are selected by default.
d. Click Layout and arrange the dimensions. You can keep the default selection if you want.
e. Click Update.

Modify a Pivot Table

a. Click Layout in the top menu to open the layout screen.
b. In this screen you can position your data dimensions as table columns, rows, or filters by clicking and dragging the dimensions from the dimensions list to the respective column, row, and filter lists.
c. Set any number of dimensions in any of the lists.
d. For instance, you can click on Organization units and drag it to the row list in order to position the organization unit dimension as table rows.
e. Click Update.

Handout 6.5.6: Case Study Using Reports and Dashboards

In your small group, read the scenarios below and discuss the following questions:

a) What data and information are needed to address the question or problem in the scenario?
b) What report or dashboard will provide you with the data you need?
c) What e-HIS application can provide you with the report? Which one has a dashboard that you can use?

1. Mr Chafulumira, an ART clinical provider, has noticed that the HIV drug consumption rate is declining at his facility. He would like to find out whether patients are returning for care.

2. An anonymous contribution to the suggestion box asserted that a laboratory technician is lazy, slow to do his work, and knocks off early.

3. Dr Chibwe would like to identify all patients between the ages of 13 and 20 enrolled in the HIV programme who have not been screened for TB and have HIV-positive family members.

4. The media recently reported that people are waiting 10 times longer to get their test results from the laboratory at Kambehi District Hospital. The chief medical officer approached the laboratory manager to ask for an explanation. The laboratory manager knows that the Haematology Department has been short-staffed for the past month, and that this may be causing the delay.

5. Watipaso Mkandire, a surgeon in the OB/GYN ward, complains that he always has to reschedule his surgeries because he is not getting timely FBC test results from the laboratory.

Session 6.6: Communicating Health Information

Time: 175 minutes

Learning Objectives

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

1. Define the key elements of communication
2. Define a single overriding communication objective
3. Identify the components of the communication model
4. Identify target audiences for communication
5. Select appropriate channels for communication
6. Present a communication plan for a health problem or issue

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape LCD
2	45 minutes	Interactive lecture, pair activity, practical activity, group work	Elements of communication, communication model, goals and objectives (slides 4–10)	Flip chart, markers, tape LCD, Handout 6.6.1
3	50 minutes	Interactive lecture, practical activity	Key Messages (slides 11–22)	Flip chart, markers, tape LCD, Handout 6.6.1
4	25 minutes	Interactive lecture, practical activity	Target Audiences (slides 23–27)	Flip chart, markers, tape LCD, Handout 6.6.1
5	45 minutes	Interactive lecture, practical activity	Dissemination (slides 28–36)	Flip chart, markers, tape LCD, Handout 6.6.1
6	5 minutes	Facilitator presentation	Key points (slide 37)	LCD

Handouts

Handout 6.6.1: Communication Plan

Resources Needed

- Flip chart, paper, and markers, tape

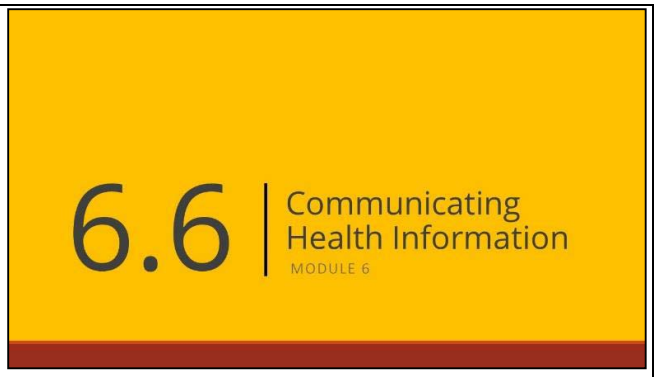
- LCD or overhead projector
- Public Health Reports Writing Guide

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2

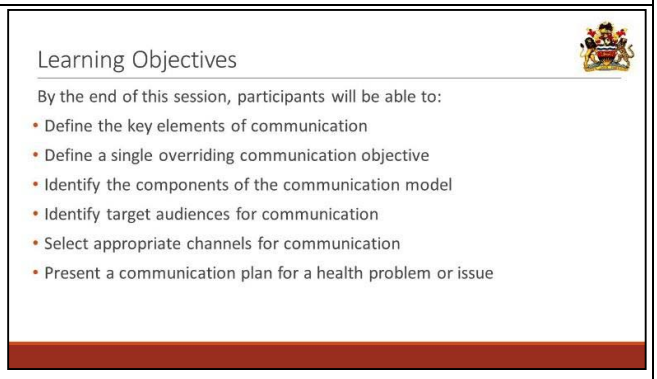
EXPLAIN that the last session looked at how to select, make, and use data visualization, reports, and dashboards to make decisions, particularly those at the facility level.



This session will build on the previous one, and look at how to strategically communicate health information to key audiences, such as the community, policy makers, donors, and other stakeholders.

Slide 3

REVIEW the learning objectives for this session.



EXPLAIN to participants that they will be working in pairs throughout this session to develop a communication plan and presentation related to a specific health issue or problem. As the session goes through each element and component of a communication plan, participants will be given time to work on their own plans.

Trainer Instructions: Step 2 (45 minutes)

Use slides 4–10 and the facilitator notes to guide this step.

Slide 4

ASK participants to work in pairs to discuss the following:

- What are the potential uses of the health information produced by the Ministry (or your facility)?
- To whom is that health information communicated? Why?
- How is it communicated (format, frequency, etc.)?

ALLOW 5 minutes to discuss.

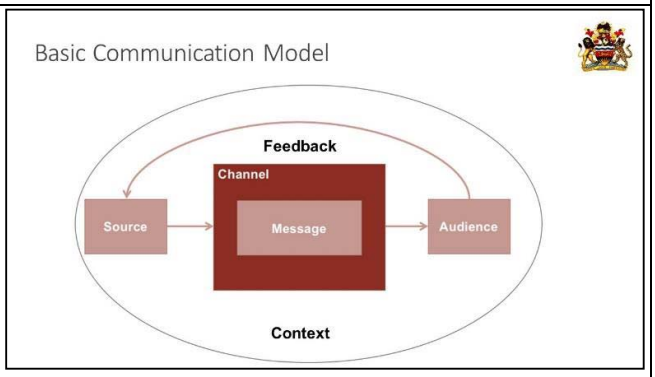
On completion, **ASK** a few volunteers for their responses.

Slide 5

ASK: What are the basic elements required for communication?

EXPLAIN that a basic communication model includes:

- The message—the information you are trying to convey
- The source—the person or organization sending the message
- The channel or method used to send the information
- The audience—those who receive and interpret the message

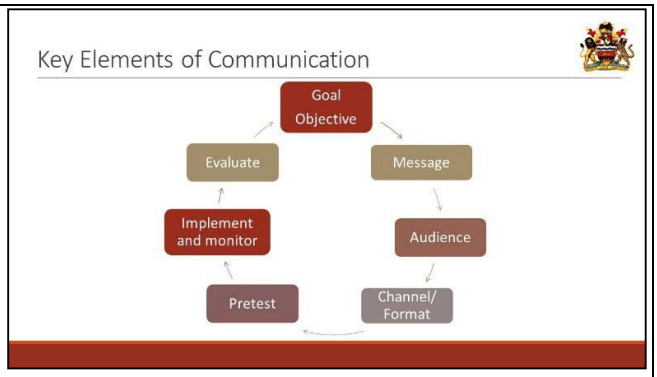


DISCUSS the following points:

- You can see from the diagram that communication is bi-directional: the source communicates with the audience, and the audience provides feedback to the source.
- The elements of this model are greatly affected by the context in which the communication occurs. Factors such as politics can affect all four of these components.
- Communication can be internal—that is, taking place within an organization (e.g., the Ministry as a whole, a district, or even a facility)—or external facing (communicating with the public directly or through media).
- We also need to consider the strategy for dissemination—i.e., whether it will be active or passive.

Slide 6

EXPLAIN that in this session, we're going to introduce the basic elements of communicating health information, and talk in more detail about some of the components. You may have seen similar versions of this framework. It is called a **communications plan**. It's all essentially the same concept.



The process starts with:

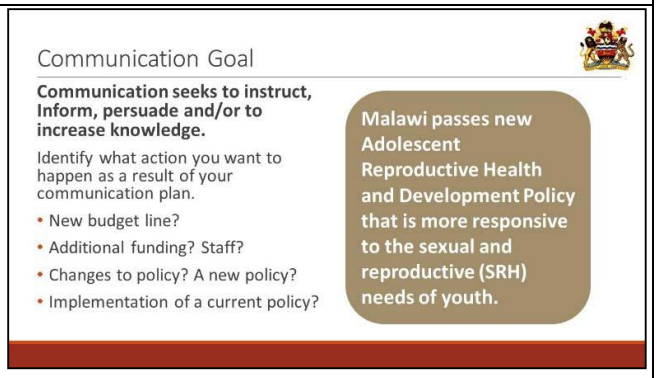
- Identifying a goal—determining the high-level outcome you are looking to achieve
- Developing a relevant communication objective
- Developing messages that are tailored for different audiences
- Determining who the audiences are, and what they need with regard to your issue
- Determining the best channel or formats to deliver the message
- Designing a plan for pretesting materials and presentations
- Implementing and monitoring
- Evaluating the impacts of your work

Slide 7

ASK: What is the goal of communication?

Answer: *To instruct, inform, persuade, and/or increase knowledge.*

EXPLAIN that the first question we need to ask is: What is your goal?



This step is where you clearly identify the ultimate action you want to have happen. Is it the creation of a budget line, additional funding, changes to policy language, implementation of an existing policy, or a new policy altogether? Before you get started, you will need to be very clear about what it is you're trying to achieve, so that you can plan for how to get there.

EXPLAIN that what we are looking at in this slide is an example of a policy goal.

ASK: What is the communication goal for this policy?

Slide 8

NOTE: This slide is animated.

EXPLAIN that the communication objective refers to the key message that you need to convey in order to achieve your goal. The most important message is considered your single overriding communication objective.

This objective often includes one of the four common communication purposes:

- **Change**: creating growth/decline in values for different times/age periods
- **Comparison**: showing differences in values based on a categorical breakdown
- **Composition**: deconstructing a total into subgroups
- **Correlation**: showing the relationship between different variables

EXPLAIN that once your communication goal and objective are identified, you can begin to identify the source, message, audience, and channel to use for your communication activities.

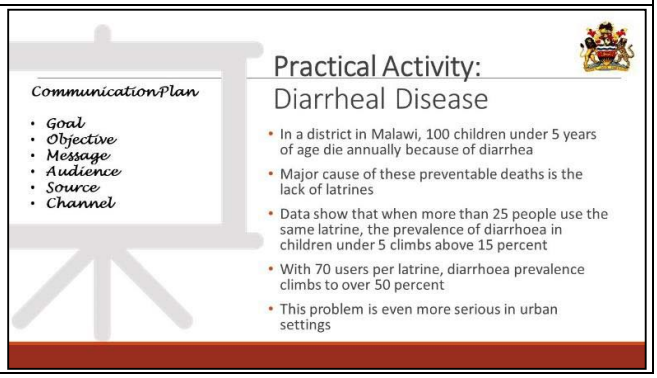
CLICK on the slide to reveal the Malawi ARHD policy example. Use this example to **LEAD** a large group discussion on the communication objective for passing a new policy.

ENCOURAGE participants to think of one or two communication purposes that can be used to highlight the communication objective:

- What **change** do you want to see as a result of this new policy?
- What **comparisons** would you like to make to show that the new policy is responsive to the sexual and reproductive needs of youth?

EMPHASIZE that any communication has one objective; the entire communication is focused on that objective.

Slide 9



DIVIDE participants into groups of three or four.

REFER them to **Handout 6.6.1: Communication Plan**.

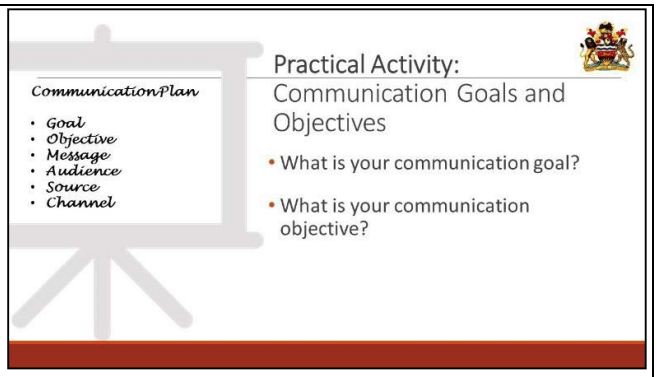
EXPLAIN that over the course of this session, they will develop a communication plan focused on the problem of diarrheal deaths.

Slide 10

EXPLAIN that once they have selected their issue they should:

- Decide on a communication goal
- Define the communication objective.

FILL in the Goal and the Objective sections of **Handout 6.6.1: Communication Plan**



ALLOW 30 minutes for this first activity.

After 30 minutes, **GIVE** each pair three (3) minutes to report back with their issue, communication goal, and communication objective.

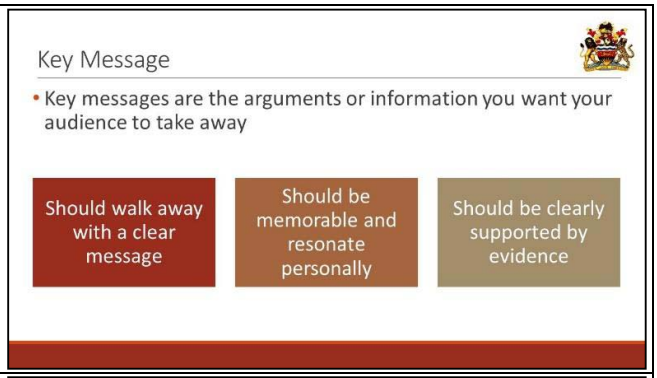
Trainer Instructions: Step 3 (50 minutes)

Use slides 11–22 and the facilitator notes to guide this step.

Slide 11

RECALL that the next step in developing a communication plan is crafting your **MESSAGE**.

REVIEW these key points about messages.

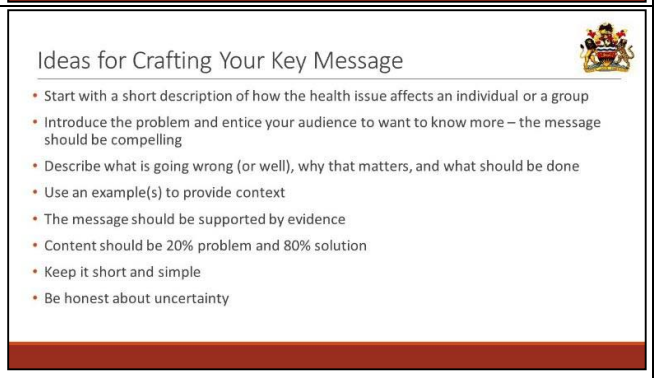


Slide 12

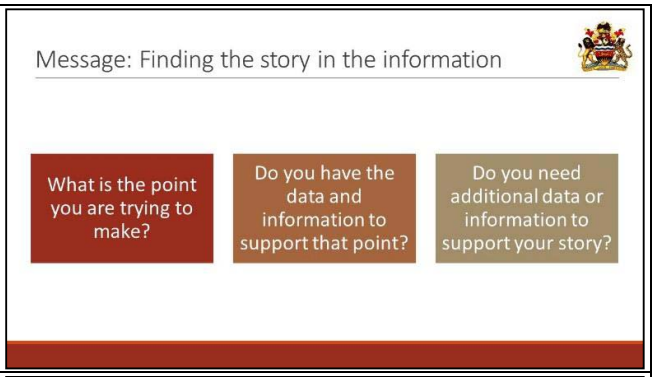
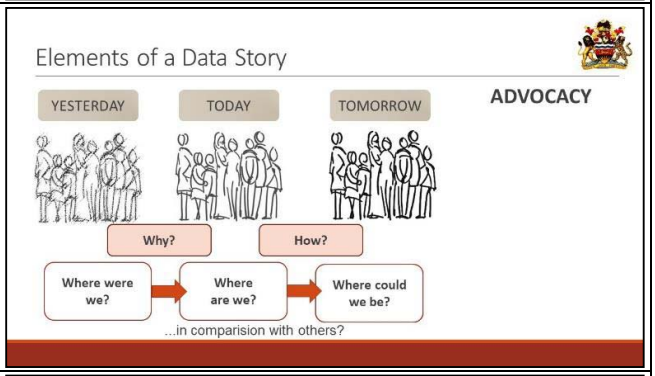
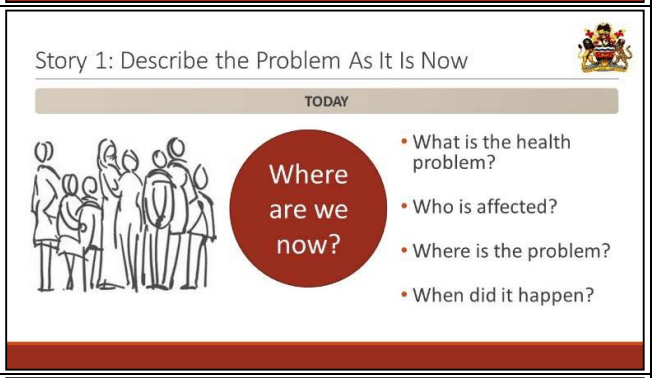
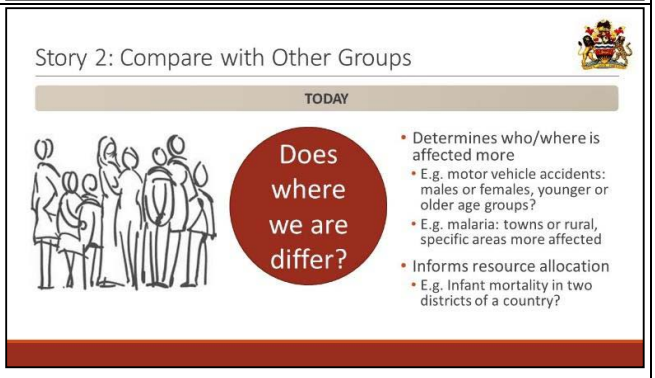
NOTE: This slide is animated.

EXPLAIN that your message is based on your objective and your audience.

CLICK to highlight the point that messages should be supported by evidence.

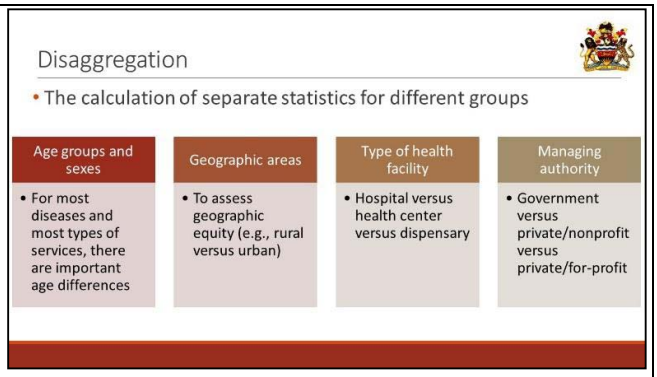


EXPLAIN that messages must always be based on evidence and understanding. Our strongest messages are best supported by evidence (RHIS, surveys, science). If there is little supporting knowledge or consensus, our stories require more effort to explain, and we must be honest about uncertainty. Try to communicate one idea with each message using clear and concise communication.

Slide 13	**RECALL** the 'data stories' we have discussed.	
Slide 14	**NOTE:** This slide is animated. The heading changes after each click.	
Slide 15	**EXPLAIN** that the most basic data story is simply a description of where we are now—for example, what the crude death rate this year is. **REVIEW** the purpose of descriptive epidemiology and analysis here.	
Slide 16	**EXPLAIN** that a slightly more complicated data story is to describe where we are now, and compare it across place or different population groups. Group comparison determines who is affected more, or where the problem is the worst. For example, with motor vehicle accidents, are males or females more affected? Are younger or older people more affected? Or, for malaria, are towns or rural areas more affected? Comparing groups informs resource allocation—for example, looking at infant mortality in two districts.	

Slide 17

EXPLAIN that for most indicators, the data and the analysis should be **disaggregated**. That is, separate statistics should be produced for different groups. Therefore, the analytic calculations are done several times—once for each group with its own numerator and denominator.



ASK: Why do you think we disaggregate?

Answer: *The ability to compare groups often provides interesting information that can be useful.*

The most common types of disaggregation involve:

- **Age group and sex**: For most diseases and most types of services, there are important age differences, especially between children younger than 5 and older patients. For some diseases, such as HIV, there may also be important differences between males and females.
- **Geographical area**: Routine facility data are an ideal source for assessment of disparities between geographical areas, districts, and even individual health facilities.
- **Type of health facility:** Hospitals provide a different volume and range of services than do smaller health facilities. Disaggregating statistics by type of facility helps to examine whether the completeness of reporting is lower from some types of facility than others.
- **Managing authority**: Government versus private/for-profit versus private/non-profit.

NOTE: It may be necessary to acknowledge the absence or incompleteness of private-sector data

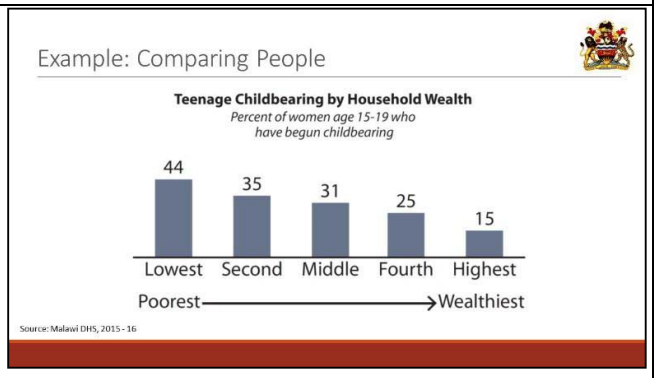
Slide 18

EXPLAIN that here we are looking at a chart showing the percentage of teenage women aged 15–19 who have begun bearing children.

ASK: How were these data disaggregated?

Answer: *By household wealth*

ASK: What is the key message this chart is trying to convey?



Answer: *That the percentage is highest among adolescents from the poorest households, and among those from the wealthiest households.*

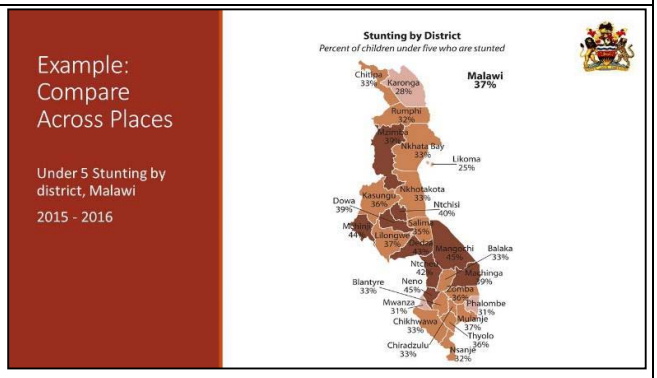
EXPLAIN: *Adolescent women in the poorest households are nearly three times as likely as those in the wealthiest households to have begun childbearing (44% versus 15%).*

ASK: *Was this an effective way to disaggregate and communicate this data? Why or why not?*

Answer: Yes, because this comparison provides interesting information that can inform decision making.

Slide 19

EXPLAIN that here we see a map of the prevalence of under-five stunting by district in Malawi. The lighter colours indicate a lower prevalence; the darker colours a higher prevalence.



ASK: How were these data disaggregated?

Answer: *By place/location/district*

ASK: What is the key message this map is trying to convey?

Answer: *Children under the age of 5 years in different districts experience different rates of stunting.*

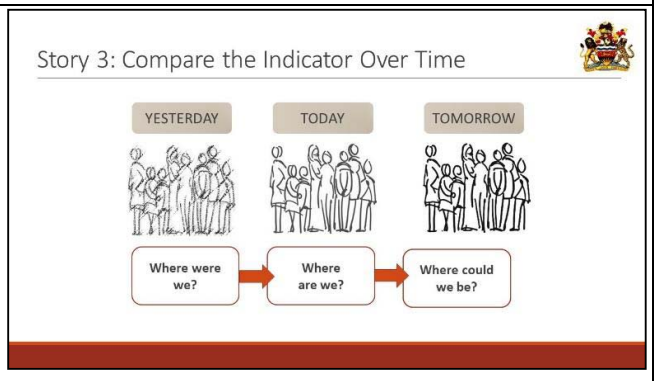
ASK: Was this an effective way to disaggregate and communicate this data? Why or why not?

Answer: *Maybe. If the audience for this data includes people knowledgeable about the causes of stunting, and the possible reasons for the differences between districts, it could be useful for decision making.*

Source: Malawi DHS, 2015–2016.

Slide 20

EXPLAIN that an additional story is to show change over time—for example, trends in death rates. This is possible if comparable data (i.e., of similar case definition and completeness) are available for several years; a multiyear trend is most enlightening.



Although some diseases (such as laboratory-confirmed malaria) and services (total outpatient attendance) may show a seasonal trend, the data for most other diseases would not be expected to show a meaningful short-term trend. In such cases, disaggregation by month should be avoided in tables and graphs.

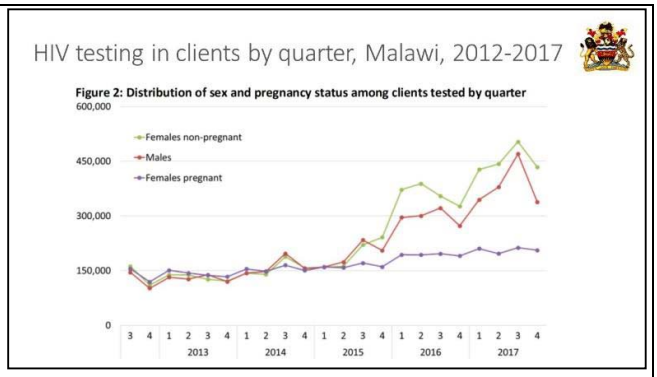
Slide 21

EXPLAIN that this example is comparing the distribution of sex and pregnancy status among those tested for HIV over time.

LEAD a discussion with the full group:

- What is being shown in this graph?
- How does HIV testing compare among males, pregnant females, and non-pregnant females?
- What could account for increases in HIV testing over time? Why are there declines in testing for most groups in the fourth quarter of each year?

Source: Integrated HIV Program Report: October–December 2017.

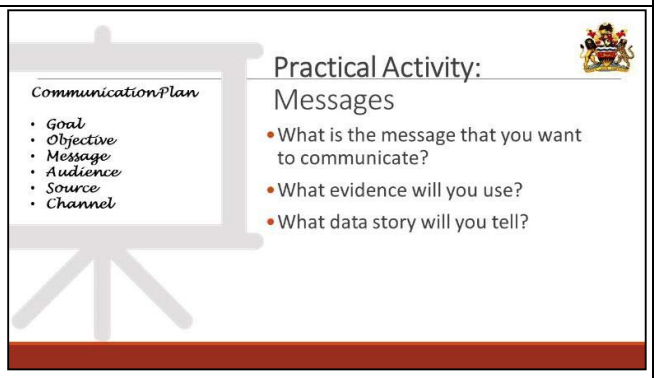


Slide 22

RETURN to the group activity.

EXPLAIN that participants will have 30 minutes to discuss the questions on this slide.

INSTRUCT them to **FILL IN** the Message section of **Handout 6.6.1: Communication Plan**, including the data that they want to use to tell their story.



Trainer Instructions: Step 4 (25 minutes)

Use slides 23–27 and the facilitator notes to guide this step.

Slide 23

EXPLAIN that the next part of communication is about who receives the message: the **audience**.

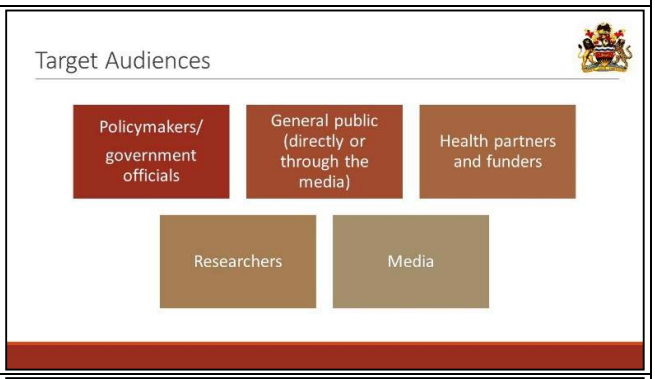
EXPLAIN that messages should be tailored to the people you are communicating with and hoping to influence. Consider their knowledge of the subject, data literacy, and availability to receive the message.

Key questions to consider:

- Who can take action?
- Who has influence and resources?
- Who can affect the outcome?
- Who will oppose the action?

Slide 24

ASK: What are the primary audiences to consider when developing messages about health?

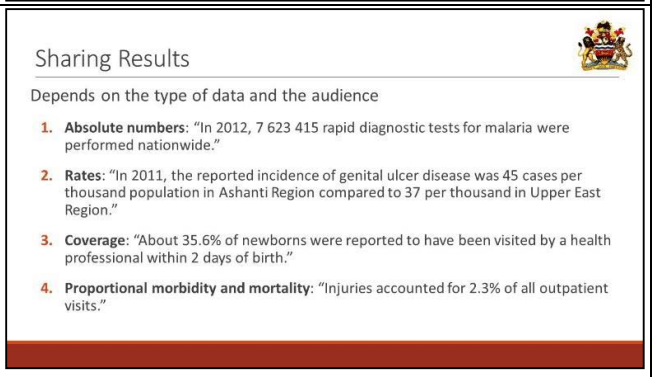


Slide 25

EXPLAIN that how you share information will depend on the orientation of your audience—technical versus non-technical.

ASK participants to modify examples 2–4 for non-technical audiences.

USE the points below to supplement the discussion.



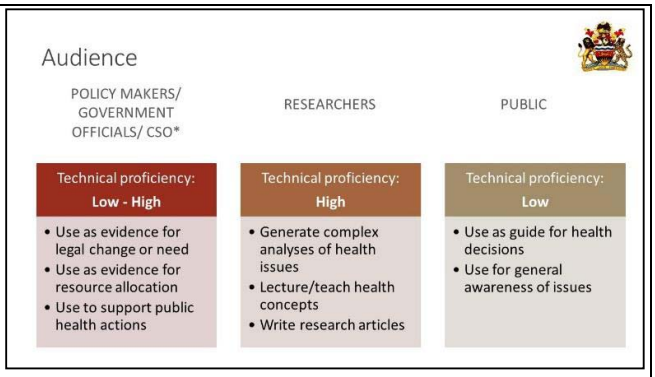
Absolute numbers: Absolute numbers can sometimes provide a useful sense of the volume of services (e.g., '7,623,415 rapid diagnostic tests for malaria were performed nationwide during 2012'). They usually cannot be easily interpreted and compared with the statistics from another geographical region or time. Absolute numbers are also difficult for a non-technical audience to understand especially, when they are not shared on a one-to-one basis. For a non-technical audience, it may be necessary to round the number—e.g., 'almost 8 million', 'more than 7.5 million'.

Rates and coverage: For this reason, health statistics are best presented as rates (e.g., 'during 2011, the reported incidence of genital ulcer disease was 45 cases per thousand in the Ashanti Region, compared to 37 per thousand in the Upper East Region'), or in terms of coverage ('35.6% of newborns were reported to have been visited by a health professional within two days of birth').

Proportional mortality and morbidity: One of the most meaningful ways to analyse disease-specific data on outpatient and inpatient morbidity and mortality is as a proportion of all diseases presenting at the health facility. For example, 'injuries accounted for 2.3% of all outpatient visits'.

Slide 26

EXPLAIN that these next two slides briefly outline the main audiences for sharing health messages, their motivation for receiving information, common messages that are shared with them, and the media that are used to share the messages.



ASK: Why is it important to identify the audience?

Answer: *Stakeholders have different interests in the data, and may use them in different ways. They may have different technical backgrounds, so different language may be needed to convey the message effectively.*

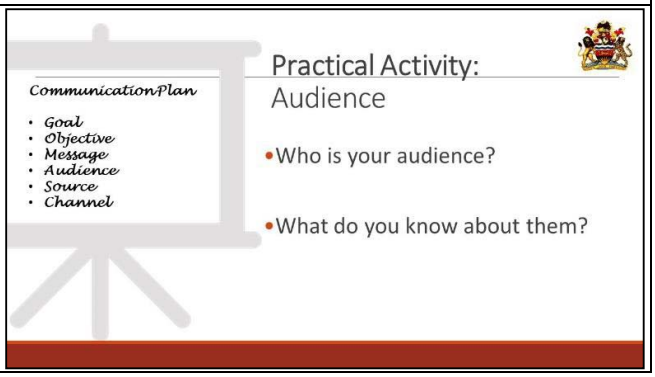
Civil society organizations (CSOs) can form part of the decision-making effort within the society.

Slide 27

RETURN to the group activity.

EXPLAIN that participants will have 15 minutes to discuss the questions on this slide.

INSTRUCT them to **FILL IN** the Audience section of **Handout 6.6.1: Communication Plan.**

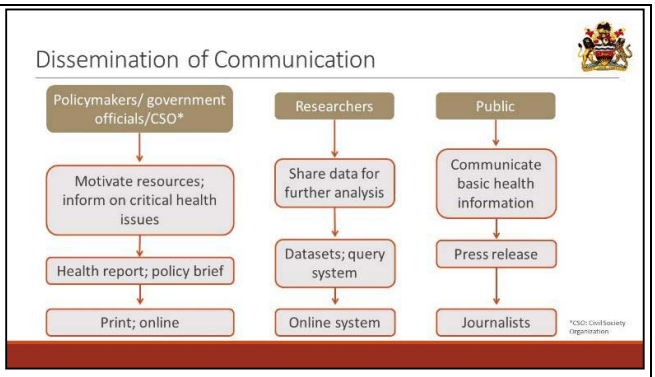


Trainer Instructions: Step 5 (45 minutes)

Use slides 28–36 and the facilitator notes to guide this step.

Slide 28

EXPLAIN that we have identified our goal and our key message, and we know who our audience is, their technical capacity, and their interest in the information. Each of these stakeholders receives communication through a specific channel from a specific source.



A channel is the medium through which the information is transmitted. Now, we must consider how the information will get to the audience we've identified.

Slide 29

EXPLAIN that a source is the person or organization sending the message.

There are usually two types of sources that convey messages:

- Interpersonal sources communicate information through one-on-one interaction; examples of interpersonal sources are family members, friends, and colleagues. Within the health sector, information at most levels is usually shared on a one-to-one basis.
- Mediated sources communicate through one-to-many interaction; they include journalists, politicians, and organizations (e.g., MOHP, WHO, UNICEF).

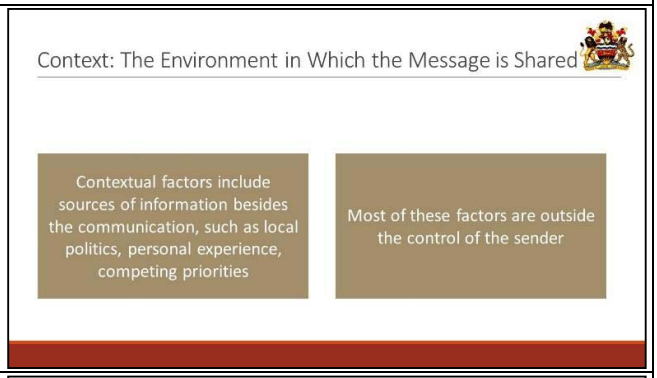
A mixture of sources can result when mass media information is shared with friends through interpersonal interactions.

Slide 30

ASK: Can the context influence if or how the audience will receive the information? Why or why not?

Answer: *Yes.*

ASK FOR or **PROVIDE** examples.



Slide 31

EXPLAIN: Messages are communicated via **channels**. Similar to sources, there are two types of communication channels:

- Interpersonal channels include oral presentations, social media, and text messaging.
- Mediated channels include reports, policy briefs, memos, road shows, newspapers, newsletters, and flyers.

Channel selection is a critical component of message development and distribution. Our audiences are usually colleagues within the Ministry, especially policy makers, or the general public. Consider audience access and preference when crafting a message.

Slide 32

ASK: Can the type of channel(s) selected influence the acceptability and impact of the message?

Answer: *Yes!*

EXPLAIN that it is helpful to try to integrate a range of communication messages and channels over time.

Always be prepared to provide additional resources for information seekers. If your target audience is a group, prioritize the communication channel with the widest reach. If your target audience is an individual, prioritize the communication channel that is most likely to get a response. Decide when you want your intended audience to receive the message.

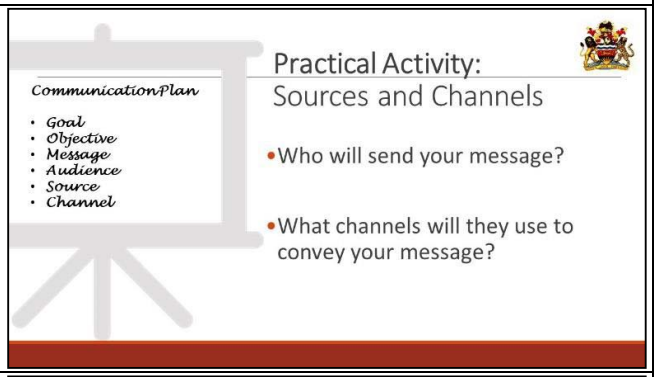
EMPHASIZE that these various communication channels and media outlets are **tools** to support your communication strategy; they are NOT a communication strategy in and of themselves.

Slide 33

RETURN to the pair activity.

EXPLAIN that participants will have 15 minutes to discuss the questions on this slide.

INSTRUCT them to **FILL IN** the Sources and Channel sections of **Handout 6.6.1: Communication Plan.**

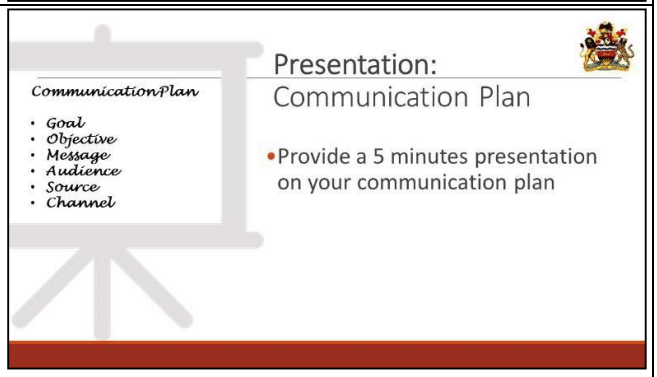


Slide 34

After 15 minutes, **TELL** participants they will have another 10 minutes to prepare a presentation on their communications plan.

EXPLAIN that each pair or group will have 5 minutes to do their presentation.

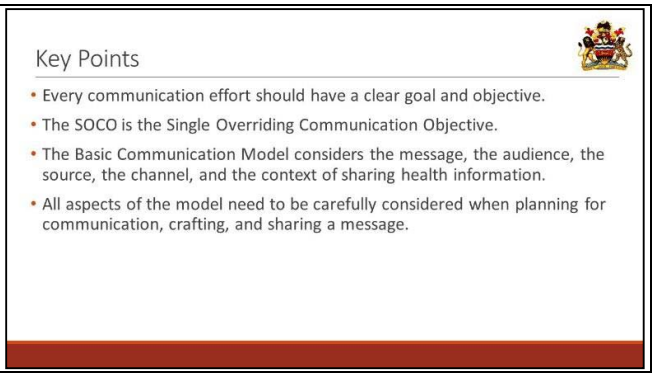
After 10 minutes, **BRING** the participants back together, and have each pair or group present their communication plan.



Slide 35	**ASK** participant to comment on the messages presented by the groups.	
Slide 36	**EMPHASIZE** that active engagement with decision makers is key to ensuring that data are put to use. Active engagement with decision makers means that we: • **Communicate data** by sharing or exchanging information and ideas through a variety of channels, from printed documents to face-to-face conversations. • **Influence** decision making through our communication and interaction with decision makers by providing quality data, and facilitating discussions about the data that affect an individual or organizational decision-making process. • **Advocate change** through a deliberate, planned process that uses evidence to promote implementation of a specific recommendation or set of recommendations.	

Trainer Instructions: Step 6 (5 minutes)

Use slide 37 and the facilitator notes to guide this step.

Slide 37	**REVIEW** the session using the key points on the slide. **ASK** participants to share their observations on communicating messages using data.	

Handout 6.6.1: Communication Plan

GOAL	
OBJECTIVE	
AUDIENCE	
Who are they?	**What is known about them?**
MESSAGE	
SOURCE(S)	
Interpersonal	**Mediated**
CHANNEL	

Session 6.7: Monitoring & Evaluation

Time: 60 minutes

Learning Objectives

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

1. Distinguish between monitoring and evaluation
2. Describe the role of M&E in decision making
3. Define an approach for evaluating public health programmes

Session Overview

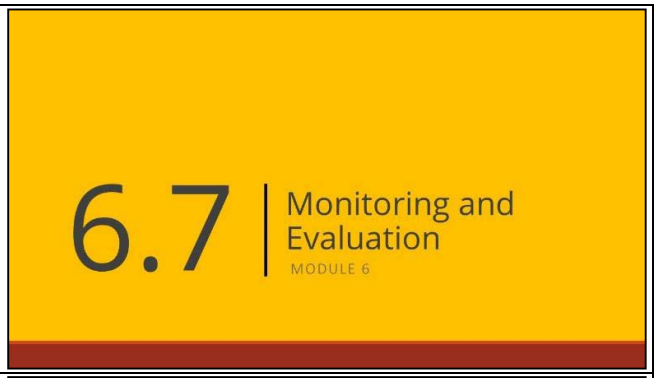
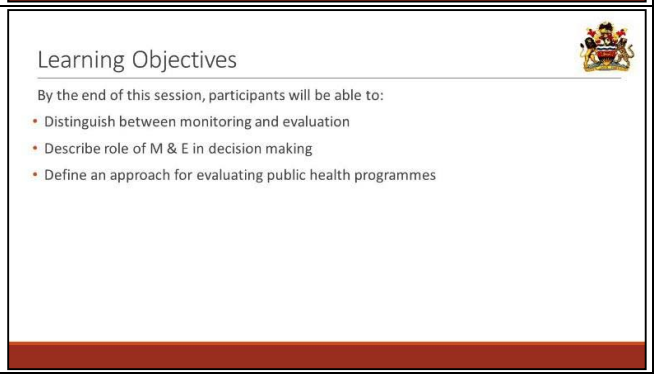
Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	15 minutes	Interactive Lecture, Practical Application	Monitoring (slides 4–7)	Flip chart, markers, tape, LCD
3	35 minutes	Interactive Lecture, Discussion	Evaluation (slides 8–15)	Flip chart, markers, tape, LCD
4	5 minutes	Facilitator presentation	Key Points (slide 16)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, marker, and tape
- LCD or overhead projector

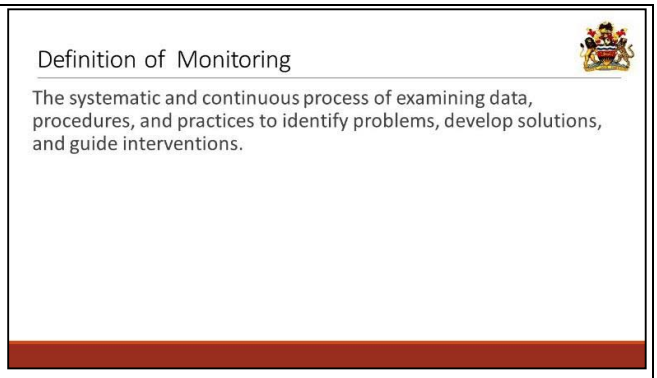
Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (15 minutes)

Use slides 4–7 and the facilitator notes to guide this step.

Slide 4	**NOTE** this slide is animated. **WAIT** until participants have a chance to respond before clicking to reveal the answer. **EXPLAIN** that in the earlier session on evidence-based decision making, we discussed M&E as part of the decision-making cycle. In this session, we will discuss these two concepts in more detail.	

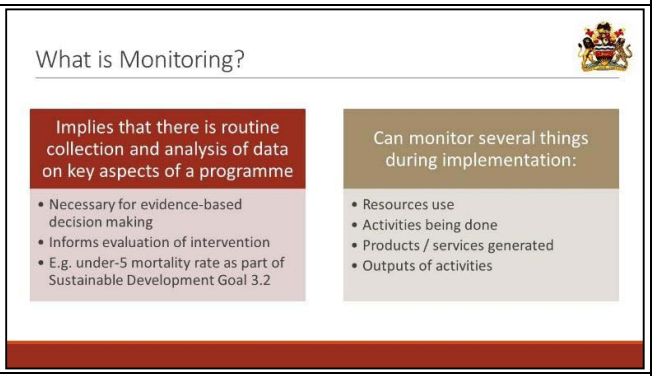
ASK: What is the definition of monitoring?

ALLOW a few responses, and then **CLICK** to reveal the answer.

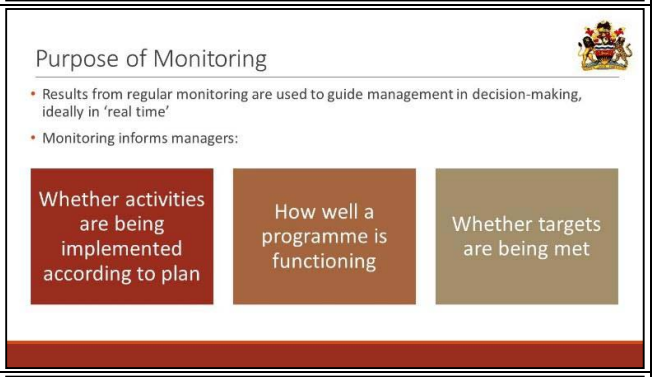
EXPLAIN that monitoring the implementation of any plan is essential. The purpose of monitoring is to know whether or not you are meeting your objectives within the timelines specified in the plan—and, if not, why not. Monitoring is no longer the 'poor relation'—it is a critical component of health care planning.

Slide 5

EXPLAIN the points on the slide.

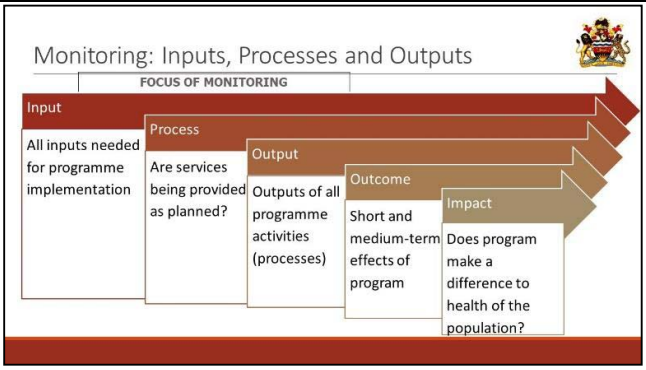


Slide 6



Slide 7

EXPLAIN that monitoring involves recording what a programme has done—activities and outputs, comparing actual outputs with planned outputs—and making adjustments when the difference between the plan and what is actually achieved becomes too great.



Questions one might ask in the process of monitoring include:

- How many people were reached?
- Which people were reached?
- How many supplies were used?
- Which programme procedures were followed? Which were not followed?
- Were there any interruptions to the programme? What were they?

EXPLAIN that the types of indicators across this pathway will be discussed in more detail later.

Trainer Instructions: Step 3 (35 minutes)

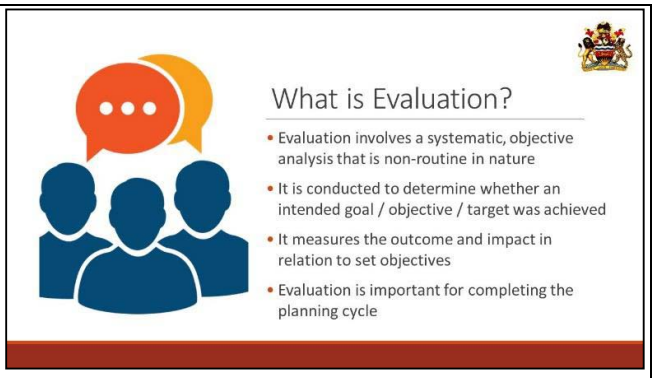
Use slides 8–15 and the facilitator notes to guide this step.

Slide 8

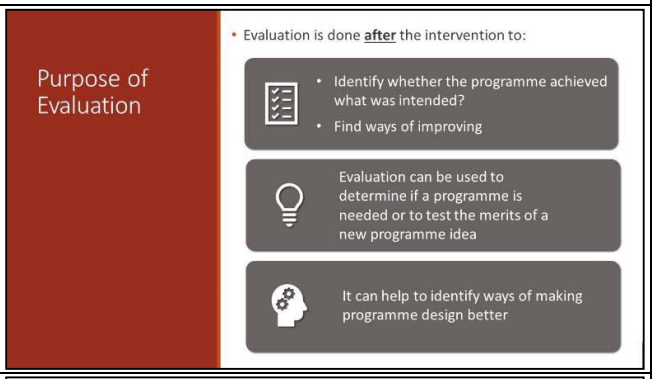
NOTE: This slide is animated. **WAIT** until participants have a chance to respond before clicking to reveal the answer.

ASK: What is evaluation? How is it different from monitoring?

ALLOW a few responses, and then **CLICK** to reveal the answers on the slide.



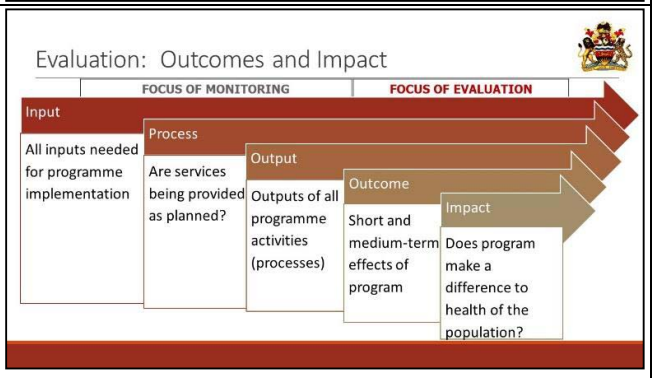
Slide 9



Slide 10

EXPLAIN that evaluation focuses on outcome and impact. Note the differences between monitoring and evaluation.

DISCUSS why programmes do not work, and how evaluation can help to identify why they fail.



Answers:

Theoretical failure: The programme was implemented, BUT its output does not lead to the desired outcome, which does not lead to the desired impact. In other words, the assumption was incorrect.

Implementation failure: The theory behind the programme was correct, but was not implemented properly or as planned.

EXPLAIN: Questions one might ask during the course of an evaluation include:

- Is the programme necessary?
- Are the programme's activities enabling it to meet its objectives?
- Have expected outcomes been achieved?
- What changes did the programme bring about?

- Is the project having the desired impact?
- Have any unintended changes occurred? What were they?
- Is the programme cost-effective? Is it successful?
- Should the programme continue?
- Are the benefits of the programme likely to be sustained?

EXPLAIN that the types of indicators across this pathway will be discussed in more detail later.

Slide 11

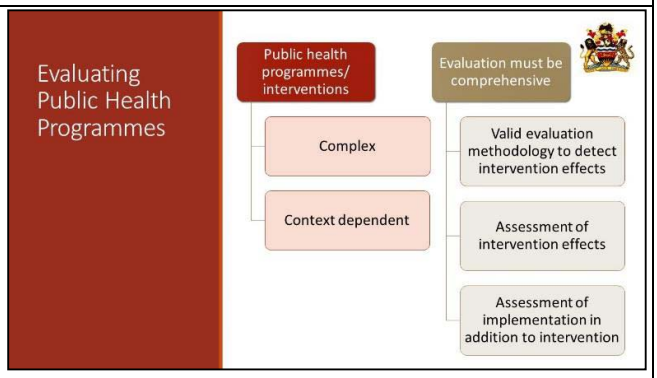
ASK participants the following questions to ensure they understand this table:

Item	Monitoring	Evaluation
Frequency	Routine	Periodic, occasional, intermittent
Main Action	Keeping track, oversight	Assessment
Basic Purpose	Track progress, adjust work plan	Determine outcomes and/or impact, relevance, and cost-effectiveness
Focus	Inputs, activities, outputs, work plans	Outcomes, impact, relevance, and cost-effectiveness
Information Sources	Routine or sentinel systems, field observation, progress reports, rapid assessments	Same, plus surveys, studies
Completed by	Programme managers, funders, supervisors, beneficiaries, community workers	Same, plus external evaluators
Reporting to	Programme managers, supervisors, funders, beneficiaries, community wkrs	Same, plus policymakers

- Which one focuses on work planning? (monitoring)
- Which one is undertaken by supervisors (both)
- Which one looks at surveys? (evaluation)
- Which one tracks progress of programme activities? (monitoring)
- Which one assesses programme outcomes? (evaluation)
- Which one might look at data in DHIS2? (both)

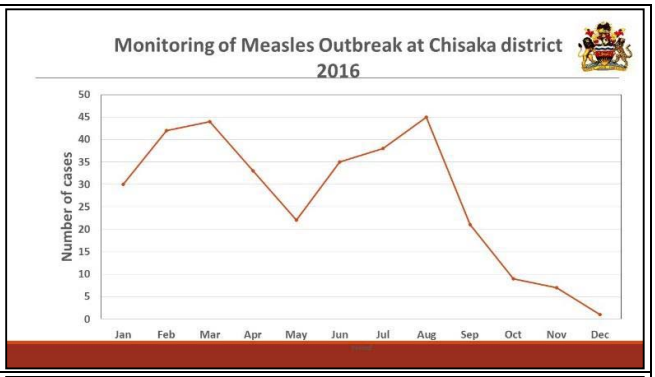
Slide 12

EXPLAIN that evaluating public health programmes and interventions is a complex, context-dependent process. Evaluations must be comprehensive, account for the validity of the evaluation methodology to detect intervention effects, and assess both the implementation and the effects of the intervention.

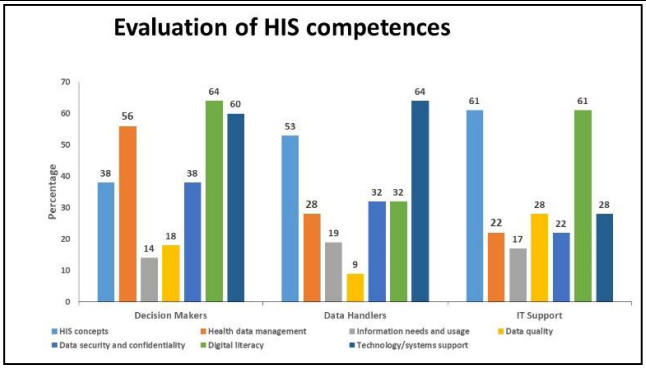


EXPLAIN: For programmes that promote good health and prevent poor health in populations, context may refer to the social, political, or organizational environment, socioeconomic status and/or demographic factors where activities occur.

Slide 13



Slide 14



HIS competencies differ among those in different roles in the health system.

EXPLAIN the graph:

Decision makers: Higher competency scores were observed in the areas of data quality (56%), digital literacy (64%), and technology/systems support (60%). Lower scores were observed in information needs and usage (14%) and data security and confidentiality (18%).

Data Handlers: Data handlers performed most strongly in technology/systems support (64%); only 9% demonstrated competency in data quality.

IT Support Providers: IT support providers demonstrated competency in HIS concepts (61%) and digital literacy (61%). Few (17%) were able to demonstrate competency in questions pertaining to information needs and usage.

ASK: What conclusions can you draw from these data?

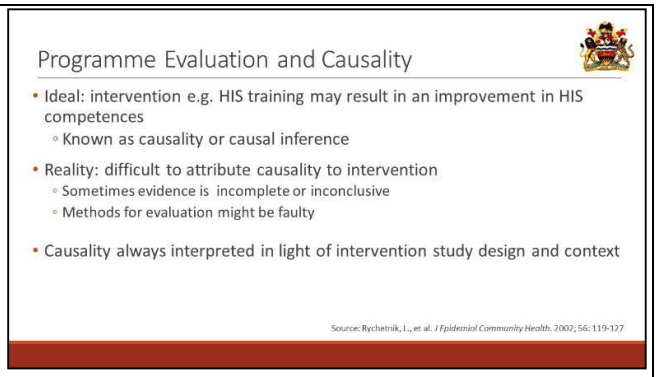
Answers may include: *Need to improve data quality, information needs, and usage competences across all cadres.*

ASK: Is this an example of monitoring or evaluation?

Answer: *Evaluation.*

Slide 15

EXPLAIN: One important note regarding programme evaluation and causality: it would be ideal to know for certain that an intervention caused an improvement in HIS competences. This is known as causality or causal inference.



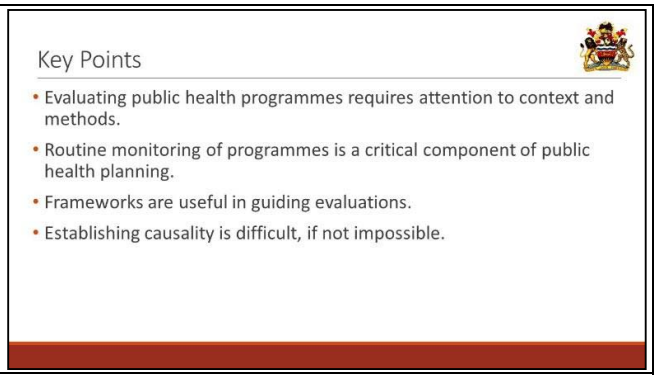
In reality, it is difficult to attribute causality to interventions. There are many competing factors, such as other activities and natural events that occur during the intervention. The evidence is often incomplete and inconclusive. It is also possible that our evaluation methods might be faulty. Causality is always interpreted in light of intervention study design and context.

Trainer Instructions: Step 4 (5 minutes)

Use slide 16 and the facilitator notes to guide this step.

Slide 16

REVIEW the key points on the slide



Module Seven
Session 7.1

MODULE 7: DATA SECURITY
Session 7.1: HIS Security Concepts

Time: 105 minutes

Learning Objectives

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

1. Define key HIS security terms
2. Explain why HIS security is increasingly important
3. Explain the effects of loss of data confidentiality, privacy, integrity and availability on patients
4. Explain the five (5) pillars of data security
5. Describe examples of health data breaches

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	20 minutes	Activity/ Facilitator presentation	HIS Security Terms (slides 4–7)	Flip chart, markers, tape, LCD, index cards prepared for activity
3	20 minutes	Group activity: Case Study Part 1	Importance of HIS Security (slide 8)	Flip chart, markers, tape, LCD, Handout 7.1: The Case of the Mysterious Missing Data
4	10 minutes	Discussion/ Facilitator Presentation	Five Pillars of Data Security (slide 9)	Flip chart, markers, tape, LCD
5	45 minutes	Facilitator presentation/ Discussion Group activity: Case Study Part 2	Security Breaches (slides 10–21)	Flip chart, markers, tape, LCD, Handout 7.2.1: The Case of the Mysterious Missing Data – Part 2
6	5 minutes	Facilitator presentation	Key points (slides 22–23)	Flip chart, markers, tape, LCD

Handouts

- Handout 7.1.1: The Case of the Mysterious Missing Data
- Handout 7.1.2: The Case of the Mysterious Missing Data – Part 2

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector
- Index cards

Advance Preparation

- If desired, write out the session's learning objectives on a piece of flip chart paper
- Prepare sets of index cards for the activity by writing the following data security terms and their definitions (one card for each term, plus one card for each definition):

  System Security: The methods, procedures, or sets of steps used to control user access and authentication, assign system privileges, maintain file and file system integrity, backup, monitoring processes, logkeeping, and auditing of a system

  Data Security: The protection of data against deliberate or accidental access by unauthorized persons.

  Privacy: Ensuring that individuals maintain the right to control what information is collected about them, how it will be used used, who maintains it

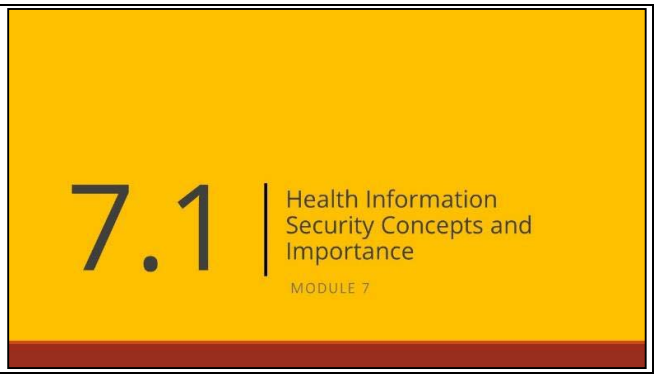
  Confidentiality: Whether the information stored on a system is protected against unintended or unauthorized access

  Integrity: Maintenance of data to ensure its correctness, consistency

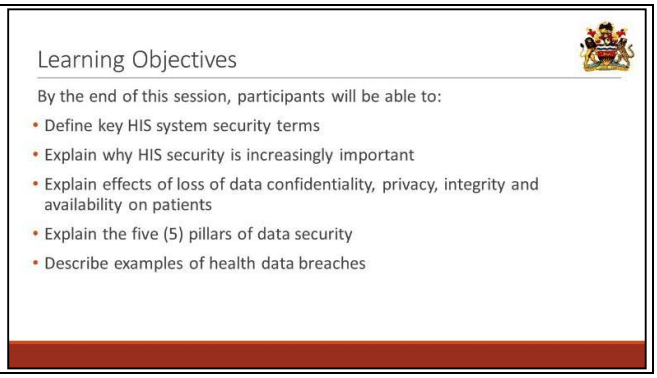
  Availability: Continuous access to data at a required level of use in all situations

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**NOTE** the advance preparation needed for this activity.	

Slide 3	**REVIEW** the learning objectives for this session.

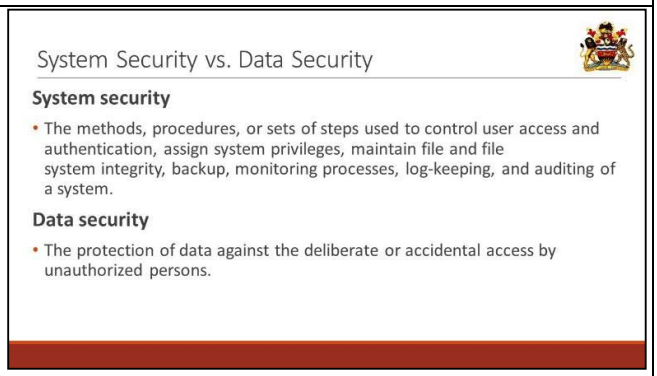


Trainer Instructions: Step 2 (20 minutes)

Use slides 4–7 and the facilitator notes to guide this step.

Slide 4	**PAIR ACTIVITY (5 MINUTES):** Hand out a set of index cards, half with a security term written on each card and half with the corresponding definition. If there are not enough cards for everyone, have some participants pair up. **ASK** participants to search for the person with the term or definition that matches what is on their card. When they think they have found the right match, have them link arms and wait for the rest of the participants to do so. Then, **LEAD** a brief discussion using the information on the next few slides. **HIGHLIGHT** where a participant's answers match the slide.

Slide 5	**EXPLAIN** that there are four security terms that are closely related to one another: system security, data security, privacy, and confidentiality. (Sometimes system security and data security are used interchangeably; this is also true for privacy and confidentiality.) **ASK** the pair with the **system security** term and definition cards to share that definition with the other participants. **EMPHASIZE** that **system security** focuses on the technical features and functions of the software, database, and OS that support these aspects of data quality.



ASK the participants with the **data security** cards to explain to the rest of the group what data security is.

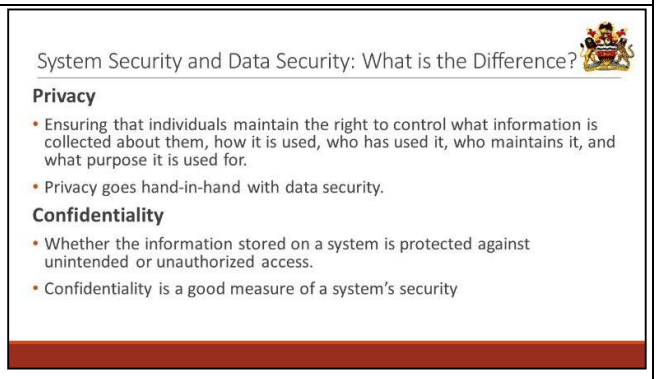
EXPLAIN that systems operate in what are frequently referred to as internal and external environments:

- Systems operate within the parameters of the immediate software, OS, and hardware used within a facility's network (internal environment); as well as with the software, OS, and hardware used outside of the facility's network (external environment).
- Within an HIS using an EMR system, data will be accessible to or shared *internally*—that is, with people who work at the facility where the data is collected and stored.
- Data will also be accessible to and shared with people external to the facility—at other levels of the health system.
- This interaction between internal and external environments increases the importance of maintaining system and data security, and ensuring that patient privacy and confidentiality are respected.

ENSURE that participants understand the difference between internal and external environments, and then go on to the next slide to explain how system and data security are related to privacy and confidentiality.

Slide 6

EMPHASIZE that the terms privacy and confidentiality are very closely linked to both system security and data security. Note that some system or software features or functions are specifically designed to maintain the privacy of patient data.



ASK participants with the **privacy** cards to define privacy:

Privacy involves ensuring that individuals maintain the right to control what information is collected about them, how it is used, who has used it, who maintains it, and what purpose it is used for.

ASK participants if there is anything in the definition of system security that relates to privacy.

Participants should notice that system security refers to controlling user access and authentication, or who collects, uses, or maintains their data. **EMPHASIZE** that **system security** ensures that patient records are stored in a way that respects their privacy. For example, an EMR system functions this way.

ASK the **data security** pair to repeat the definition of data security.

Participants should understand that data security indirectly supports the privacy rights of patients by making sure that people who should not have access to or use patient health data cannot access it, whether intentionally or unintentionally.

Next, **ASK** the pair with the **confidentiality** cards to present the first part of the definition of confidentiality:

Confidentiality involves making sure that the information stored on a system or in patient files is protected against unintended or unauthorized access.

NOTE that **data security** is more directly related to ensuring that a patient's data remains confidential, because it specifically focuses on protection against unintended or unauthorized access.

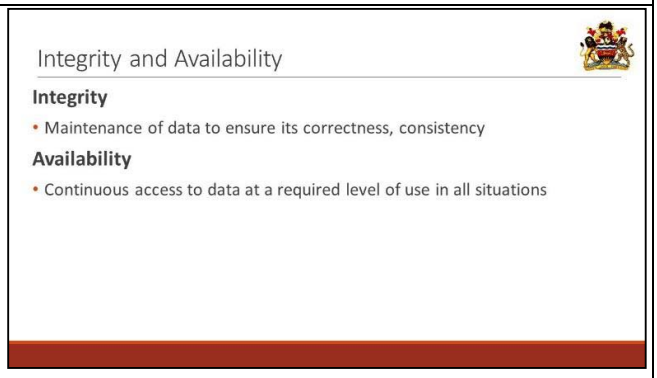
ASK the pair to continue with the rest of the definition. **HIGHLIGHT** the relationship between system security and data security. System security controls user access and authentication, granting access to patient data to the appropriate people. Data security protects data from unauthorized access, actively barring unauthorized people from access to patent data.

USE the second half of the definition to clarify how these two aspects of security are connected: Since systems are sometimes used to manage sensitive information, data confidentiality is often **a measure of the ability of the system to protect its data**.

SUMMARIZE: System security ensures that patient data is kept secure, private, and confidential; data security supports and strengthens system security.

Slide 7

EXPLAIN that integrity involves correctness and consistency. Examples include ensuring a patient's name or address is not changed without prior authorization, or without following established procedure; and ensuring that changes in one patient file are reflected in all other files kept for that patient.



ASK participants to give their own examples of situations where data integrity has been compromised. **DISCUSS** these examples with the participants for better understanding.

EXPLAIN that availability involves ensuring continuous system access/availability/uptime so that data can be accessed under all circumstances (normal, unusual, extreme).

ASK participants to do some brainstorming: What are possible causes of system unavailability? (Examples: blackout, hacking, updates, natural causes.)

Trainer Instructions: Step 3 (20 minutes)

Use slide 8 and the facilitator notes to guide this step.

Slide 8

ASK participants why they think it is important to discuss system and data security within the context of an HIS and EMR system.

HIGHLIGHT that part of its importance is related to patients' interest in having their data protected (data security) and that the other reason that system security is important is related to data quality and the system's ability to ensure the integrity and reliability of the data stored within its database.

REFER participants to **Handout 7.1.1: The Case of the Mysterious Missing Data**.

ASK three different participants to take turns reading each paragraph of the case.

Then **ASK** participants to brainstorm: What do you think could have happened?

RECORD their responses on a flip chart.

Spend no more than five (5) minutes brainstorming and discussing different types of threats. Before continuing, explain that participants will have an opportunity to learn more about the missing data and possible threats later in the session.

Using the three questions on the slide, **LEAD** a brief discussion focusing on the different types of security threats, and the impact of lack of data security and confidentiality as it relates to patients. Each question should be introduced in turn, after participants have had an opportunity to offer their thoughts.

SUMMARIZE the discussion using the key points below:

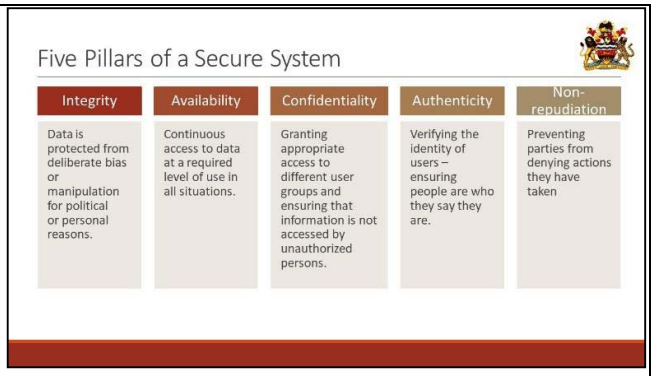
- Patient data are personal, sensitive, and valuable.
- Public dissemination of patient data can have adverse impacts on patients (e.g., stigma within a community, loss of friends/employment/support as a result of leaked patient data).
- Data that have been attacked and corrupted can impact the quality of care that patients receive.
- Clinicians cannot make good decisions about patient care and treatment, resource management, and program management if data have been tampered with.
- System security ensures that patient data are kept secure, private, and confidential.
- System security supports high-quality data.

EXPLAIN that we will now look more closely at these points and how they relate to the pillars of a secure system, and reiterate that we will return to the case study to learn more about the missing data and possible threats later in the session.

Trainer Instructions: Step 4 (10 minutes)

Use slide 9 and the facilitator notes to guide this step.

Slide 9



EXPLAIN that a secure system is built on five key pillars. These pillars are intended to help develop secure systems and prevent unauthorized system access, unplanned system downtime, and corruption or theft of data.

NOTE that some of these may sound familiar to participants, as they are very close to the different dimensions of data quality discussed in Session 5. **ASK** participants to identify which pillars correspond to specific dimensions of data quality. They should identify: integrity.

REVIEW this pillar with participants, noting that the basic definitions are the same, while highlighting the specific application of these two terms as pillars of a secure system:

Integrity: Data are protected from deliberate bias or manipulation for political or personal reasons. In a secure system, this includes protecting the hardware (i.e., the hard drive and server) and software (database and applications) from physical attacks, intentional or otherwise.

The data collected, stored, and reported by the HIS are based on protocols and procedures that do not change according to who is using them, when they are being used, or how often they are used. In a secure system, this means that the software and hardware follow protocols and procedures that do not change based on the user or access site. The same software will treat data the same way whether it is installed in Zomba or Chitipa, and whether the data are being used by an HMIS officer or a data clerk.

Then **INTRODUCE** participants to the other four pillars, giving examples for each one.

NOTE: The terms **data**, **asset**, **resource**, and **system** are often used here interchangeably.

Availability: Data are made available when needed, based on who and what has access to the database. Limiting the types of devices (mobile phones, laptops, printers, etc.) that have access to a database can also be a means of restricting access to that database. Hackers can gain access to a database by masking the identity of the actual device they are using (e.g., making a laptop look like it is a printer).

Confidentiality: Data are encrypted; third parties cannot economically decrypt data.

Authentication: The process of confirming with a high degree of certainty that a given counterparty is who they say they are. Authentication thwarts impersonation. Parties must confirm their identities before being allowed access to systems and resources.

	Non-repudiation: Neither party can deny sending, receiving, or accessing the data. This implies a degree of auditability. As such, logs of who sent the data and who received it are recommended.

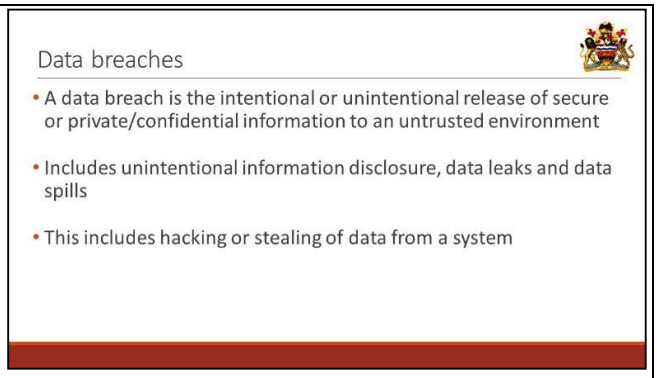
Trainer Instructions: Step 5 (45 minutes)

Use slides 10–21 and the facilitator notes to guide this step.

Slide 10

ASK participants what they understand the term **data breach** to mean.

EXPLAIN to participants the definition of the word 'untrusted' in terms of who is allowed to access what kinds of data. When giving or receiving data, it is important to ensure that both parties are trusted persons or representing trusted organizations.



NOTE: data breaches can be intentional (e.g., hacking) or unintentional (data leaks or spills).

Slide 11

DIVIDE participants into four small groups.

- Two groups will discuss causes of data breaches, using examples from their facilities.
- Two groups will discuss the effects of security breaches, with examples from their facilities.

ALLOW five (5) minutes for discussion.

ASK a volunteer from each group to present their group's findings with the rest of the participants.

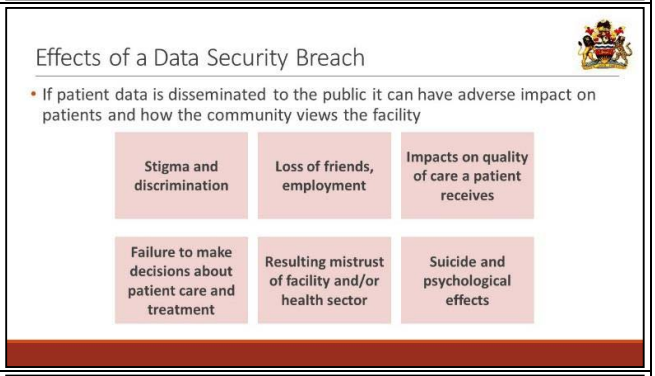
Slide 12

Slide 13

NOTE: This slide is animated.

ASK some of the participants to give examples of the effects of a data security breach.

Then **CLICK** to reveal the answers.



Slide 14

LEAD a large group discussion on the specific measures that can be taken to control or prevent each of the four types of security breaches.

RECORD the participants' responses on a flip chart.

When the discussion is finished, **GO THROUGH** the responses; for each one, **ASK** which cadres can take responsibility for that measure.

USE a different colour pen to mark DM (decision maker), DH (data handler), and/or IT next to each measure.

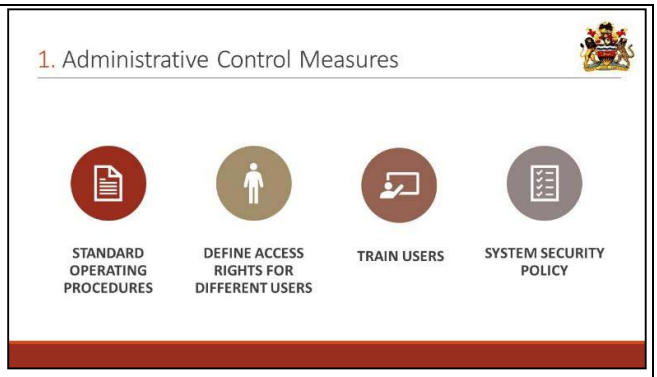
SAY: Now we will take a closer look at each of these.

Slide 15

DESCRIBE each of the administrative control measures.

ASK participants to think of examples of administrative control measures they either use or have seen being used.

NOTE: Policies on different aspects of the system include measures such as backups, passwords, and antivirus protocols that will help to ensure security.



EXPLAIN the importance of using licensed software.

Slide 16

DESCRIBE each of the physical control measures.

ASK participants to think of examples of physical control measures they either use or have seen being used.

Examples include CCTV, Access Control.

DISCUSS whether these are adequate and how they are used in relation to preventing security breaches.

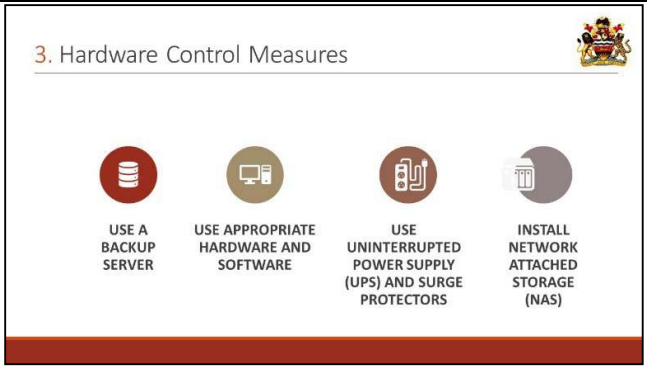
COMPARE onsite and offsite storage of backup copies.

Slide 17

DESCRIBE each of the hardware control measures.

ASK participants to think of examples of hardware control measures they either use or have seen being used.

Examples include UPS, Generators, Solar Inverters, NAS.



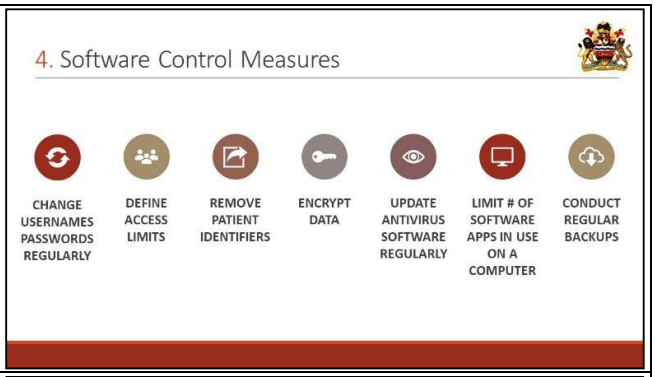
DISCUSS the concept of Network Attached Storage and its benefits.

ENSURE participants understand physical backup servers.

Slide 18

DESCRIBE each of the software control measures and their importance.

ASK participants to think of examples of software control measures they either use in their work environment or have seen being used.



Slide 19

NOTE: This slide is animated. Do not click until instructed below.

REFER participants to **Handout 7.1.2: The Case of the Mysterious Missing Data – Part 2.**

ASK a different participant to read each paragraph.

INTRODUCE the small group discussion by reminding participants that Yamikani and Gilbert have experienced a security breach, and the actual source or threat that caused the security breach is still unknown.

DIVIDE participants into four small groups to discuss the answers to the questions on the slide.

INSTRUCT participants to assign the roles of discussion facilitator, note-taker, and reporter to members of their groups. Alert them that they will have 10 minutes for their discussion, and then each group will have an opportunity to share their responses.

MONITOR the discussions to ensure that they are on track.

After 10 minutes, **BRING** the class back together to **DEBRIEF** the discussion.

ASK the groups to share the security threats they identified in the case study.

RECORD their responses on a piece of flip chart paper.

Then **ASK** each group to share which threats they think explain the unauthorized access to the database.

PUT a star next to the threats suggested by each group. Some threats may thus have multiple stars next to them.

CHALLENGE participants to think *beyond* the situation Yamikani and Gilbert encountered by **ASKING:** What other system or data security threats exist that Yamikani and Gilbert might encounter in the future? **ADD** these threats to the flipchart.

At the end of this part of the discussion, have participants reflect on the length and breadth of possible security threats. **EMPHASIZE** that these are threats to any site with an EMR system.

SUMMARIZE the group discussion by pointing out the different types of security vulnerabilities and threats (physical, personnel, network, etc.) reflected on the list that the group has developed. **HIGHLIGHT** the most likely source of the security breach that the groups came up with—i.e., the threats with the most stars next to them.

EXPLAIN that when security measures fail and the system is breached, such compromises in system or data security have serious consequences.

ASK participants what some of the implications of compromised system and data security might be. Encourage participants to think back to the first part of the case study, and challenge them to go beyond the ideas raised then.

Participants may provide a variety of responses, among them:

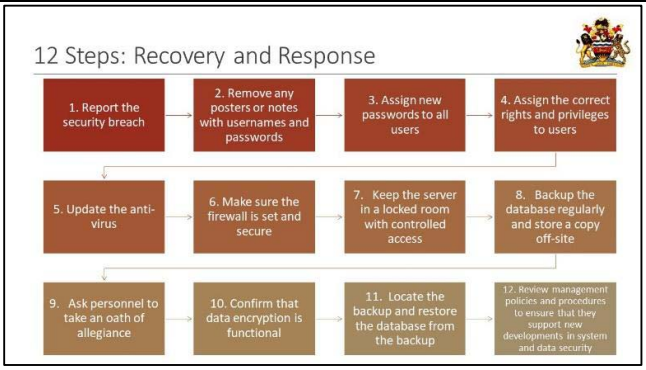
- *The data no longer have integrity; thus data quality is poor.*
- *Confidentiality and privacy are not maintained.*
- *Providers may not be able to provide appropriate care and treatment.*
- *Patients and providers may lose faith in the EMR system, and possibly the overall health system.*

NOTE that one of the most serious implications of compromised system and data security is that existing preventive measures and deterrents did not succeed in averting the threat. **REFER** back to the case study: despite the security measures taken by the facility, a security breach still occurred. Understanding all of the implications of a compromised system and data security enables health managers, users, and IT administrators to both recover from the attack, and respond in a way that strengthens security and prevents future attacks.

Slide 20

USE the results from the small group discussion to discuss how health facilities can recover from a security breach and promote data security, privacy, and confidentiality in response.

REFER participants to their list of identified threats from the case study.



ASK participants to suggest actions that can be taken to remove these threats.

Their responses should include:

- *Report the security breach (to health managers, stakeholders).*

  EXPLAIN the reason(s) for reporting to each of the aforementioned audience/stakeholders (supervisors, trustees, board members).

  EXPLAIN the reporting hierarchy—who the breach gets reported to, and by whom.

- *Remove any posters or notes with usernames and passwords.*
- *Assign new passwords to all users.*
- *Assign the correct rights and privileges to users.*
- *Update the antivirus software.*
- *Make sure the firewall is set up and secure.*
- *Back up the database regularly, and store a copy offsite.*
- *Keep the server in a locked room with controlled access.*
- *Ask personnel to sign non-disclosure agreements.*
- *Confirm that data encryption is functional.*

EMPHASIZE that health managers, system users, and IT/system administrators contribute in similar and different ways to make the system as secure as possible. **HIGHLIGHT** the role of Yamikani in the case study, noting how she detected the possibility of a security threat initially; and the role of Gilbert who identified the actual cause. Then **REVIEW** the list of measures, and **ASK** participants to identify who is responsible for making sure that these measures have been taken and are actively in place. Use the information below to guide the discussion,

Health managers:
- Advocate for strong IT and security policies that prohibit sharing of usernames and passwords.
- Remove any posters or notes with usernames and passwords.
- Ensure administrators assign new passwords to all users.
- Ensure administrators assign the correct rights and privileges to users.
- Do not post or make available usernames or passwords. Health managers, system users, and IT/system administrators contribute in several ways to make the system as secure as possible.
- Ask personnel to sign non-disclosure agreements (NDAs).
- Make sure the database is backed up regularly, and a copy stored offsite.
- Make sure that the server is kept in a locked room with controlled access.

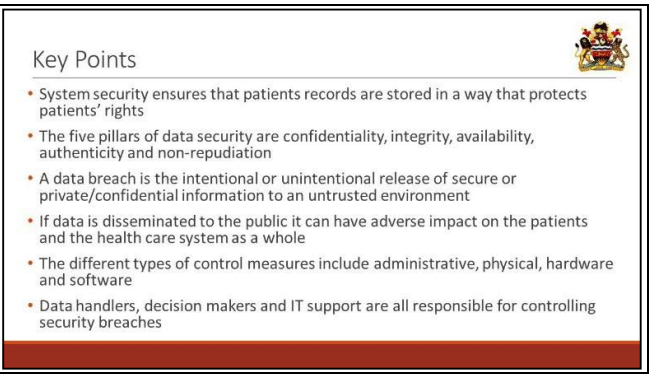
System Users:
- Do not post or make available usernames or passwords.
- Change their passwords periodically.
- Inform the health manager or IT/system administrator if they do not have the correct rights and privileges.
- Sign NDAs.

IT/System administrators:
- Remove any posters or notes with usernames and passwords.
- Assign new passwords to all users.
- Assign the correct rights and privileges to users.
- Do not post or make available usernames or passwords.
- Ask personnel to sign NDAs.
- Back up the database regularly and store a copy offsite.
- Keep the server in a locked room with controlled access.

Slide 21	Hopefully, it is obvious! ☺	

Trainer Instructions: Step 6 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22	**REVIEW** the key points from the session. **ASK** if there are any questions before concluding the session.	

Handout 7.1.1: The Case of the Mysterious Missing Data

Hellen Kiplagat is the data manager at Sub-district X Hospital. At the end of the month, she is often asked to assist with gathering and aggregating patient data from all of the health facility reports in the district to include in the district report. For the past six months, they have been using an EMR system to enter and manage patient data at the hospital, and data received from the health facilities. This has made quarterly district reporting much easier and faster than in the past.

On March 29, Hellen verifies whether all available data from the health facilities and hospital for January, February, and March have been entered into the EMR system. She notices that three of the 10 facilities in the district have yet to submit a total of seven monthly reports. Hellen makes a note to follow up with those facilities about the missing reports.

On April 5, Hellen receives a call from the health records and information officer (HRIO). The HRIO tells her that he ran the district's quarterly report, and is very concerned that so much data are missing from the report. After some discussion, it becomes clear to Hellen that data are missing not only for the three health facilities that did not submit their reports on time, but also for a fourth facility, as well as for Sub-district Y Hospital and Sub-district X Hospital itself. After the call, Hellen investigates the missing data further, and finds that only the March data are missing. She knows that these data have been entered into the EMR system, and begins to suspect that something has happened to the data in the EMR database.

Handout 7.1.2: The Case of the Mysterious Missing Data – Part 2

Hellen contacts Gilbert Kirwa, the hospital's IT/system administrator, and explains the situation. Gilbert tells her that he will look into the issue and let her know if he discovers anything about the missing data. The next day, Gilbert comes to her office and tells her that the EMR system's database has been hacked, and the data for March from the four health facilities and the two sub-district hospitals have been deleted. Gilbert explains that he can restore the data from database's backup file; however, he also needs to determine how the hacker gained access to the system's database and deleted the data for March.

Gilbert suggests that he visit the facilities affected by the security breach over the next week. Below are his notes from two of the visits.

Sub-district X Hospital

Hospital recently experienced turnover in key positions. One of the data clerks left for a new job at an NGO after intense disagreements with the hospital's data manager and threats of dismissal. The receptionist has been asked to take on the data clerk's data entry duties. The medical officer mentioned that the hospital is currently out of petrol for the backup generator, and he is waiting for approval to use their own funds to purchase additional petrol. Noticed a data clerk playing a Flash video online on one of the client machines. Looks like one of the older Flash player versions that are vulnerable to malware attacks.

Sub-district Y Hospital

Local server had been successfully networked, hospital personnel had been assigned roles, usernames, and passwords for the EMR system based on their duties in the hospital—all with the assistance of the data clerk, who seems to have a basic background in IT. She has users routinely change their passwords, and has managed to negotiate with the hospital in-charge for the use of a small closet where the server can be stored somewhat securely: the closet door does not have a lock itself, so the data clerk purchased a latch and lock locally.

Session 7.2

Session 7.2: Managing Confidentiality Within the HIS

Time: 60 minutes

Learning Objectives

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

1. Discuss local and international confidentiality regulations
2. Describe access controls
3. Describe the importance of user access roles and privileges
4. List the different user account types
5. List the different privileges associated with each type
6. Explain how access rights are assigned within a facility
7. List how the user interface changes based on assigned privileges for different accounts and systems

Session Overview

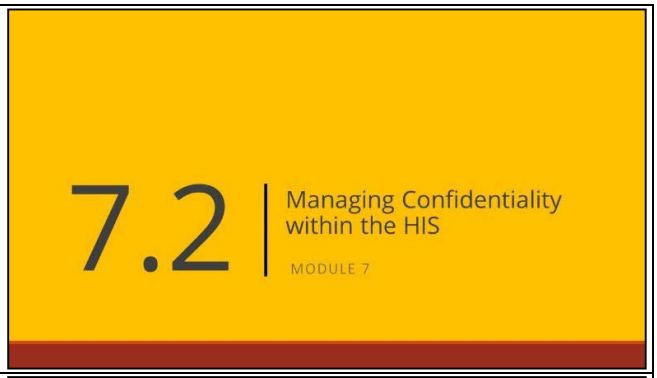
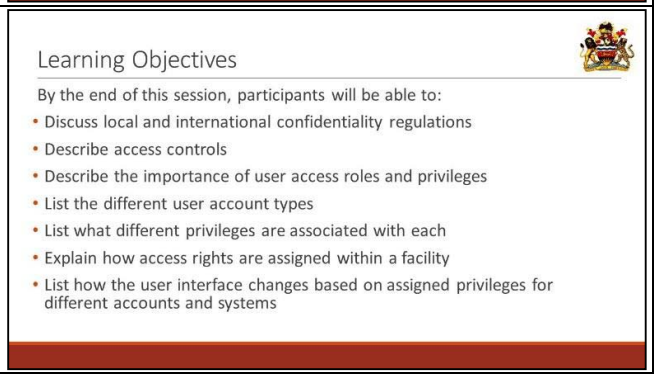
Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	25 minutes	Discussion/ Facilitator presentation/ Activity	Confidentiality Regulations (slides 4–10)	Flip chart, markers, tape, LCD
3	25 minutes	Discussion/ Facilitator Presentation	Access Control, Rights and Privileges (slides 11–17)	Flip chart, markers, tape, LCD
4	5 minutes	Facilitator presentation/ Discussion	Key points (slides 18)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

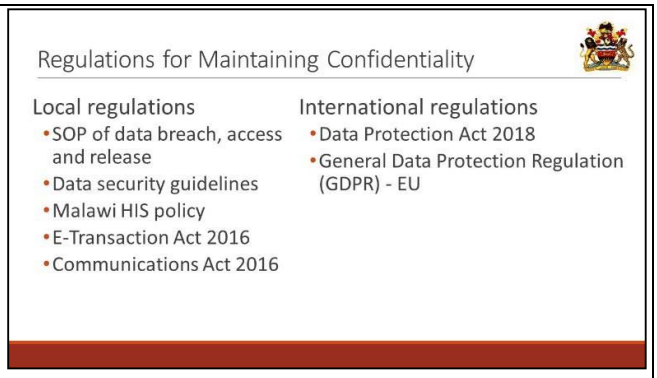
Trainer Instructions: Step 2 (25 minutes)

Use slides 4–10 and the facilitator notes to guide this step.

Slide 4

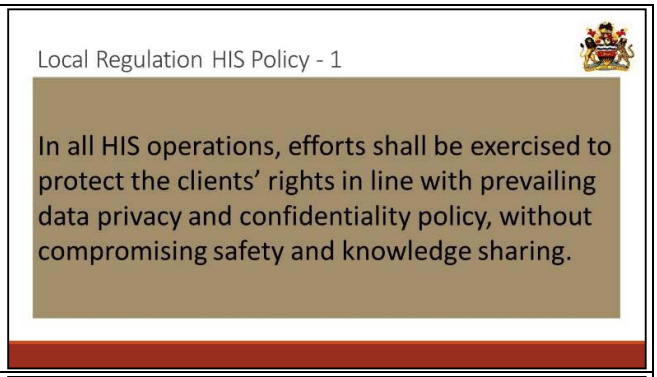
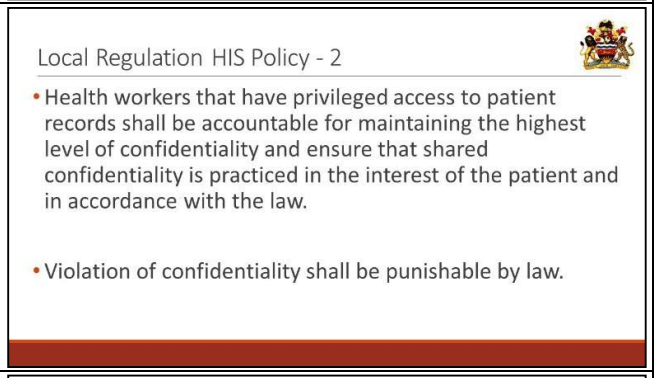
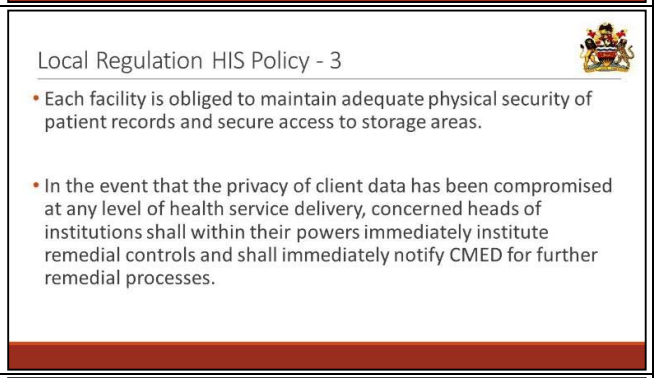
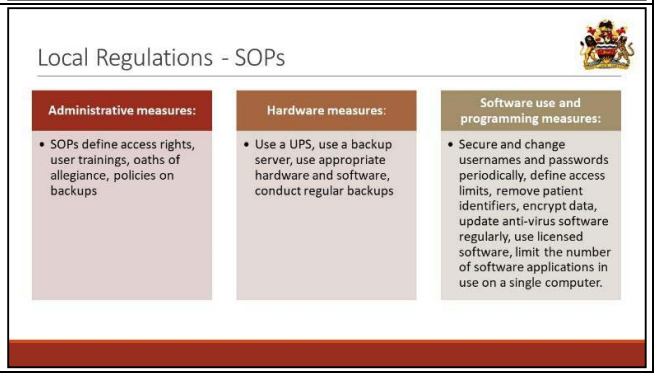
ASK a participant to recall the definition of confidentiality that we learnt in session 7.1.

Confidentiality refers to whether the information stored on a system is protected against intended or unauthorized access.
Confidentiality is a good measure of system security



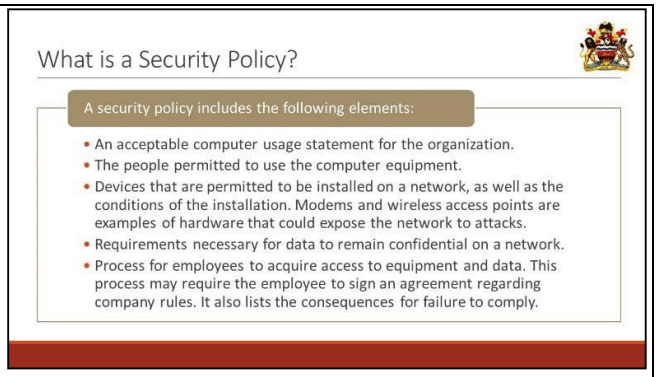
INFORM participants that there are many documents that describe regulations for maintaining confidentiality. These include the data access, release, and security SOPs; HIS policy; the Data Protection Act, E-transaction Act, and Communications Act; and the General Data Protection Regulation (GDPR).

EXPLAIN that these will be included in the resource documents for the curriculum.

Slide 5	**EXPLAIN** the importance of contextualizing local regulations when adapting international regulations and treaties.	
Slide 6	**ASK** participants to give examples of confidentiality violations—both in general and specific to HIS. **DISCUSS** these violations; **ASK** participants what punishments they think would be appropriate for such violations.	
Slide 7	**DISCUSS** with participants whether there are existing procedures and templates for use when reporting a breach; and, if not available, the necessary for such a template, and what components should be included.	
Slide 8	**EXPLAIN** that there are SOPs currently under development to provide guidelines for ensuring data security.	

Slide 9

EXPLAIN that a security policy is a collection of rules, guidelines, and checklists. Network technicians and managers of an organization work together to develop the rules and guidelines for the security needs of computer equipment and systems.



A security policy should describe how a company addresses security issues. Though local security policies may vary between organizations, there are questions all organizations should ask:

- What assets require protection?
- What are the possible threats?
- What should be done in the event of a security breach?
- What training will be in place to educate the end users?

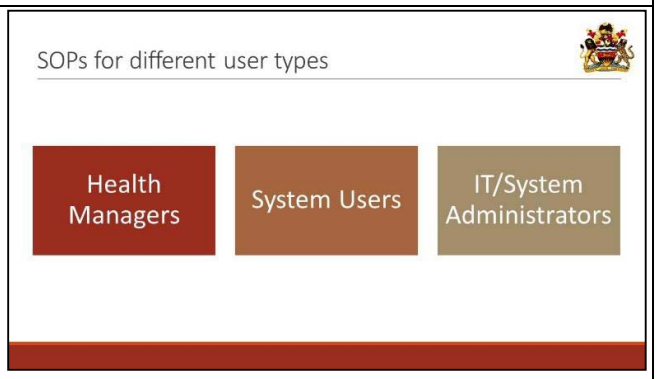
NOTE: To be effective, a security policy must be enforced and followed by all employees.

Slide 10

EXPLAIN that each audience or user type has different SOPs to follow.

PROVIDE an example of SOP for each category.

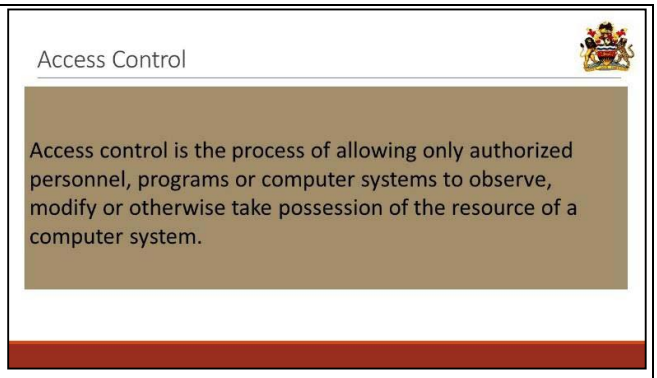
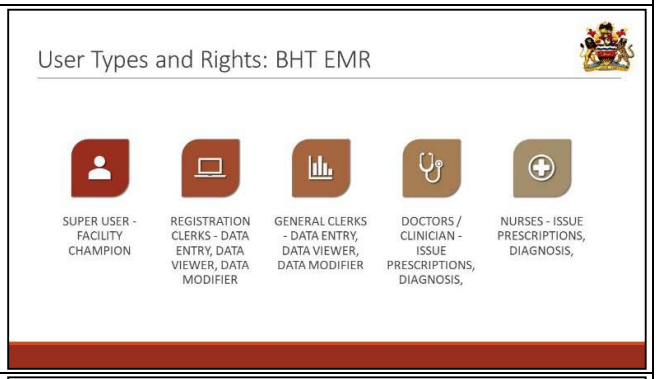
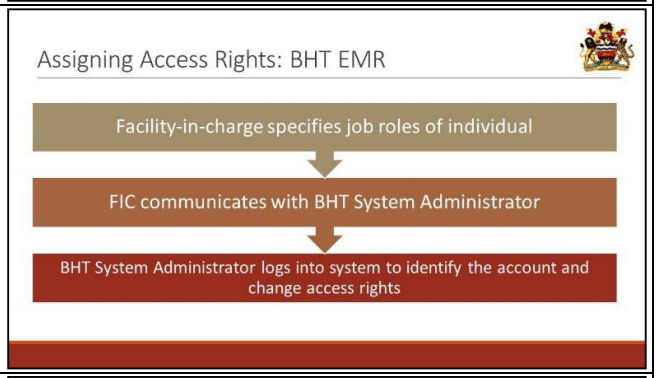
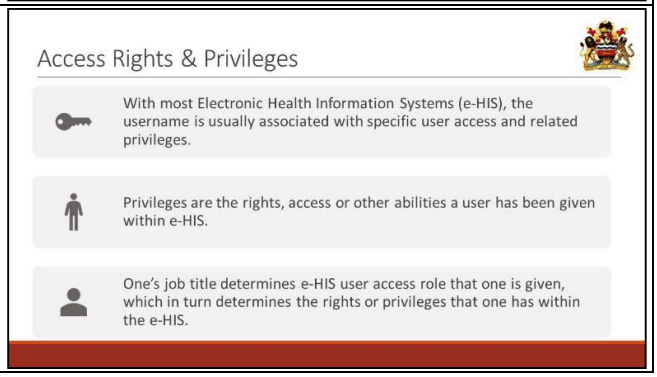
EXPLAIN the chain of responsibility, with corresponding SOPs, when a breach occurs—from data handlers to IT support to health managers.



PROVIDE examples of users in each category.

Trainer Instructions: Step 3 (25 minutes)

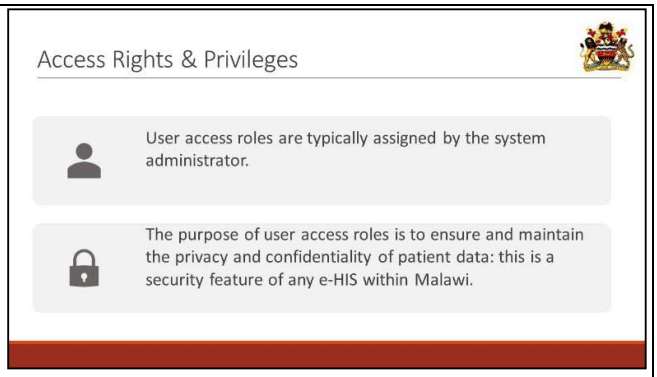
Use slides 11–17 and the facilitator notes to guide this step.

Slide 11	**EXPLAIN** access control. **DISCUSS:** • Which users can access a system • What resources those users can access • What operations those users can perform • How to enforce accountability	
Slide 12	**REVIEW** the discussion, using the example of BHT EMR. **DISCUSS** the user types and rights shown here.	
Slide 13	**ASK** participants to think of challenges they've experienced when changing user rights for their existing accounts.	
Slide 14		

Slide 15

OUTLINE responsible personnel for creating and assigning users accounts and roles by system:

- EMR: Baobab Health Trust
- DHIS2: DHIS2 administrator
- LIMS: Head of laboratory (KCH)
- DHAMIS: IT officer at the Department of HIV & AIDS
- LAHARS – National AIDS Commission (NAC)



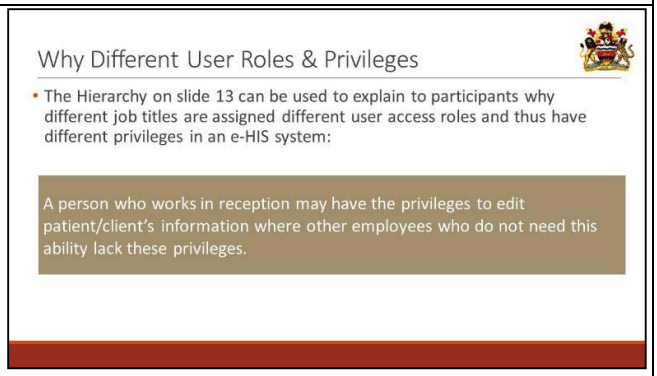
OUTLINE procedures for obtaining privileges for an e-HIS—in this example, DHIS2:

- The applicant submits a request to CMED via phone or email.
- CMED reviews the request to determine its purpose (research, commercial, development, general).
- If research-related privileges are being requested, the administrator checks to see whether the corresponding ethical documents have been requested from the National Health Research Committee.
- If general privileges are being requested, a username and password are created, with appropriate privileges (data viewer) assigned.
- If development-related privileges are being requested, a username and password are created, with appropriate privileges (data viewer, data entry, district admin) assigned.
- Feedback is communicated via email to the user requesting privileges.

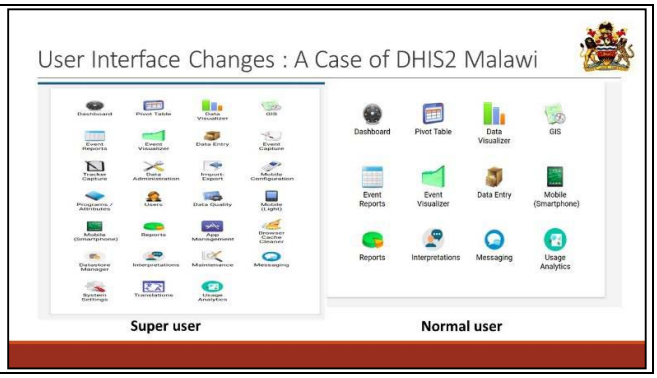
Slide 16

DISCUSS the relationship between user type, job title, and access rights and privileges.

REFER to the hierarchy we just looked at. **EXPLAIN** why different job titles are assigned different user access roles, and thus have different privileges in the system.

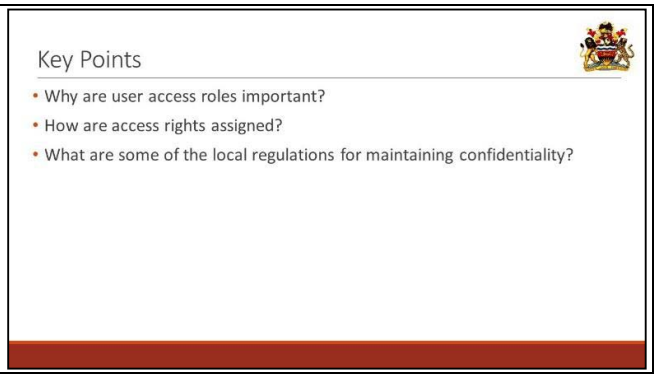


For example, a pharmacist may have privileges or rights to access areas of the e-HIS system relevant to their work (such as data on patient regimens) that a receptionist or physiotherapist does not because their work does not require that level of access.

Slide 17	**EXPLAIN** that the UI changes depending on user privileges.	

Trainer Instructions: Step 4 (5 minutes)

Use slide 18 and the facilitator notes to guide this step.

Slide 18	**USE** the questions on this slide to check participant understanding of key points on access and security.	

Session 7.3

Session 7.3: Levels of Electronic HIS Security

Time: 75 minutes

Learning Objectives

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

1. Identify levels where potential threats to computer systems can occur
2. Describe threats at each level of information system security
3. Discuss different control measures to counteract security threats

Session Overview

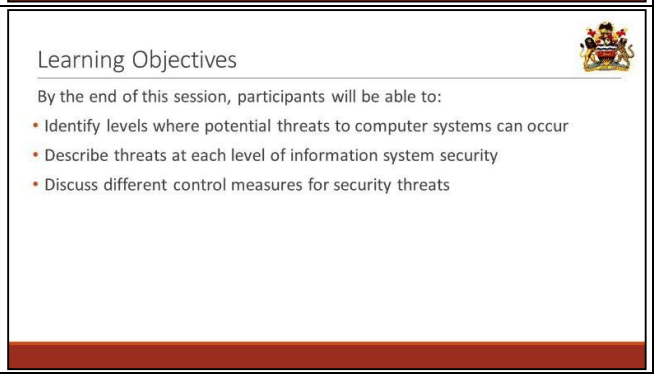
Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	15 minutes	Discussion/ Facilitator presentation	Hardware and Software Threats (slides 4–10)	Flip chart, markers, tape, LCD
3	5 minutes	Discussion/ Facilitator Presentation	Network Threats (slides 11–12)	Flip chart, markers, tape, LCD
4	40 minutes	Discussion/ Facilitator Presentation	User-related Threats (slides 13–19)	Flip chart, markers, tape, LCD
5	5 minutes	Discussion/ Facilitator Presentation	IT Expert Threats (slides 20–21)	Flip chart, markers, tape, LCD
6	5 minutes	Facilitator presentation	Key points (slide 22)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (15 minutes)

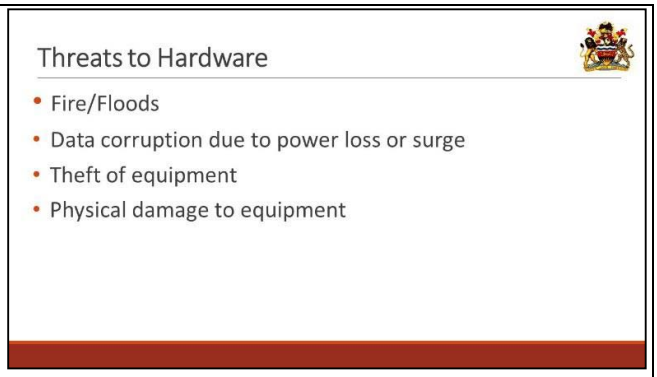
Use slides 4–10 and the facilitator notes to guide this step.

Slide 4	**DISCUSS** how these levels correspond to functional systems in the e-HIS.	

Slide 5

EXPLAIN that **hardware** refers to the physical components of ICT systems, including:

- Cables
- Mice
- Keyboards
- Computers
- Networking devices
- Uninterrupted power supplies (UPS)



EXPLAIN that there are many threats to such components, such as those outlined in the slide.

ASK participants to identify other possible threats to hardware.

Possible answers include:

- *Earthquakes*
- *Damage from riots*

Slide 6

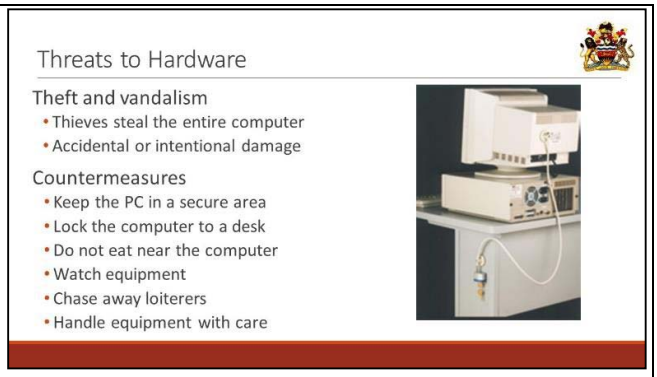
ASK participants how they have been affected by power loss or power spikes in their work environment or daily lives, and if they have improvised power solutions.

EXPLAIN that larger installations use generators to protect their networks. Hospitals may use generators to ensure their systems are running at all times.

Quite often, the power solution is a combination of batteries and generators.

When the power goes out, the batteries supply electricity long enough for the generators to start up and stabilize. Then the batteries stop and the generators provide power to the facility.

Slide 7



ASK participants whether they have experienced a case of theft or vandalism that led to an inactive a system or affected their daily or routine operations.

EXPLAIN: There are several methods of physically protecting computer equipment:

- Use cable locks with equipment.
- Keep telecommunication rooms locked.
- Fit equipment with security screws.
- Use security cages around equipment.
- Label and install sensors on equipment, such as radio frequency identification (RFID) tags.
- Install physical alarms triggered by motion-detection sensors.
- Use webcams with motion-detection and surveillance software.

For access to facilities, there are several means of protection:

- Card keys that store user data, including level of access.
- Biometric sensors that identify physical characteristics of the user, such as fingerprints readers or retinal scanners.
- Posted security guards.
- Sensors to monitor equipment.

Slide 8

EXPLAIN that disasters are unavoidable; they will happen from time to time

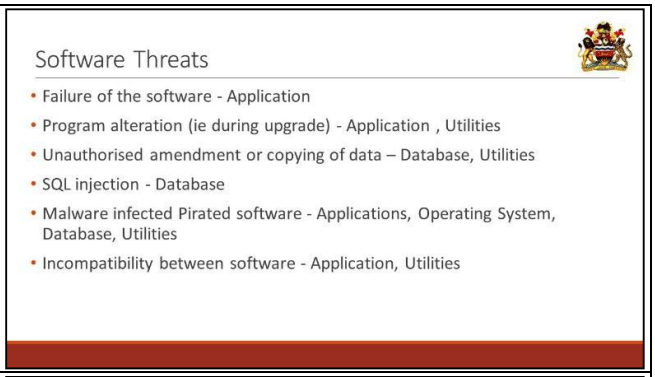
However, we can implement counter-measures to reduce the effects when such threats happen.

EXPLAIN the importance of a disaster recovery plan (DRP).

A DRP is a documented process or set of procedures to protect and recover business IT infrastructure in the event of a disaster. Such a plan, ordinarily documented in written form, specifies the procedures an organization is to follow in the event of a disaster.

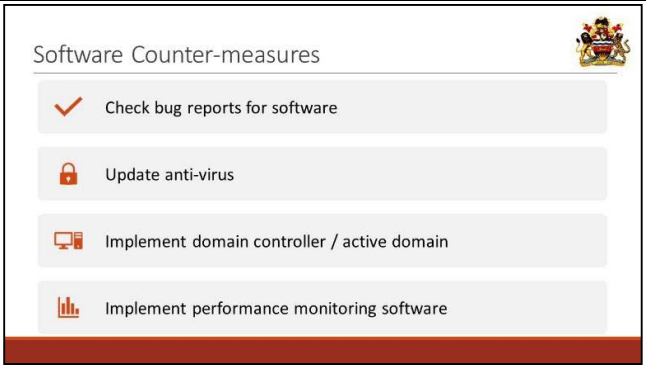
Slide 9

ASK participants if they can think of other threats that might exist, and which types of software they might affect.



Slide 10

HIGHLIGHT that networked computers in a domain can receive software updates simultaneously, speeding up installation of system updates and patches.



Other software counter-measures include:

- Regular updates for antivirus protection—recommended to keep the latest threats from infecting the system.
- Regular updates for other software needed to run the e-HIS as a whole, such as utilities, applications, and database programs.
- Monitoring software performance by logging into a central server to capture critical errors and anomalies.
- Software developers post bug reports and software updates on their websites. These sites should be closely monitored for critical updates.

Trainer Instructions: Step 3 (5 minutes)

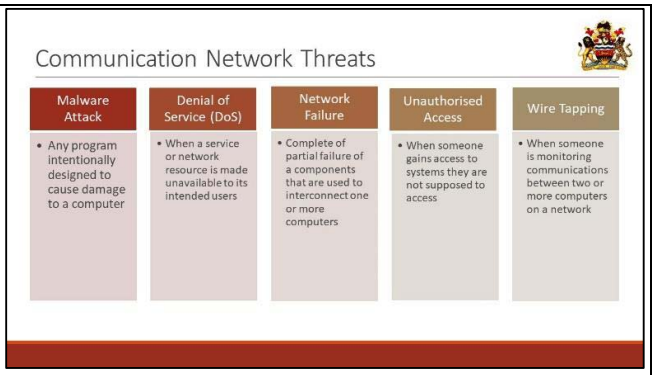
Use slides 11–12 and the facilitator notes to guide this step.

Slide 11

GO THROUGH the definitions of communication network threats.

ASK participants what experience, if any, they have with each one.

SHARE experiences of your own to ensure participants understand what each of them are.



Malware
Any computer program that is intentionally designed to cause damage to a computer or any of the various components that are used to interconnect two or more computers.

ASK participants what kind of damage they think could be done to a computer that has been infected with malware.

Examples:

- *Abnormal functionality of the computer—for example, some programs stop running*
- *Computer shuts off*

Denial of service (DoS) attack
When a computer service or network resource is made unavailable to its intended users by a perpetrator temporarily or indefinitely disrupting services of a host connected to the Internet.

ASK participants to imagine a scenario where they have denied someone of some items. What happens between the two of you?

Examples:

- *Not directly telling the person, but rather keeping him/her pre-occupied with something else to change the focus*
- *A group of people crowding the entry door of a shop, making it hard for legitimate customers to enter—hence disturbing the trade.*

Network failure
Complete or partial failure of components that are used to connect one or more computers.

ASK participants to identify what could be the causes of the failure in the network components.

Examples:

- *Old equipment*
- *Natural or human error*
- *Security breaches*
- *Power failure*

Unauthorized access
When someone gains access to a website, program, server, or other systems they are not supposed to access.

ASK participants how one can gain access to items one is not supposed to access.

Examples:

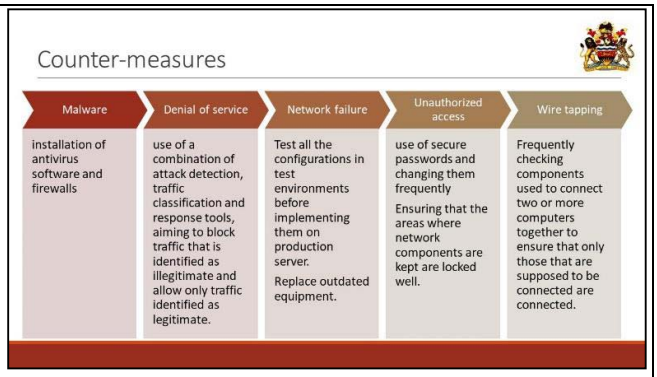
- *Revealing usernames and passwords to colleagues*
- *Using straightforward passwords e.g date of births, one's name etc.*

Wiretapping
When someone monitors the communications being made between two or more computers on a network through placement of a monitoring device (called a **bug**) or the use of other communication technologies.

Slide 12

ASK participants to identify some types of antivirus software used in their respective working environments.

EXPLAIN that most counter-measures against DoS attacks—such as switches, firewalls, and routers—focus on hardware.



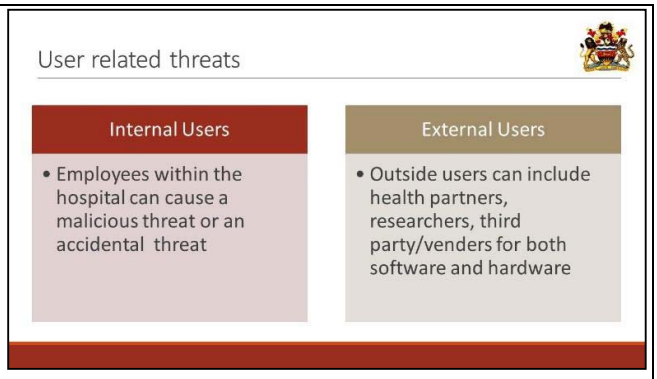
PRESENT some scenarios and ask participants to identify which ones were caused by network failure or unauthorized access.

Trainer Instructions: Step 4 (40 minutes)

Use slides 13–19 and the facilitator notes to guide this step.

Slide 13

ASK participants to give examples of internal users and external users, with definitions recalled from Session one and below.



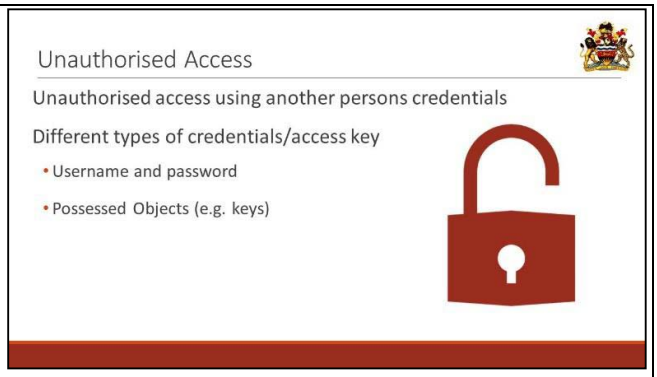
Internal users: Employees within the hospital can cause a malicious or accidental threat.

- IT technicians
- Doctors
- Nurses
- Data entry clerks
- HMIS Officer

External users: Outside users can also cause a malicious or accidental threat.

- Health partners
- Researchers
- Third-party hardware or software vendors
- Baobab Health Trust Employees
- University of Malawi Employees
- Employees from ICT companies (IT centre, Globe, etc.)

Slide 14



EXPLAIN: Unauthorized access refers to gaining access to a computer or network without permission.

Unauthorized use frequently involves the use of a computer or its data for unapproved or possibly illegal activities. Unauthorized use can include a variety of activities, such as an employee using an organization's computer to send personal email messages, or someone gaining access to a hospital computer and viewing private patient data.

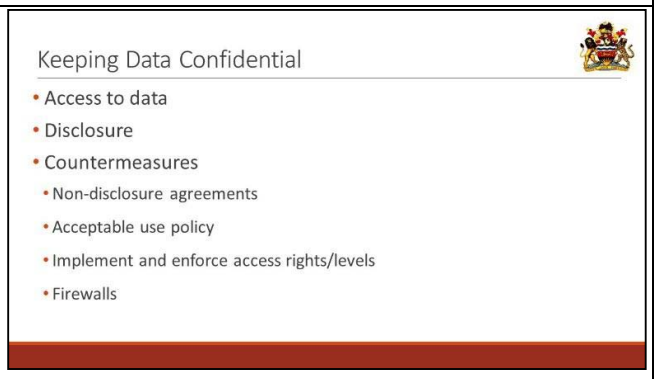
Unauthorized access is often achieved through the use of stolen credentials—that is, usernames and passwords, and possessed objects.

A **username**, or **user ID** (identification), is a unique combination of characters, usually letters and numbers, that identify a specific user. A **password** is a private combination of characters associated with a specific username; passwords are used as a method of verification and confirms the user is allowed to access certain computer resources.

A **possessed object** is any item that you must carry with you to gain access to a computer or facility. Examples of possessed objects are badges, cards, smart cards, and keys. The card you use in an automated teller machine (ATM) is a possessed object that allows access to your bank account.

ASK participants to share how they manage access keys in their work environment. Do they share personal access keys? What happens if they are sick and someone else wants to use their access rights?

Slide 15



EXPLAIN that in the course of their work, different users (doctors, nurses, etc.) have access to different types of private data.

EMPHASIZE that all users have a responsibility to keep data confidential.

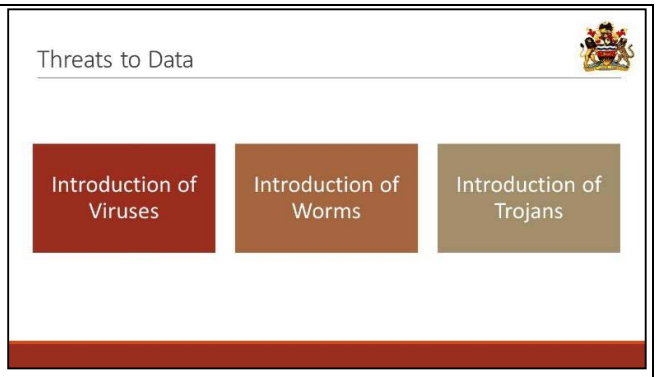
Examples of ways to keep data confidential:

- Provide access only to the data needed to accomplish a task. Do NOT give out unnecessary information.
- Develop and make known to all users an acceptable-use policy for ICT equipment.
- Have all users handling private data sign NDAs.
- Use access levels.
- Use hardware and software firewalls.

Slide 16

EXPLAIN: Threats can be introduced to the system via:

- Flash drives
- Visiting infected websites
- Downloading infected files
- Installing infected software
- Opening email attachments

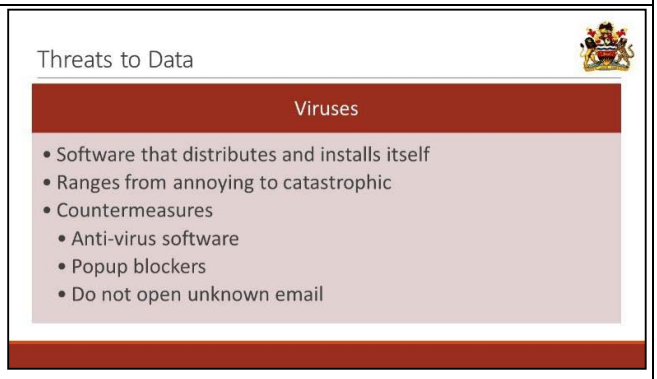


NOTE: this list is not complete; other threats to data exist. One example is a **rootkit**, a malicious program that gains full access to a computer system.

ASK participants if they can identify other software threats to data. If so, how do they affect the data?

Slide 17

EXPLAIN: A virus is a program written with malicious intent and sent by attackers.



A virus hides by attaching itself to computer code, software, or documents on the computer. When the file is accessed, the virus is executed and infects the computer. Among the methods through which a virus can be transferred to other computers are email, file transfers, and instant messaging.

A virus has the potential to corrupt or even delete files on your computer, use your email to spread itself to other computers, prevent the computer from booting, cause applications to not load or operate correctly, or even erase your entire hard drive. If the virus is spread to other computers, those computers could continue to spread the virus.

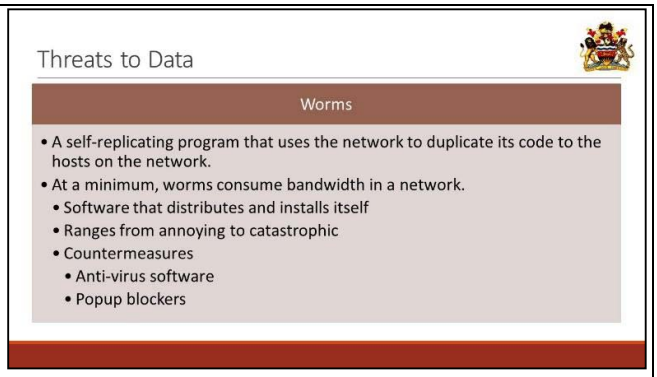
Some viruses can be exceptionally dangerous. One of the most damaging types of virus is used to record keystrokes. Attackers can use these viruses to harvest sensitive information, such as passwords and credit card numbers. The virus sends the data it collects back to the attacker. Viruses can also alter or destroy information on a computer. Stealth viruses can infect a computer and lay dormant until triggered by the attacker.

ASK a participant to give an example of a scenario they have encountered where their device has been attacked by a virus.

- What caused the attack?
- What was the name of the virus?
- What damage did the virus cause?
- How did they resolve the situation?

Slide 18

EXPLAIN: A worm uses the network to duplicate and distribute its code to the hosts on a network, often without user intervention.



A worm is different from a virus because it does not need to attach to a program to infect a host.

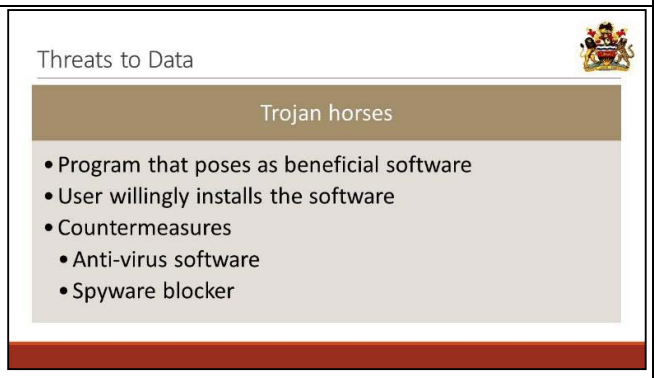
Worms typically spread by automatically exploiting known vulnerabilities in legitimate software.

ASK a participant to give an example of a scenario they have encountered where their computer or device was attacked by a worm.

- What caused the attack?
- What was the name of the worm?
- What damage did the worm cause?
- How did they resolve the situation?

Slide 19

EXPLAIN: A Trojan horse is malicious software disguised as a legitimate program. As the name suggests, the threat is hidden in software that appears to do one thing—but behind the scenes does another. The program can reproduce like a virus and spread to other computers. Computer data damage, exposed login information, and production losses can be significant.



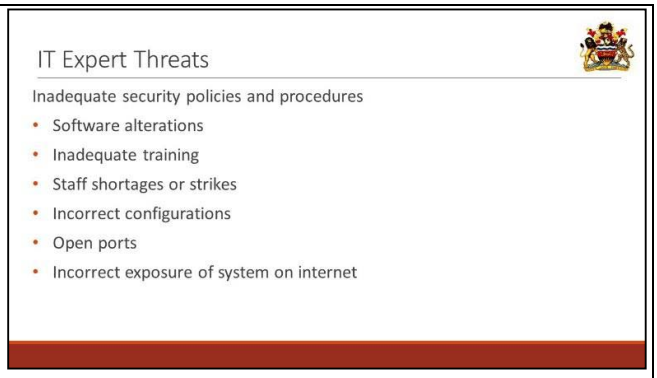
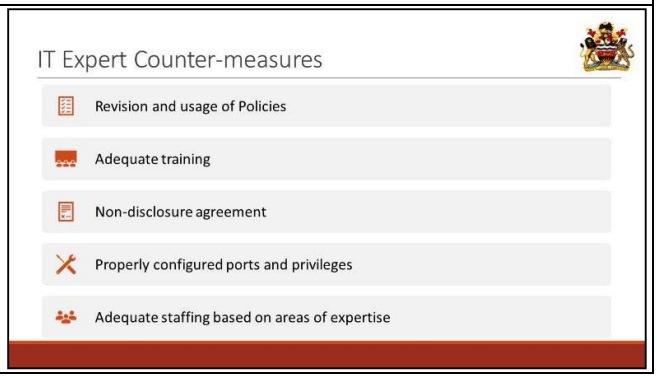
A technician might be needed to perform repairs, and employees might lose or have to replace data. An infected computer could be sending critical data to competitors, while at the same time infecting other computers on the network.

ASK a participant to give an example of a scenario they have encountered where their computer or device was attacked by a Trojan horse.

- What caused the attack?
- What was the name of the Trojan horse?
- What damage did it cause?
- How did they resolve the situation?

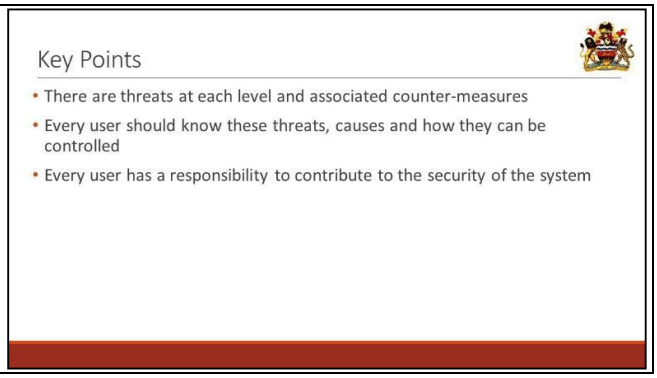
Trainer Instructions: Step 5 (5 minutes)

Use slides 20–21 and the facilitator notes to guide this step.

Slide 20	**HIGHLIGHT** that IT experts themselves may be a vulnerable area for system breach if they fail to follow standards and procedures, or if they have not been adequately trained. **EXPLAIN:** Systems are sometimes exposed to third parties online to share data. However, incorrect configuration can cause exposure to unintended users.	
Slide 21	**EXPLAIN** each of these counter-measures and how they relate to IT experts (someone already experienced in the field).	

Trainer Instructions: Step 6 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22	**REVIEW** the key points covered during the session.	

Session 7.4: Security Breaches

Time: 90 minutes

Learning Objectives

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

1. Describe the signs and symptoms of security breaches
2. Explain the aim of having a business continuity plan
3. Describe the role of backups within a business continuity plan
4. Demonstrate how to perform a backup
5. Demonstrate how to install antivirus software
6. Explain the importance of resetting passwords
7. Explain the purpose of a firewall

Session Overview

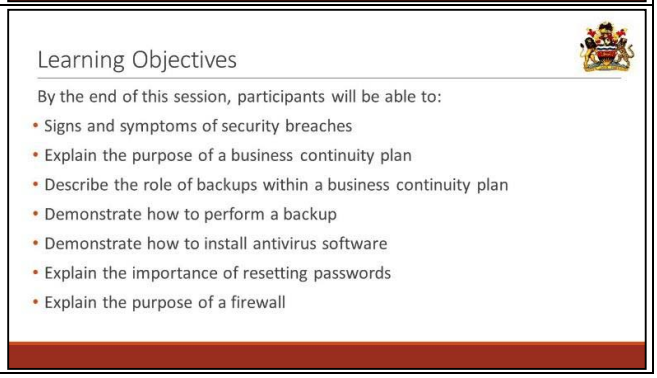
Step	Time	Method	Content	Resources
1	5 minutes	Facilitator presentation	Session introduction and learning objectives (slides 1–3)	Flip chart, markers, tape, LCD
2	5 minutes	Discussion/ Facilitator presentation	Signs of Security Breaches (slide 4)	Flip chart, markers, tape, LCD
3	10 minutes	Brainstorm/ Facilitator Presentation	Business Continuity Plans (slides 5–7)	Flip chart, markers, tape, LCD
4	30 minutes	Discussion/ Facilitator Presentation/ Demonstration	Backing Up Data (slides 8–12)	Flip chart, markers, tape, LCD
5	15 minutes	Discussion/ Facilitator Presentation/ Demonstration	Antivirus Software (slides 13–14)	Flip chart, markers, tape, LCD
6	15 minutes	Discussion/ Facilitator Presentation	Usernames and Passwords (slides 15–20)	Flip chart, markers, tape, LCD
7	5 minutes	Facilitator Presentation	Firewalls (slide 21)	Flip chart, markers, tape, LCD
8	5 minutes	Facilitator presentation/ Discussion	Key points (slides 22)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2		
Slide 3	**REVIEW** the learning objectives for this session.	

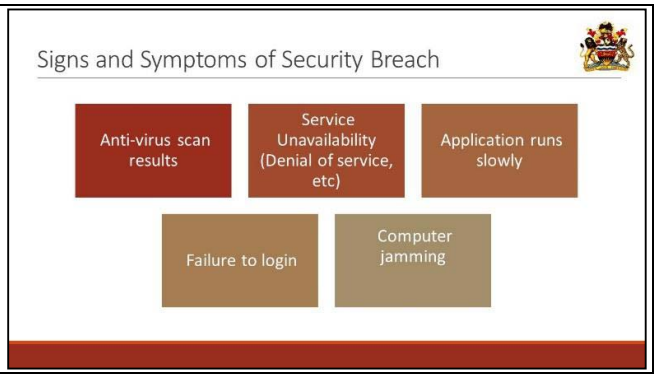
Trainer Instructions: Step 2 (5 minutes)

Use slide 4 and the facilitator notes to guide this step.

Slide 4

ASK participants to share any experiences they've had with security breaches.

- How did they know there was something wrong? What were the effects?
- How was the breach resolved?

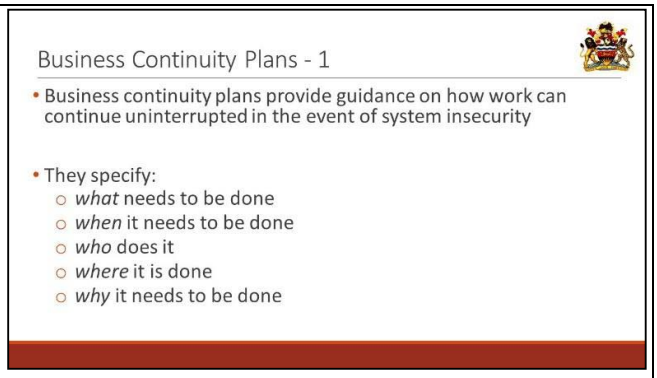


Trainer Instructions: Step 3 (10 minutes)

Use slides 5–7 and the facilitator notes to guide this step.

Slide 5

EXPLAIN that it is essential to have a plan in place that addresses how the health facility or hospital can continue to use the system in the event of a security breach or threat.

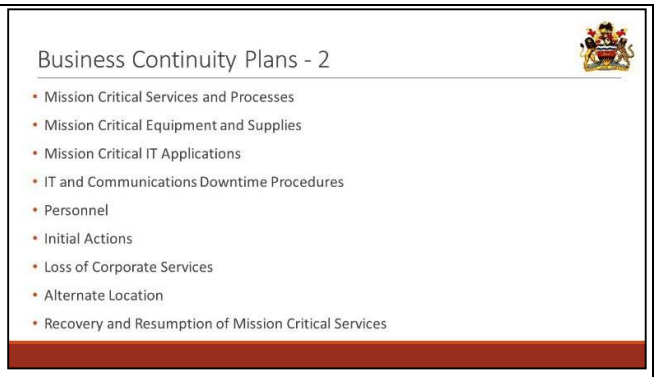


NOTE that:

- This type of plan is usually referred to as a **business continuity plan** because it allows business to continue despite damages or other security compromises.
- Any type of continuity plan includes guidance on what needs to be done, when it needs to be done, who does it, where it is performed, and why.
- Continuity plans include procedures to be followed on a routine basis, as well as actions to take once a security breach occurs.
- Continuity plans contribute to a facility's ability to respond to and recover from security breaches.

Slide 6

EXPLAIN that this slide lists topics often covered by a business continuity plan.



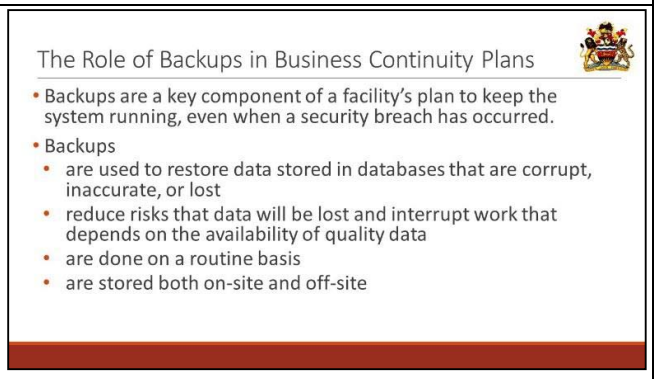
DISCUSS these examples:

- **Airtel Malawi:** When their server room caught fire, Airtel was offline for months. The company had neither a business continuity plan nor a disaster recovery site.
- IT personnel at NBS went on strike, which shut the company's system down.

Slide 7

NOTE: This slide is animated.

ASK participants to brainstorm about why and how backups are used as part of business continuity plans.



CLICK to reveal that backups are the main means of restoring lost data in the shortest amount of time with the least effort possible, leading to continued and uninterrupted access to quality data.

NOTE: use available SOPs on backup plans.

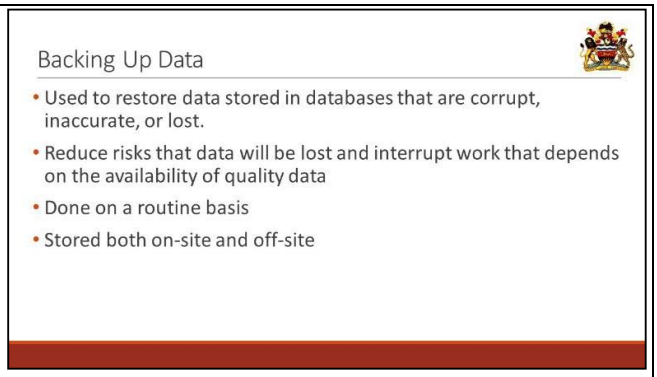
Trainer Instructions: Step 4 (30 minutes)

Use slides 8–12 and the facilitator notes to guide this step.

Slide 8

EXPLAIN the different types of backups:

- Full: includes all files and folders on the system
- Incremental: includes the files that have changed since the last backup
- Differential: includes the files that have changed since the last full backup



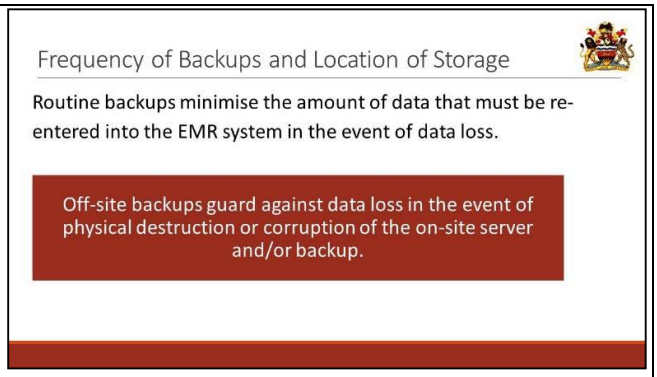
EXPLAIN when and what to back up in the e-HIS setting.

Slide 9

EXPLAIN backups, with a focus on frequency and storage location.

ASK participants how the frequency of backups and on/offsite storage supports business continuity plans.

If needed, provide participants with the following example of the impact of performing backups infrequently:

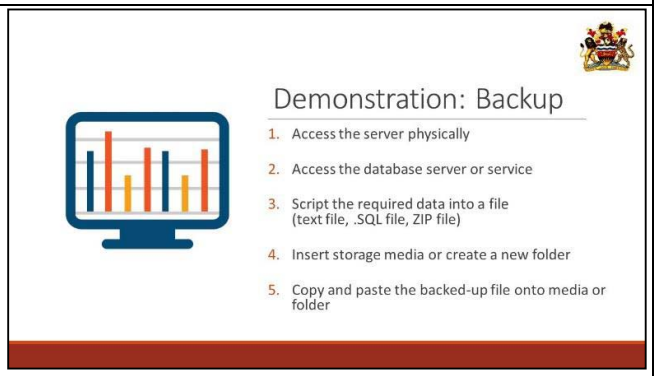


- If a site has three data entry clerks who enter 15 records a day, 225 records will need to be re-entered if data are lost or corrupted and backups are done on a weekly basis.
- This will likely take the data entry clerks five days or more, possibly creating a backlog if they are re-entering lost data instead of entering new data.
- If backups are done on a daily basis, then the data entry clerks will only need to re-enter 45 records, meaning it will likely take them one day to fully recover from the loss.

Slide 10

DEMONSTRATE: How to back up data. *10 minutes total.*

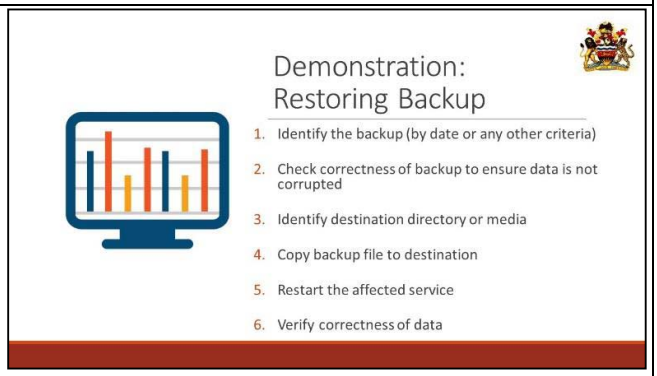
ASK participants to replicate the backup procedure just performed by the facilitator. If they do not have workstations, have one participant come to the front to demonstrate, and have the remaining participants take turns guiding them through the process.



Slide 11

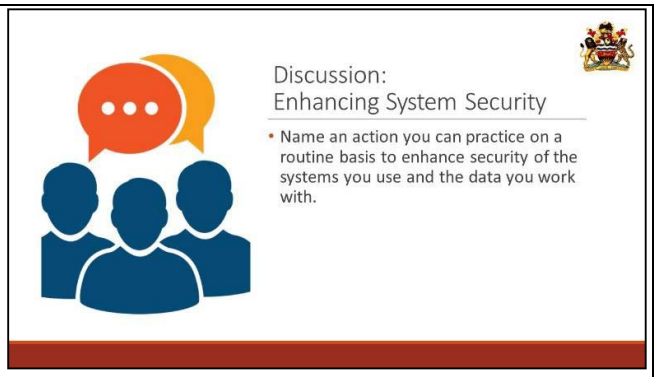
DEMONSTRATE: How to restore data from a backup copy. *10 minutes total.*

ASK participants to replicate the procedure for restoring data from a backup copy just performed by the facilitator. If they do not have workstations, have one participant come to the front to demonstrate, and have the remaining participants take turns guiding them through the process.



Slide 12

ASK participants to name one action that they can practice on a routine basis to enhance the security of their systems and the data stored in their databases.
5 minutes total.



Answers should include:

- *Routinely back up data*
- *Make sure antivirus software is up to date*
- *Encourage users to keep their logins private*
- *Monitor the physical security of equipment*
- *Restrict access to software that might expose the system to malware*

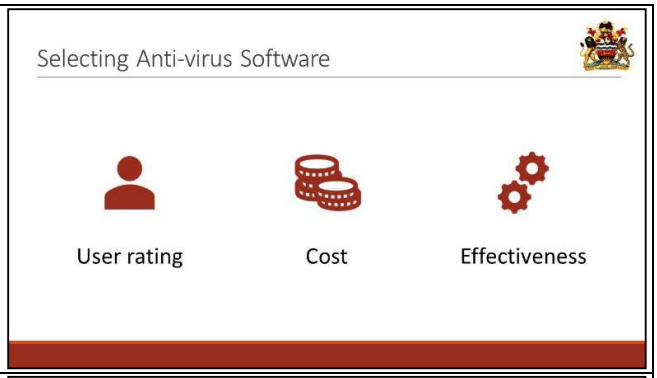
Trainer Instructions: Step 5 (15 minutes)

Use slides 13–14 and the facilitator notes to guide this step.

Slide 13

TELL participants what antivirus software will be installed and updated as a part of the demonstration.

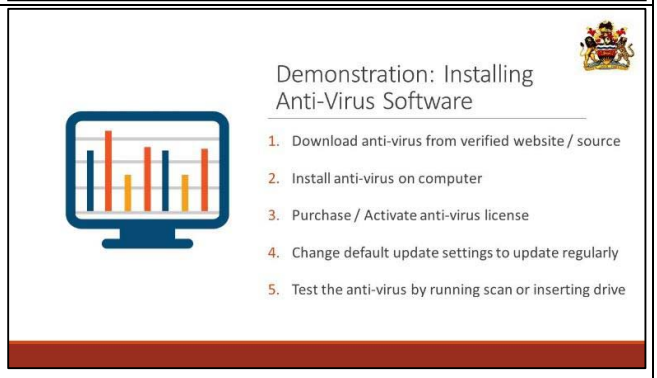
EXPLAIN the factors that influenced the selection of this software.



Slide 14

INTRODUCE this demonstration by reminding participants of the significance of up-to-date antivirus software, as well as when antivirus software should be installed, active, and updated.

EXPLAIN the equipment and information that participants will need in order to install or update antivirus software. When selecting antivirus software to purchase, factors to consider include effectiveness, user rating, cost, and required maintenance. Every antivirus program has its own installation instructions.



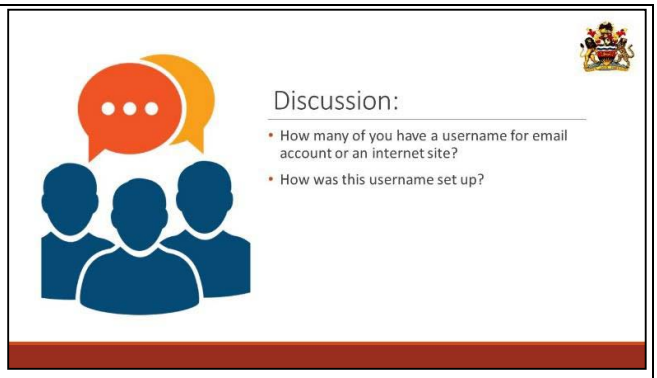
	HIGHLIGHT to participants that every antivirus program has its own installation instructions. **DEMONSTRATE:** How to install antivirus software. **ASK** participants to replicate the procedure for installing antivirus software just performed by the facilitator. If they do not have workstations, have one participant come to the front to demonstrate, and have the remaining participants take turns guiding them through the process.

Trainer Instructions: Step 6 (15 minutes)

Use slides 15–20 and the facilitator notes to guide this step.

Slide 15

ASK participants the questions on the slide. *5 minutes.*



For email accounts and Internet sites, participants may have created their own username and passwords.

DISCUSS some situations where users may be asked to provide the usernames they prefer (swear words and pet names are not allowed).

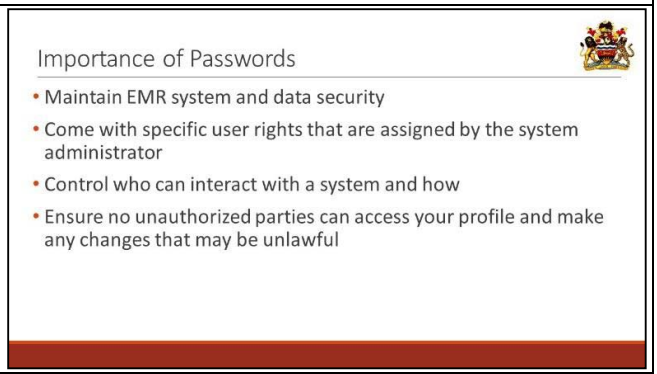
In many situations, usernames are instead provided by the employer or organization. These may be assigned or created by an IT/system administrator. Most organizations have a certain sequence for creating usernames to ensure that they are uniform and easy to remember. Often, this is some combination of the user's first and last names or initials. For the Malawi DHIS2, usernames use the first name of the user's given name linked to the last name.

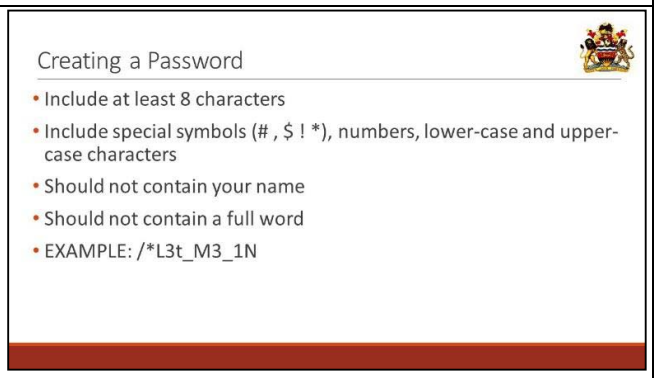
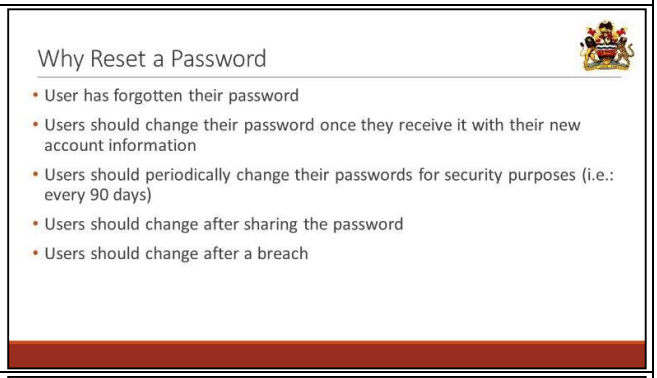
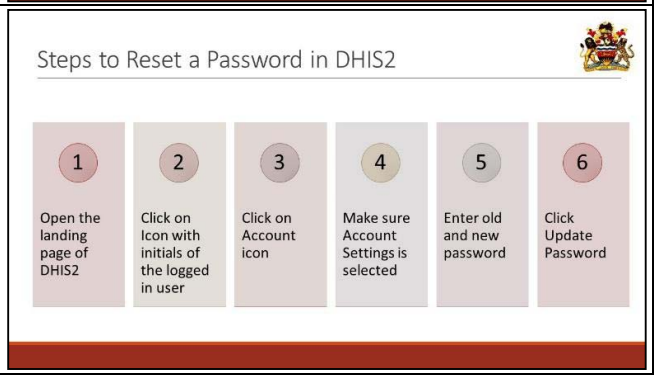
ASK: What sequence was used for your username at your facility?

Slide 16

EMPHASIZE that usernames and passwords contribute to ensuring that users maintain patient privacy and that patient health records are kept confidential.

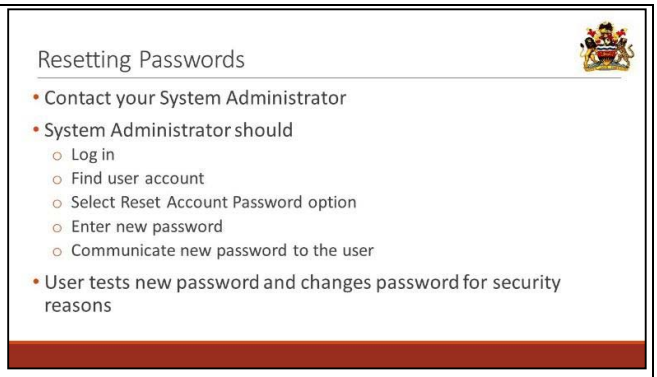
ASK participants how passwords help to maintain EMR system security and data security.



	REFER participants back to their experiences creating their own usernames and passwords. Participants should be aware that their password protects all resources that they have access to. **REFER** to the Baobab Health example, where system support staff were locked out after giving root access to the facility in-charge.
Slide 17	**EMPHASIZE** that it is the duty of the user, not the system administrator, to protect their password. **NOTE:** If a password is assigned to a user by a system administrator, the user is typically given a temporary password, which they are required to change to a more permanent password the first time they log in. 
Slide 18	**EMPHASIZE** that users may be required to change their passwords from time to time to maintain confidentiality and reduce the risk of someone else learning them. Users should change and reset passwords themselves. 
Slide 19	

Slide 20

EXPLAIN: The following is a typical example of the procedure for resetting your password:



- Go to the logon page.
- Enter your username.
- Click on Forgot Password?
- When prompted, enter your username again.
- Click on Show secret question, which prompts a text field to appear.
- Fill in your secret answer, and click on Submit.
- A Reset Password screen appears.
- Fill in your new password twice (the second entry confirms the first).
- Click on Update.

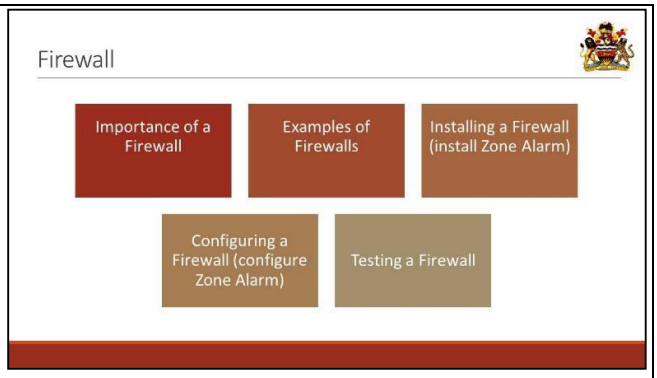
Trainer Instructions: Step 7 (5 minutes)

Use slide 21 and the facilitator notes to guide this step.

Slide 21

ASK: What is a firewall? Why is it used?

DEFINE firewall: part of a computer system or network that is designed to block unauthorized access while permitting outward communication.



A firewall is important because it:

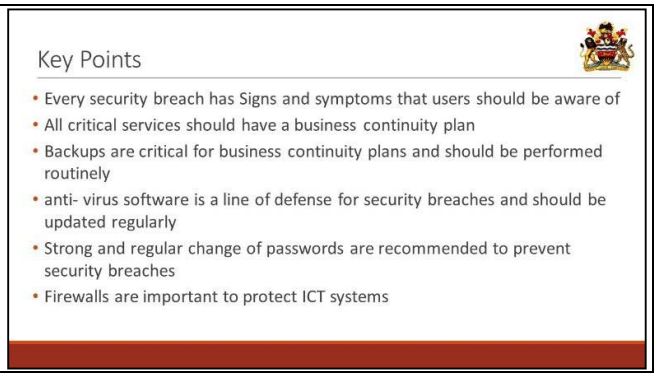
- Restricts unauthorized access
- Filters network traffic
- Blocks malicious software or communication

Examples of software-based firewalls:

- Desktop based: Windows Firewall, ZoneAlarm
- Server based: pfSense, IPTables, Squid

Trainer Instructions: Step 8 (5 minutes)

Use slide 22 and the facilitator notes to guide this step.

Slide 22	**ASK** participants if they have any questions before concluding the session.	

MODULE 8: USER AND SYSTEMS SUPPORT
Session 8.1: Importance of Support and Maintenance for Electronic HIS

Time: 60 minutes

Learning Objectives

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

1. Define user support
2. Explain the purpose and guiding principles of user support
3. Describe the levels of user support

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Interactive lecture	Session introduction (slides 1–3)	Flip chart, markers, tape, LCD
2	30 minutes	Large group discussion	User Support Definition and Principles (slides 4–8)	Flip chart, markers, tape, LCD
3	20 minutes	Large group discussion	Levels of user support (slides 9–10)	Flip chart, markers, tape, LCD, Handout 8.1.1
4	5 minutes	Interactive lecture	Issue Management (slides 11–12)	Flip chart, markers, tape, LCD
5	5 minutes	Individual activity	Key points (slide 13)	Flip chart, markers, tape, LCD

Resources Needed

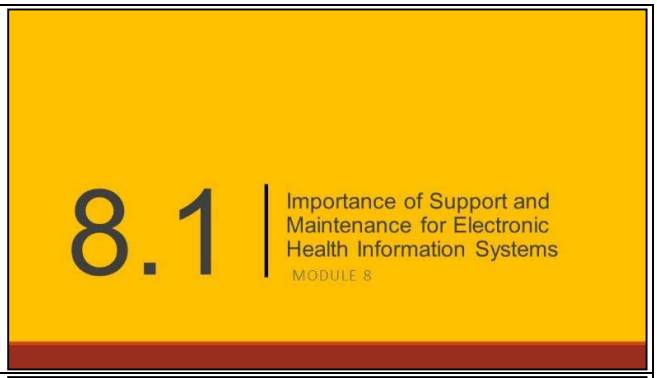
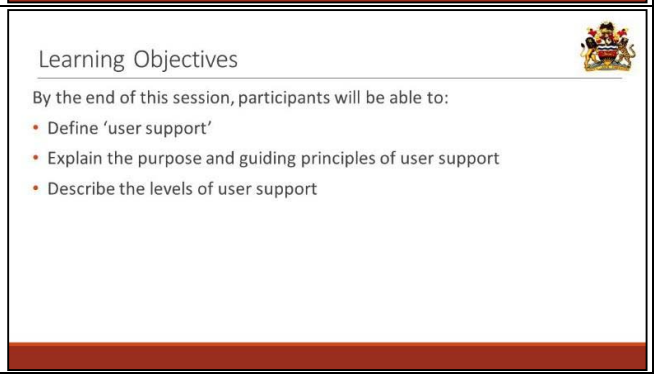
- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

Handout 8.1.1: User Support Roles

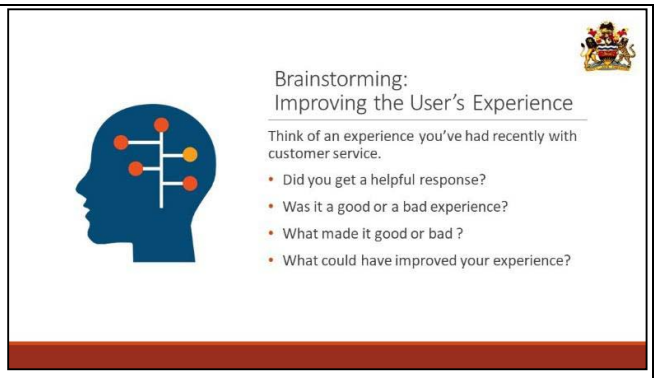
Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**SAY** this session will answer the question: Why do we need to support and maintain electronic health information systems?	
Slide 3	**ASK** a volunteer to read the learning objectives aloud. **MENTION** that some areas in this presentation may be a review for some participants, and new information for others.	

Trainer Instructions: Step 2 (30 minutes)

Use slides 4–8 and the facilitator notes to guide this step.

Slide 4	**ASK** participants to think of a recent experience they've had with customer service. It doesn't have to be with technology. It could be in a shop, with a mobile service provider, a taxi driver, etc. **ASK** the questions on the slide. **GIVE** participants a chance to respond. Keep the discussion brief (about 5 minutes). Before moving to the next slide, **EXPLAIN** that users of DHIS2, the EMR, and other e-HIS also require customer service. In the software industry, this is usually called user support.	

Slide 5

ASK participants to split into pairs to discuss the questions on the slide.

ALLOW 2–3 minutes for the discussion.

DEBRIEF answers with the full group.

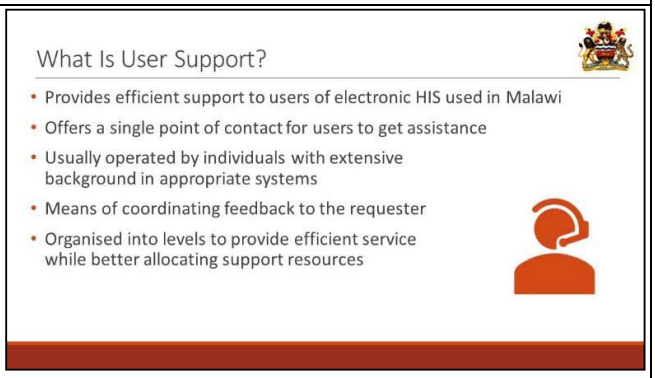
SUMMARIZE the discussion using the points on the next slide.

Slide 6

NOTE: This slide is animated.

ASK: What is user support?

SUPPLEMENT the answers from the previous discussion with the points on this slide. **CLICK** to reveal each point.



- User support is a resource for providing efficient support services to users of an information system.
- Standard user support typically offers a single point of contact for users to get assistance when they encounter problems using the system.
- User support is usually operated by individuals that have an extensive background with the appropriate system, so that they can walk users through step-by-step solutions to their problems. Two examples of user support operations are the TNM and BHT call centres.

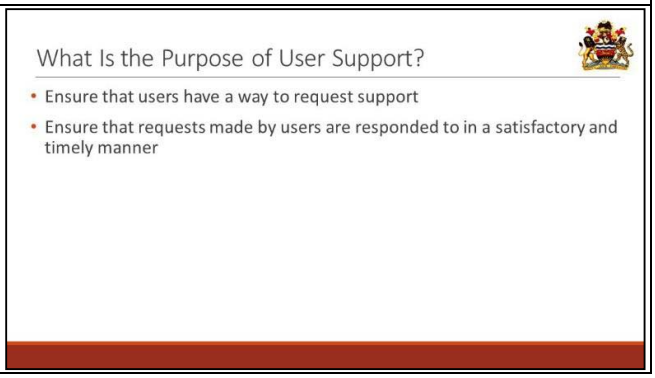
CLICK to continue on the next slide.

Slide 7

NOTE: This slide is animated.

ASK participants the question in the slide title.

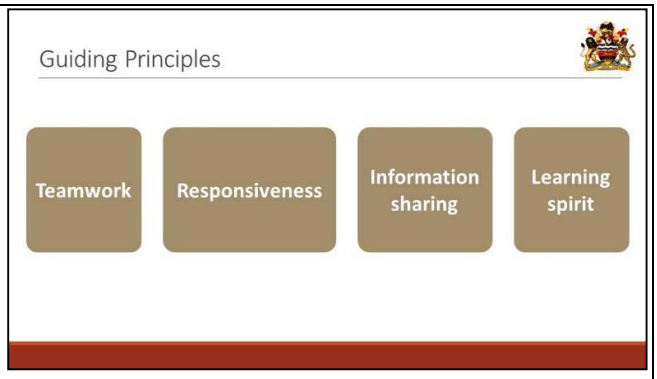
ALLOW time for them to respond before clicking through to show the answer.



Slide 8

EXPLAIN that the guiding principles of successful user support are:

- Teamwork
- Responsiveness
- Information sharing
- Learning spirit



ASK: Which of these principles are internal to the user support team? Why? Which are external between the user support team and their clients? Why?

Answer: *All are both internal and external.*

Teamwork is important internally because rarely does only one person respond to a request. You may need to rely on someone else's expertise to solve an issue or communicate with the client. It is important externally because user support team members may need to work with the client to get clarification on the issue at hand, and require assistance resolving it on the ground.

Responsiveness is important internally because user support team members and technical advisers need to work together in order to respond to the client in a timely manner. It is important externally because the client relies on the user support team to help solve their problems in a timely manner.

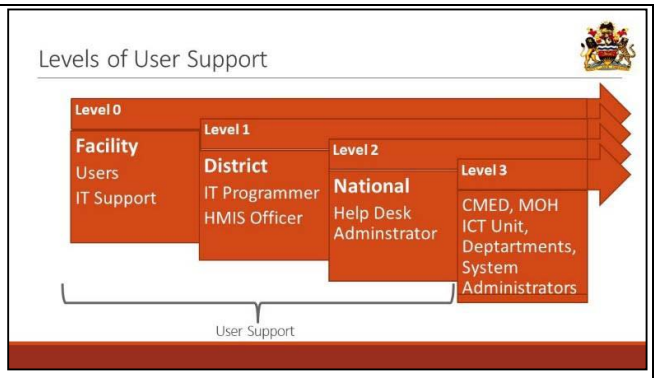
Information sharing is important internally because user support team members may need someone else's expertise to solve a problem. They rely on others to document common issues and their solutions so that no one is left reinventing the wheel when working on an issue. Information sharing is important externally because the client will be more confident in the solution and satisfied with the service if the user support team shares information transparently and proactively.

Learning spirit is important internally because a lot of user support work is about problem-solving and learning on the job. It is important externally because the system will be more successful when the client is willing to learn and play a role in the maintenance and proper use of the system.

Trainer Instructions: Step 3 (20 minutes)

Use slides 9–10 using the facilitator notes and **Handout 8.1.1** to guide this step.

Slide 9



EXPLAIN that user support, often referred to as the help desk, is organized into levels to provide the best possible service in the most efficient manner. In order for the structure to work best, it is important for users to understand the role of each level, and for IT personnel at each level to understand what their responsibilities are, and when it is appropriate to escalate an issue to the next level.

The graphic in this slide shows an example of the levels of support available to users:

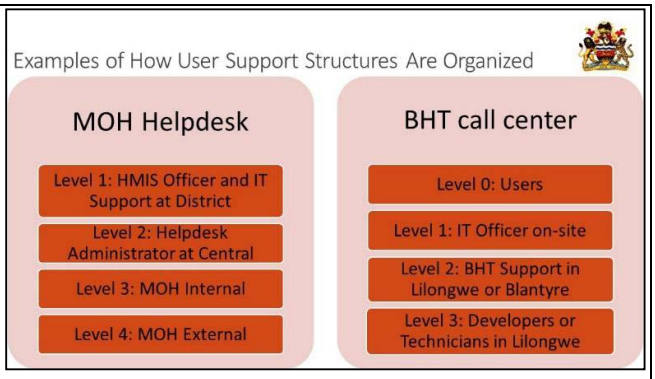
- **Level 0:** At this level, technical or technological problems, or issues**,** are resolved by the user, either without the need for assistance, or with the help of onsite IT support. Typical users include statistical clerks and data clerks.
- **Level 1** is the initial level of user support for basic issues. When issues cannot be resolved at level 0 they are escalated to level 1. Support at this level is staffed by trained teams of HMIS officers or IT programmers who have more in-depth systems training and knowledge. Their primary responsibility is to gather as much information as possible from the user in order to identify the underlying problem. If they are not able to resolve the problem, they will escalate the issue to the next level.
- **Level 2:** At this level, the help desk is usually located in Lilongwe, either at the MOHP ICT Unit, CMED, or in other departments. If EMR support is needed, contact BHT. If user support at this level are not able to resolve the issue, they will escalate to the system developers.
- **Level 3** refers to the developers of DHIS2, the EMR, or the LIS. As the creators of these systems, they are the most familiar with them, and therefore best equipped to solve technical issues.

Slide 10

REFER participants to **Handout 8.1.1: User Support Roles.**

USE this slide to introduce participants to the different ways that user support can be organized.

ASK participants what each example has in common. How do the examples differ?



User support can have different names: call centre, help desk, user support—these all refer to the same thing: assisting users with technical issues.

REMIND participants that this is an example. A general HIS help desk will have the same structure, but may differ in the specifics of who is responsible for what.

Trainer Instructions: Step 4 (5 minutes)

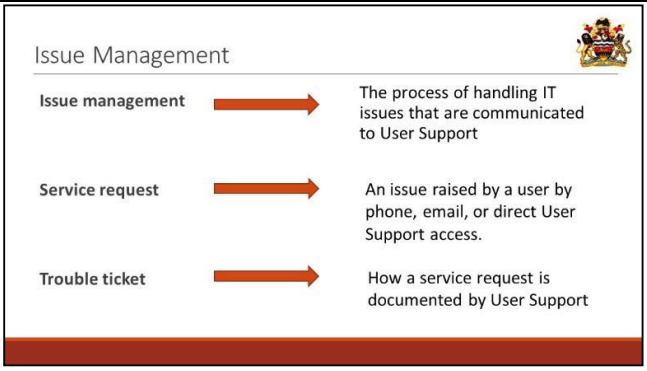
Use slides 11–12 and the facilitator notes to guide this step.

Slide 11

NOTE: This slide is animated.

ASK participants to define the terms on the slide.

EXPLAIN what issue management is by reviewing the definitions on the slide, and **COMPLETE** with the notes below:



Issue management refers to the process of handling issues that are communicated to user support.

- Issue management involves the steps taken to resolve issues, documentation of all steps taken, and all communications with the user.

When a user reports an issue, this is called a **service request**.

- Service requests can originate from any user by phone, email, or direct user support access, and even by person-to-person oral communication.

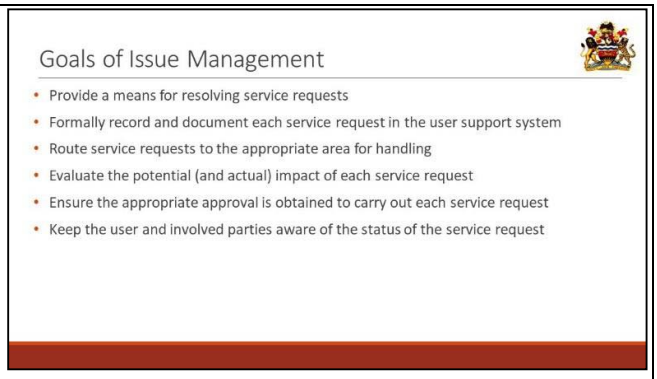
Service requests are documented by user support through the creation of a **support ticket** (sometimes called a trouble ticket).

Slide 12

NOTE: This slide is animated.

ASK: What does issue management accomplish?

ALLOW a few responses and then **CLICK** to reveal the points on the slide:



- Provides a means for resolving service requests
- Formally records and documents each service request in the help desk system
- Routes service requests to the appropriate areas for handling
- Evaluates the potential (and actual) impact of each service request
- Ensures the appropriate approval is obtained to carry out each service request
- Keeps the user and involved parties aware of the status of the service request

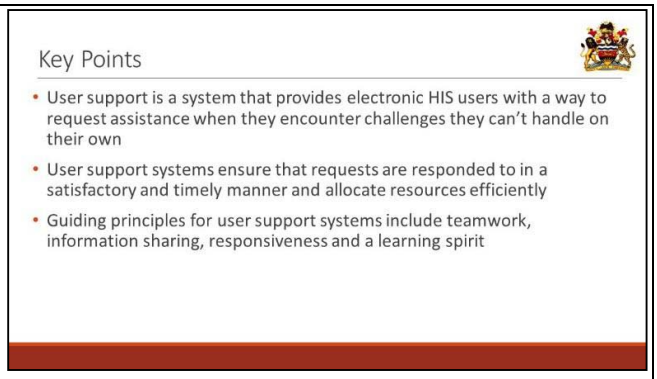
Trainer Instructions: Step 5 (5 minutes)

Use slide 13 and the facilitator notes to guide this step.

Slide 13

Note: This slide is animated.

ASK participants to take out a piece of paper and write down:



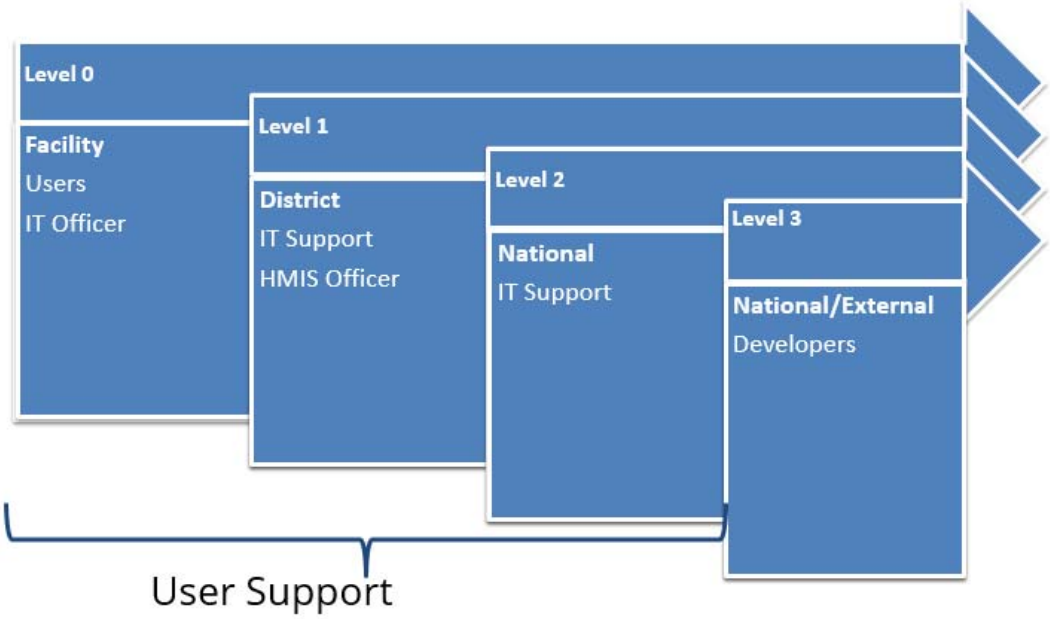
- Two things that they learnt about user support
- Something they would like to understand better about user support.

GIVE participants three (3) minutes to write down their responses. **ASK** for volunteers to share the two things that they learnt.

CLICK to reveal the key points on the slide.

COLLECT the pieces of paper. During the trainer debrief, review what they want to understand better; determine if it was covered again before the end of the day, or plan to review during the Introduction to the Day.

Handout 8.1.1: User Support Roles



Help Desk Tier	Responsibilities	Location
Level 0	• Respond to user calls • Some knowledge on how to use each system • Resolve basic hardware problems, network connectivity, basic/common user issues • Refer more complex issues to Level 1	Facility
Level 1	• Respond to issues communicated by user calls, emails, or the ticketing system • Basic knowledge on how to use each system • In charge of creating tickets and triaging ALL requests • Search knowledge base for applicable solutions • Refer complex issues to Level 2	Central
Level 2	• Respond to issues communicated by user calls, emails, or the ticketing system • Some experience with each system, can mentor others in its use • Typically handle more complex issues, and those that do not require developer action • Write knowledge base solutions on common issues and questions • Refer complex issues to developer support	District
Level 3 (Developer)	• Responsible for the system platforms • Have deep knowledge of the systems • Come up with solutions to issues and write them to the knowledge base	National

Session 8.2: Identifying e-HIS IT Issues

Time: 60 minutes

Learning Objectives

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

1. List the different types of IT issues
2. Describe common user issues
3. Describe the three types of messages users may receive, and the actions most commonly taken in response to each
4. Distinguish between a bug and a system enhancement

Session Overview

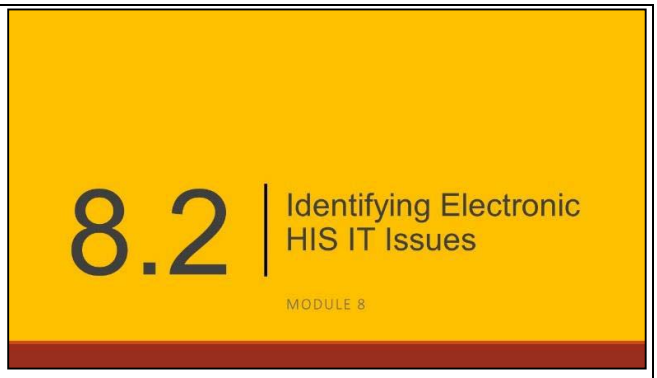
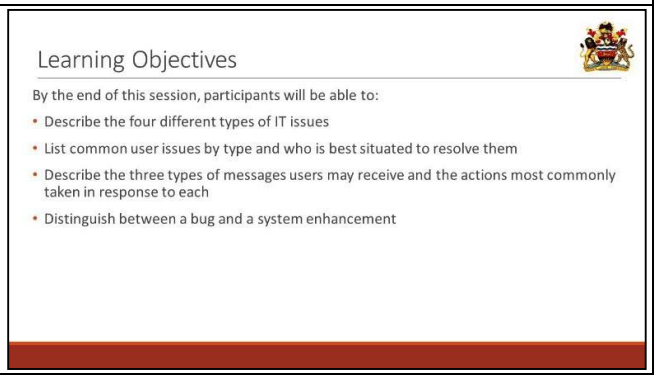
Step	Time	Method	Content	Resources
1	5 minutes	Interactive lecture	Session introduction (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Brainstorming/ interactive lecture	IT issue types (slide 4)	Flip chart, markers, tape, LCD
3	20 minutes	Interactive lecture/large group discussion	Identifying IT issues (slides 5–9)	Flip chart, markers, tape, LCD
4	20 minutes	Interactive lecture/large group discussion	Bugs and system enhancements (slides 10–13)	Flip chart, markers, tape, LCD
5	5 minutes	Individual activity	Key points (slide 14)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**EXPLAIN** that identifying issues with e-HIS systems like DHIS2 or the EMR is an important part of keeping these systems running. If you do not know why an application is not working properly, it is difficult to fix the problem—and even more difficult to use the application for its intended purpose. This can cause a cascade of data problems that could very well affect patient care. This session will look at how to identify these issues.	
Slide 3	**REVIEW** the learning objectives with participants.	

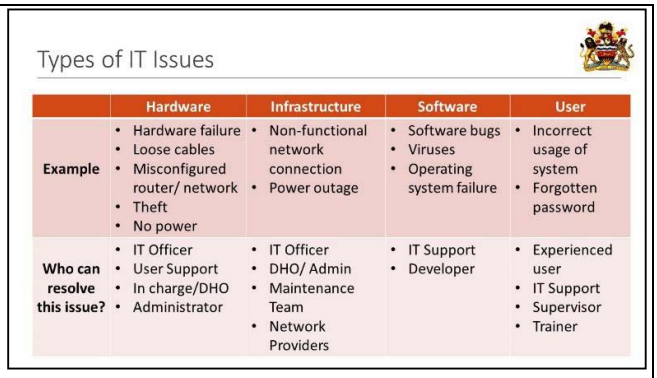
Trainer Instructions: Step 2 (10 minutes)

Use slide 4 and the facilitator notes to guide this step.

Slide 4

NOTE: This slide is animated.

ASK participants to brainstorm issues that they have encountered with any of the e-HIS used in Malawi.



Possible responses:

- *Network failure*
- *System not responding*
- *Power failure*
- *UPS failure*
- *Reports don't populate*

Highlight the problem:

ASK: There are four general categories of problem that can arise at the system level. What are they?

Answer:

- *Hardware*
- *Infrastructure*
- *Software*
- *User*

ASK participants to indicate how they would categorize each of the issues they brainstormed earlier.

ASK: Who is best situated to help resolve each kind of issue?

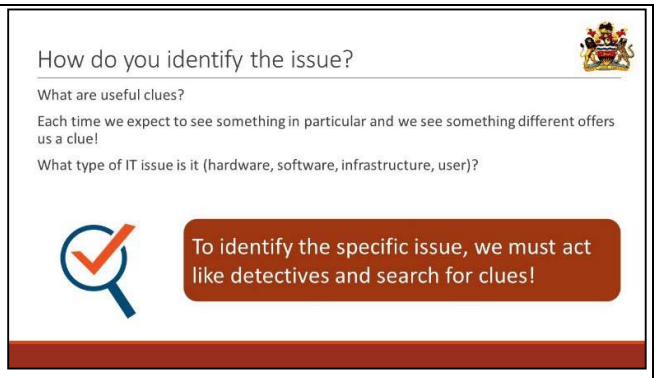
CLICK to reveal the table and **REVIEW** the responses.

EMPHASIZE that it is important to know who to go to with IT issues or challenges that you are not able to resolve on your own.

Trainer Instructions: Step 3 (20 minutes)

Use slides 5–9 and the facilitator notes to guide this step.

Slide 5



NOTE: This slide is animated.

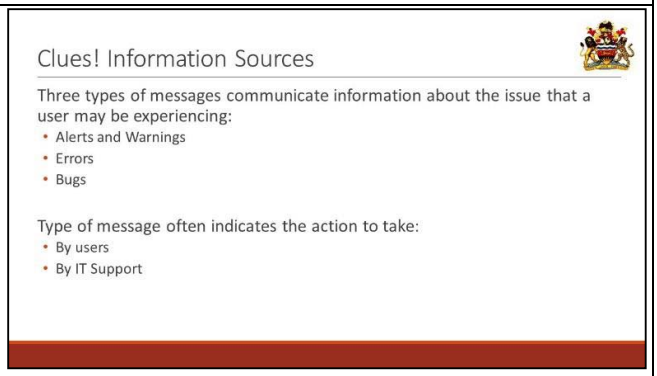
TELL participants to compare identifying an IT issue to solving a crime: the detective needs to look for clues that will tell her what happened, what went wrong, and why. These are the questions we should ask to try and understand the issue and start us on the path to resolving it.

ASK the group to select one of the issues they identified during the previous brainstorming exercise.

USE the questions on this slide to take participants through the process of identifying the issue.

EXPLAIN that the initial issue the user identifies may be only a symptom of the real issue. The first task is to determine the specific issue.

Slide 6



EXPLAIN that there are different information sources that can give us clues about a range of IT issues.

EMPHASIZE the idea that maintaining hardware and software plays an important role in keeping health data secure and of high quality.

Messages are ways that software communicates potential issues to users, enabling corrective action to be taken or maintenance performed. Note that messages vary in terms of what they are trying to communicate, and in terms of the complexity and urgency of the issue.

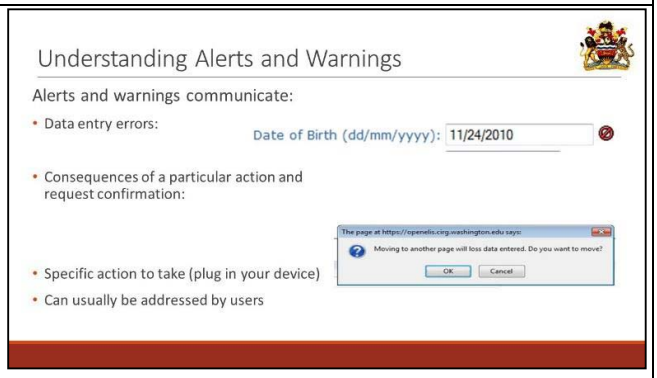
Most software generates three different types of messages: **alerts and warnings**, **error messages**, and **bugs**. It is important to understand the different types of software messages, and how urgently a message needs to be heeded so that the issue can be resolved without jeopardizing data quality.

Despite the best preventive efforts, hardware and software system failures do occur. Some may be minor and originate with users—for example, a user enters data into an e-HIS system in the wrong format and the software fails to recognize the entry. Others are more serious, and originate with the system itself—for example, an application doesn't start because another component is not working properly.

EXPLAIN that:

- Alerts and warnings can most frequently be handled by system users, though they may occasionally require assistance from an IT administrator.
- Most error messages and bugs highlight software or hardware failures; these are most often addressed by IT administrators. The next three slides provide more information and examples for each type of message.

Slide 7



EXPLAIN: Alerts and warnings are *positive* messages that assist users in maintaining data quality and reducing data entry errors.

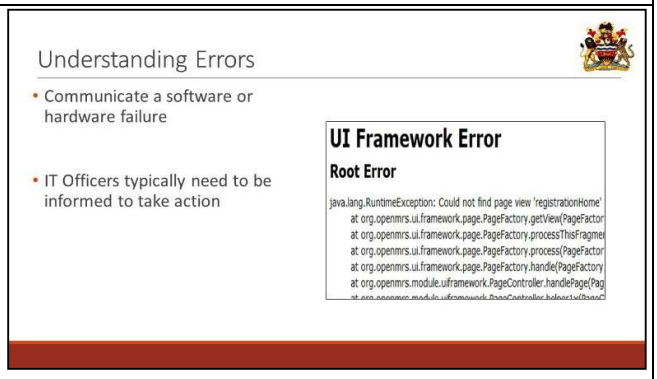
Examples of alerts and warnings include:

- A red circle indicating that a field is blank or improperly completed
- A highlighted field to indicate that a required field is incomplete
- A written message explaining that an entered value is not valid
- Telling the user the possible consequences of an action, and giving the user an opportunity to cancel the action.

ASK participants if they can name any other examples.

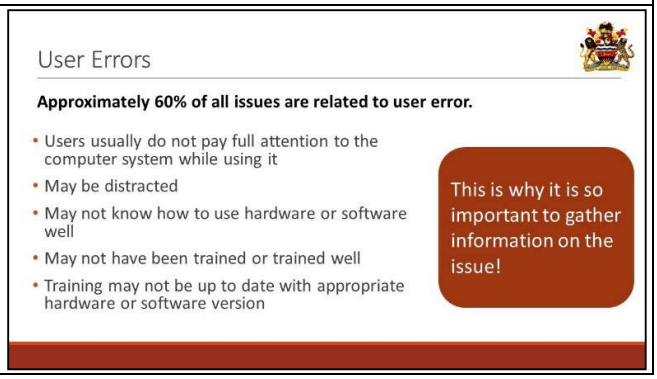
EXPLAIN that most of these messages can be handled by system users. One exception is a more advanced alert or warning that requires a certain level of access to address. A good example of this is when someone is trying to log in and have entered the wrong password enough times that the software blocks their access. The message signals to the user that they are blocked from logging on, and only someone with administrative access to the system can lift the block.

Slide 8



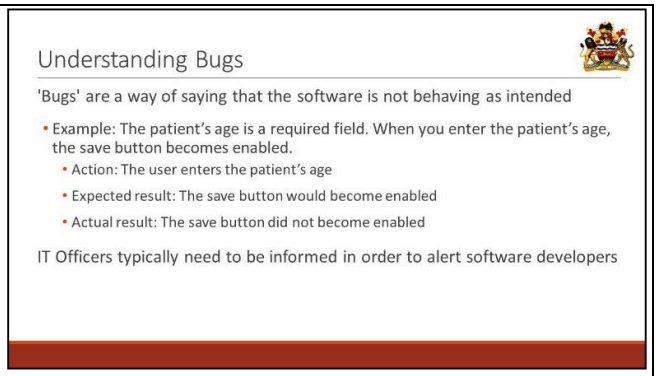
EXPLAIN that error messages generally communicate a software or hardware failure. Sometimes the message will simply say that an error has happened. Other times, a more complex message that provides additional information will be given.

When system users encounter error messages, the main action to take is to inform their IT officer or in-charge of the issue. Depending on the complexity and severity of the error, either the IT officers or IT personnel will resolve the error. It may be as simple as rebooting (restarting) the computer, or as complicated as reconfiguring an application. An error message can also indicate a failure in the software development, in which case, a software developer will need to be called in to resolve the problem.

	TELL participants that communicating about error messages and bugs will be discussed in greater detail momentarily.
Slide 9	**READ** the content on the slide. **ASK** participants if this seems accurate according to their experience. 

Trainer Instructions: Step 4 (20 minutes)

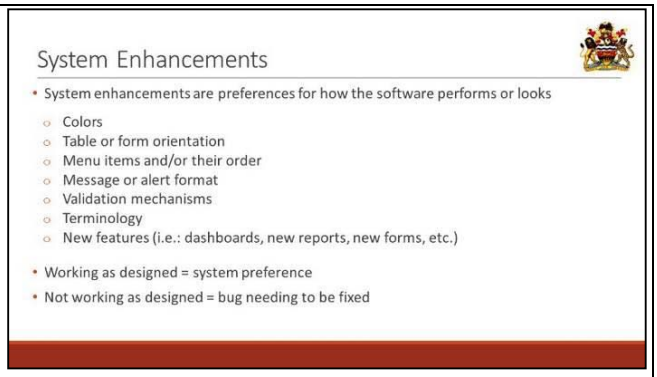
Use slides 10–13 and the facilitator notes to guide this step.

Slide 10	**EXPLAIN** that sometimes the software will not give you a message when something is not working correctly. It will do something that it does not normally do or that it is not designed to do. These are called bugs.  **ASK:** Who usually finds bugs? Participants should respond that users usually find bugs, because they interact with the system most frequently and know when it is not behaving as it is supposed to. **ASK:** Who needs to know about bugs in order for them to be resolved? **EXPLAIN** that fixing bugs is not necessarily the responsibility of the user support team, but the user support team does play a critical role in communicating the problem to the software developer, who CAN fix them.

Slide 11

EMPHASIZE that bugs do not include situations where you may wish the software worked a different way.

NOTE that system enhancements are usually changes made in response to user preferences.



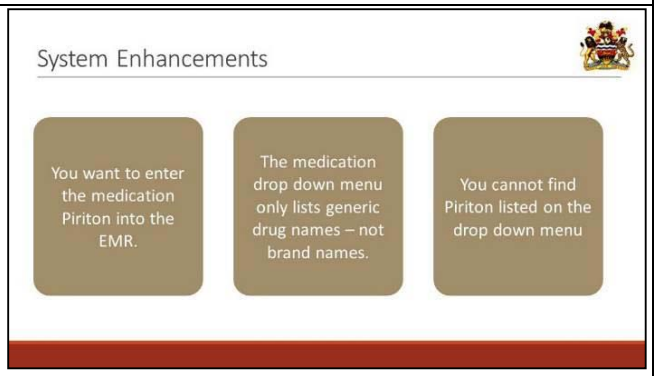
EXPLAIN that the difference in handling enhancements or feature requests as opposed to handling bug reports is that more people will have to agree that the specified feature needs to be changed or added; for the bug report, there just has to be agreement that the software is not behaving as specified.

NOTE that most maintenance effort tends to go towards a variety of software enhancements. In a study of 487 data processing organizations, enhancements for users accounted for 42% of total maintenance efforts.

Slide 12

REVIEW the example on this slide:

You want to enter the medication Piriton into the EMR. However, the medication dropdown menu lists only generic drug names—not brand names—so you cannot find Piriton listed.



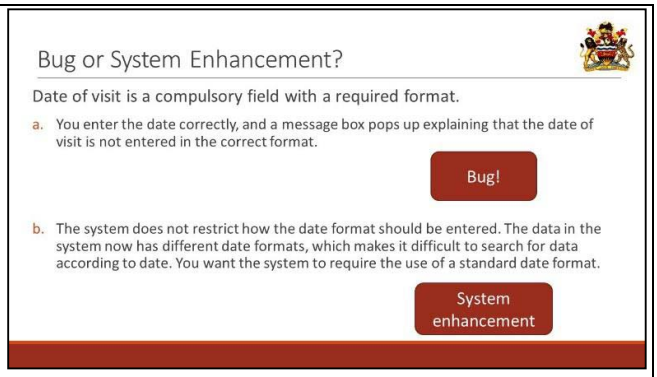
EMPHASIZE that this is not a bug. The EMR is behaving the way it was designed to, because it does not use brand names like Piriton. If you want the list to include brand names, then you must request this change. Requesting this change would be called a **feature (or software enhancement) request**. However, if the EMR does not list Piriton OR its generic name, and it has just started doing this for no reason, then it may be a bug.

Slide 13

NOTE: This slide is animated.

ASK a participant to read example a.

ASK: Is this a bug or a system enhancement?



The answer is that this could be a bug. If you have entered the date correctly but still see the error message, it may be a sign the software is not working correctly. To confirm, try repeating the procedure with a different file, or on a different computer. If the problem persists, then you may want to submit a bug report.

ASK a participant to read example b.

ASK the group to determine whether this is a bug or a system enhancement?

The answer is that to request a change here would be a system enhancement, because the software is working as it is designed. You might wish that a standard date format was enforced, but that feature has not yet been written into the system

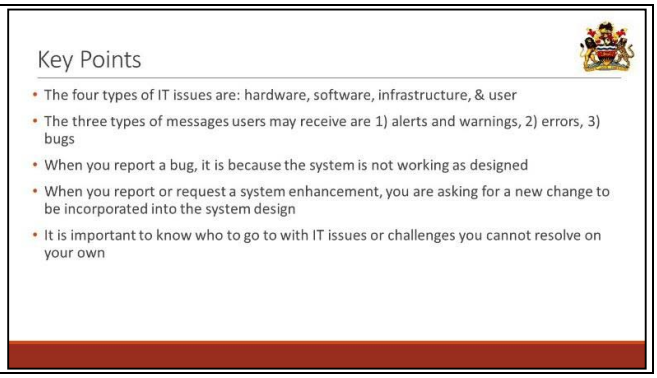
Trainer Instructions: Step 5 (5 minutes)

Use slide 14 and the facilitator notes to guide this step.

Slide 14

CONCLUDE by asking a participant to read the key points.

ASK if there are any questions before closing the session.



Session 8.3

Session 8.3: Troubleshooting

Time: 150 minutes

Learning Objectives

1. At the end of this module, participants will be able to:
2. Name five troubleshooting steps
3. Identify possible places to begin troubleshooting an issue
4. Cite common ways to troubleshoot basic issues

Session Overview

Step	Time	Method	Content	Resources
1	5 minutes	Interactive lecture	Session introduction (slides 1–3)	Flip chart, markers, tape, LCD
2	10 minutes	Interactive lecture	Introduction to troubleshooting (slides 4–5)	Flip chart, markers, tape, LCD
3	15 minutes	Interactive lecture, Practical group activity	Troubleshooting process (slides 6–10)	Flip chart, markers, tape, LCD, Handout 8.3.1
4	15 minutes	Large group discussion	Experiences troubleshooting (slide 11)	Flip chart, markers, tape, LCD
5	45 minutes	Practical group activity	Troubleshooting case study (slide 12)	Flip chart, markers, tape, LCD, Activity Sheet 8.3.2, Handout 8.3.2
6	10 minutes	Interactive lecture	Troubleshooting and issue management (slide 13)	Flip chart, markers, tape, LCD, Handout 8.3.3
7	45 minutes	Small group discussion	Troubleshooting and issue management (slide 14)	Flip chart, markers, tape, LCD
8	5 minutes	Group discussion	Key points (slides 15–16)	Flip chart, markers, tape, LCD

Resources Needed

- Flip chart, paper, and markers
- Tape
- LCD or overhead projector

Handouts

- Handout 8.3.1: Troubleshooting Steps and Tips
- Handout 8.3.2: Troubleshooting Case Studies
- Activity Sheet 8.3.2: Troubleshooting Case Studies and Answers
- Handout 8.3.3: Malawi MOHP Helpdesk Structure

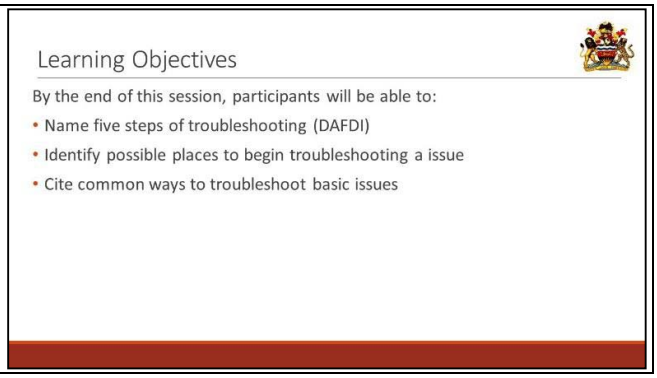
Advance Preparation

- If desired, write out the session's learning objectives on a piece of flipchart paper
- For the exercise on slide 12, cut the scenarios from **Activity Sheet 8.3.2** into individual strips

Trainer Instructions: Step 1 (5 minutes)

Use slides 1–3 and the facilitator notes to guide this step.

Slide 2	**SAY:** This session focuses on how you can help solve issues that occur while you are using any of the e-HIS applications in use at your facility or in your district.	

Slide 3	**REVIEW** the learning objectives for this session.	

Trainer Instructions: Step 2 (10 minutes)

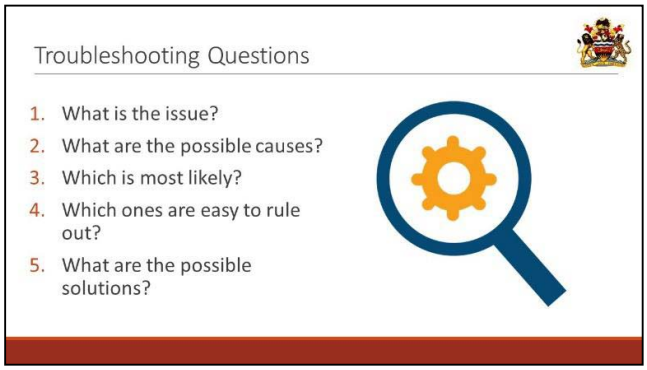
Use slides 4–5 and the facilitator notes to guide this step.

Slide 4	**ASK** what is troubleshooting? *Troubleshooting is the process of identifying, analysing, and resolving a problem. This problem could be in an organization or any type of system.* **ASK**: What do we troubleshoot? Why? *Within the context of e-HIS, troubleshooting can be done to solve any problem with any of the software, hardware, or infrastructure used for e-HIS. Troubleshooting enables the repair and restoration of a computer or software when it becomes faulty, unresponsive, or acts in an abnormal way.* **ASK:** Who troubleshoots? *Anyone who uses electronic systems to carry out their work functions should learn how to troubleshoot.*	

Slide 5

EXPLAIN that there are several questions that can help you troubleshoot IT issues with e-HIS applications.

PROVIDE more detail using an example. **ASK** participants to select one of the issues they identified earlier. One example could be: system not responding.



Once an issue has been identified, the next question to ask is: 'What are the possible causes?'

ASK: What could cause the system to not respond?

Possible causes for a non-responsive system:

- Virus
- Unplugged cables
- Hard-drive failure
- Power switch is turned off
- Malfunctioning router

Establish which ones are more likely and/or easy to rule out. Note that each issue has a number of likely causes. For instance, a computer, OS, driver, or software program may stop responding because there is a conflict between hardware and software trying to use the same resources, the system may lack resources, or the software contains a bug.

ASK: What are the most likely causes of an unresponsive system? Then have them identify causes that are easily ruled out.

ASK: What steps can you take to try to resolve the issue?

EMPHASIZE that users should not go beyond their comfort level when troubleshooting issues; it is natural for everyone to reach a point where more advanced IT assistance is required. The important thing is that you note all of your actions, from what you were doing just prior to the problem occurring to all steps you have taken to try to resolve the issue.

Trainer Instructions: Step 3 (15 minutes)

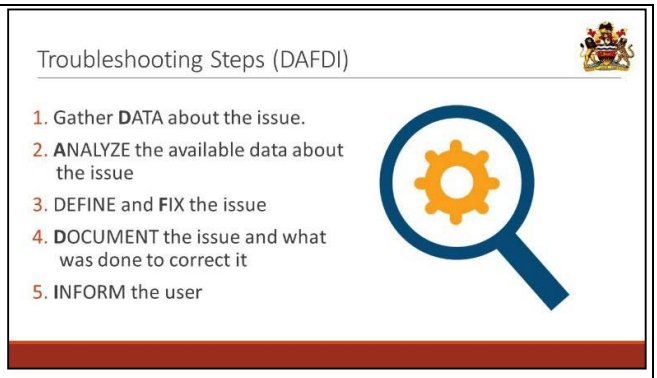
Use slides 6–10 and the facilitator notes to guide this step.

Slide 6

NOTE: This slide is animated.

CLICK to reveal each step one by one. **ASK** participants to explain in detail what each step means. If applicable, **ASK** where they will look for the information or resources to complete that step.

REFER participants to **Handout 8.3.1: Troubleshooting Steps and Tips**.



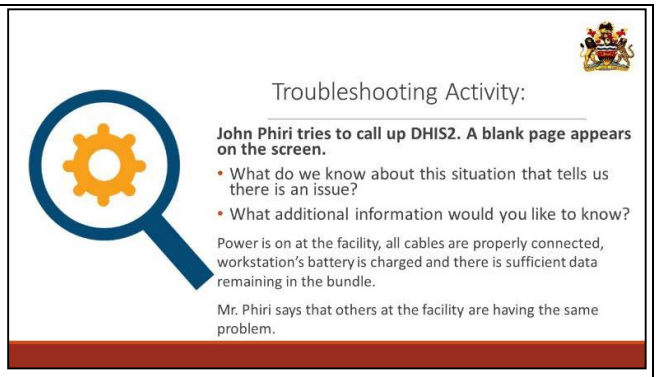
1. Gather **Data** about the characteristics, signs, or symptoms of the problem.
2. **Analyse** the available data about the problem, and generate some ideas about the kind of problem or failure that is occurring.
3. Be aware that gathering and analysing data often occur cyclically. That is, analysis of available information—or the lack thereof—typically prompts a search for other signs or symptoms.
4. **Define and Fix** the problem. Once you know what type of problem you're dealing with, it becomes easier to determine what the actual problem is, and what to do to resolve it.
5. **Document** both the problem and what was done to correct it.
6. **Inform** user support about the problem. Whether the problem is straightforward enough to fix yourself, or it becomes too complex to solve yourself, someone needs to know what is going on and what to expect.

ASK what experience participants have had with troubleshooting. What have they done that has helped them find a solution? They may respond with any of the tips below or from the handout.

- Try to understand the problem from all angles.
- Accept that you may have to work with only partial understanding.
- Try the easy fixes first.
- Ensure that you are attacking the root of the problem rather than a symptom. Can it be reproduced?
- Are there side effects of the original problem or your proposed solution?
- Confirm your solution.
- Document the solution where others can also use it as a reference.

Slide 7

NOTE: This slide is animated. *Only the top half of the slide is visible to participants.*



USE the questions on the slides and below to guide participants through the example on the next five slides.

ASK: What do we know about John Phiri's situation?

The page is blank.

ASK: What additional information would you like to have?

- Are all of the cables connected properly?
- Is there a power outage?
- Is the workstation's battery charged?
- Is the application working on other workstations?
- Are the workstations using the correct URL?
- Is the router or dongle on?
- Are there still data on the bundle?
- Is the WiFi working?
- Is the correct IP address being used?

SAY that there is some additional information available. **CLICK** on the slide to review the new information with participants.

- Are all of the cables connected properly? Yes.
- Is there a power outage? No.
- Is the workstation's battery charged? Yes.
- Is the application working (or not working) on other workstations?
- Is the router or dongle on? You check the router and it is on.
- Are there still data on the bundle? There are still data left on the bundle
- Is the WiFi working? Yes
- Are the workstations using the correct URL? No.
- Is the correct IP address being used? No

Slide 8

SAY: The next step is to analyse the data that we have about John Phiri's situation in the previous slide.

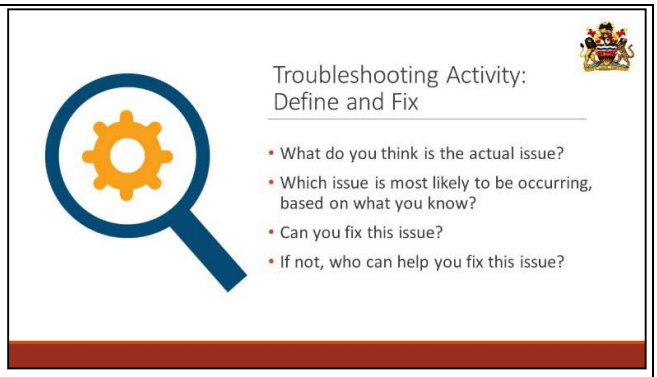
ASK the questions on the slide.

The data indicate that this is not a hardware or infrastructure problem: other users are having a similar problem, power is available to the workstations, and data are still available on the bundle.

Slide 9

ASK the questions on the slide.

Participants should arrive at two possible and likely issues: The workstations are not using the correct URL or the wrong IP address is being used—e.g., they used one ending in dhis2.health.com instead of dhis2.health.gov.mw



Participants, particularly users, may say they don't know how to fix this problem. Other participants may know how to fix this problem.

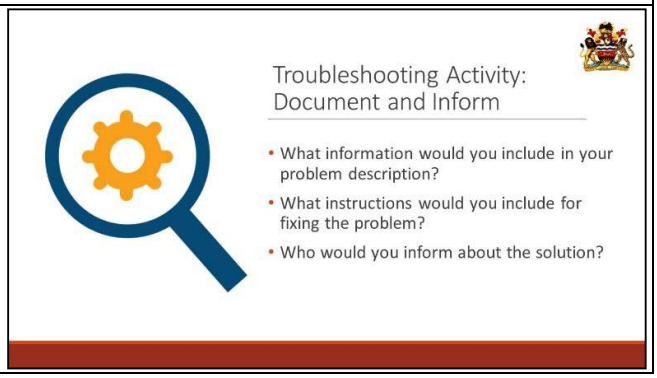
INVITE a participant who knows how to fix the problem to guide the facilitator through the fix.

Depending on the solution, the facilitator can indicate whether the fix worked or not.

DEMONSTRATE how to change the incorrect URL to the correct one.

Slide 10

Briefly **REVIEW** the questions that participants should ask when going into documenting and informing others about the issue and its fix.



Trainer Instructions: Step 4 (15 minutes)

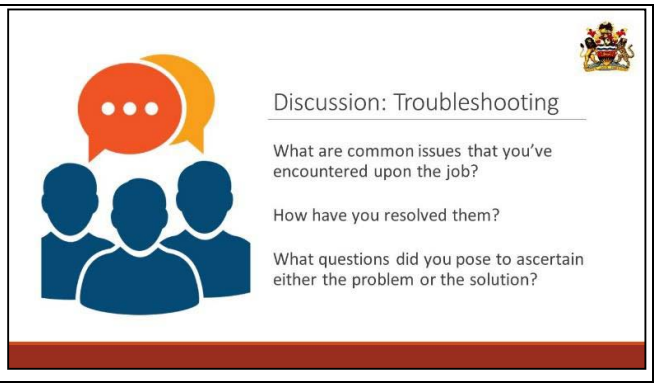
Use slide 11 and the facilitator notes to guide this step.

Slide 11

ASK:

- What are common issues that you've encountered upon the job?
- How have you resolved them?
- What questions did you pose to ascertain either the problem or the solution?

ALLOW 15 minutes for discussion.



Trainer Instructions: Step 5 (45 minutes)

Use slide 12 and the facilitator notes to guide this step.

Slide 12

45 minutes total

FOLLOW the instructions on **Activity Sheet 8.3.2** for this exercise. **CUT** the scenarios into individual strips.

1. **ASK** participants to get into groups of three or four.
2. **REFER** participants to **Handout 8.3.2: Troubleshooting Case Studies. GIVE** each group two (2) scenario strips.
3. **EXPLAIN** that each group has one or two scenarios. For each scenario, they should answer the questions on this slide; then they will present their discussions to the larger group.
4. **ALLOW** 20 minutes for discussion.
5. **DEBRIEF** by asking each group to present one of their scenarios and a summary of their discussion. **USE** the key on the activity sheet to highlight any points the participants miss. This discussion should take about 15 minutes.

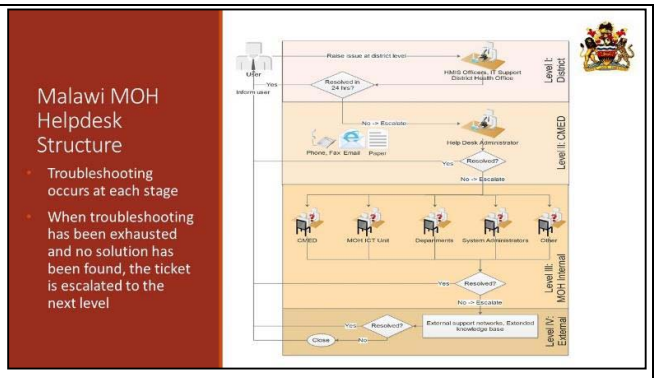
Trainer Instructions: Step 6 (10 minutes)

Use slide 13 and the facilitator notes to guide this step.

Slide 13

REFER participants to **Handout 8.3.3: Malawi MOHP Helpdesk Structure**.

REMIND participants that troubleshooting occurs at each support level. When troubleshooting has been exhausted and a solution still has not been found, that is when you escalate the ticket to the next level.



REMIND participants that it is important to remember to document problems and their solutions in detail. This can save someone else the tiring job of troubleshooting! In fact, it may save YOU the tiring job of troubleshooting the problem next time!

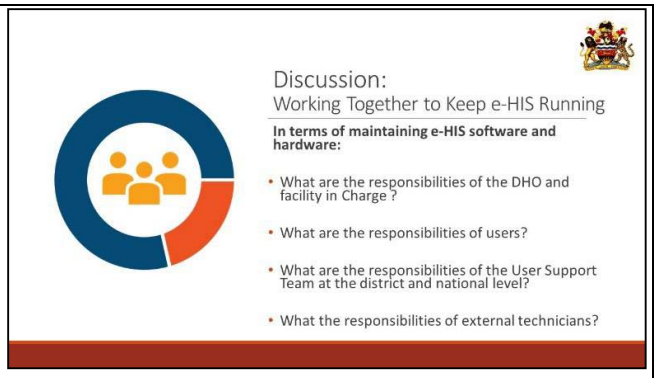
Trainer Instructions: Step 7 (45 minutes)

Use slide 14 and the facilitator notes to guide this step.

Slide 14

EXPLAIN that different people work together in order to keep systems performing as intended, and to make sure that decision makers consistently have access to high-quality data.

This discussion focuses on the roles and responsibilities of each group.



EXPLAIN how the small group discussion will work, and what each group should focus on during time they have:

- Participants will be divided into four groups.
- Each group will be assigned a small group discussion question.
- Each group will need to assign a facilitator, note-taker, and reporter.
- Each group will have 15 minutess to discuss the questions and prepare to report.

ENCOURAGE participants to think back on the troubleshooting session. **ASK** if participants have any questions about what they are to discuss in their small groups.

DIVIDE participants into four groups, and **ASSIGN** each group one of the questions on the slide. Make sure that the discussion questions are visible for all four groups to refer to during the discussion.

MONITOR the group discussions to ensure that they are focused and progressing.

After 15 minutes, bring everyone back together. **REMIND** participants that each group will have five (5) minutes to present the results of their discussion, and then five (5) minutes to take questions from the other groups. **ASK** for one group to volunteer to go first.

DEBRIEF the discussion, highlighting the following points:

- Reporting issues with software, hardware, or networking is a key part of maintaining a system.
- Users who report issues enable IT support and application developers to take action to keep the system running.
- IT support can take preventive maintenance actions:
    - routine calls to sites to identify issues
    - system and network performance monitoring
    - monitor and replace components when they are no longer supported or under warranty

Trainer Instructions: Step 8 (5 minutes)

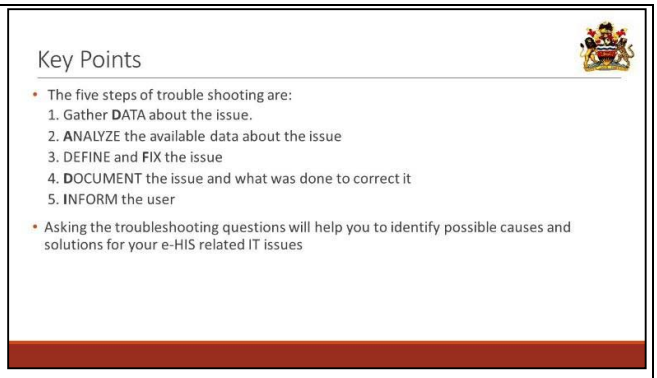
Use slide 15 and the facilitator notes to guide this step.

Slide 15

ASK participants to take out a piece of paper and write down three things that they learnt during this session.

ASK them to write down three things that they would like to know more about.

After 2–3 minutes, have participants **SHARE** what they learnt.



Then **CLICK** to reveal key points from the session.

Handout 8.3.1: Troubleshooting Steps and Tips

Troubleshooting Steps (DAFDI)

1. Gather **Data** about the characteristics, signs, or symptoms of the problem.
2. **Analyse** the available data about the problem and generate some ideas about the kind of problem or failure that is occurring. This often occurs cyclically: analysis of available information—or the lack thereof—typically prompts a search for other signs or symptoms.
3. **Define and Fix** the problem. Once you know the type of problem you're dealing with, it becomes easier to determine what the actual problem is, and what to do to resolve it.
4. **Document** both the problem and the steps taken to correct it.
5. **Inform** user support about the problem. Whether the problem is straightforward enough to fix yourself, or it becomes too complex to solve yourself, someone needs to know what is going on and what to expect.

Troubleshooting Tips

- ✓ Look for recent changes:
  - Has the software been recently upgraded?
  - Has the IP address changed?
  - Has new hardware been installed?
- ✓ Check all of the obvious things (cables are plugged in, power sources are functioning, etc.).
- ✓ Try to duplicate the error.
- ✓ Close and restart all open applications.
- ✓ Reboot the computer.
- ✓ Ensure each piece of equipment is working before moving on to the next.
- ✓ Don't make any assumptions.
- ✓ Try the easiest fixes first:
  - Is this a problem that can be resolved through better training or mentorship?
  - Check that all equipment is securely plugged in and turns on.
  - First try turning off the application and/or the hardware and restarting.

Handout 8.3.2: Troubleshooting Case Studies

Dr Francine Dzombe, Biologist, Lab Supervisor

Dr Dzombe calls you because she cannot generate a patient report from the Lab Information System.

Dr Musa Maseko, Physician

Dr Maseko can connect to the EMR system but he can't access the reports module.

Adele Panja, Lab Technician

Adele contacts you to say that the link to lab results in the LIS doesn't work. She is certain that she could view the results page yesterday afternoon.

Jackson Mwanza, Nurse

Jackson says that he cannot save any patient forms in the EMR.

Helen Kachali, Receptionist

Helen says that she put in her password but the system won't let her in.

Richard Gondwe, Clinical Officer

Richard needs to open the EMR but he can't connect to it.

Violet Chanika, Data Clerk

Violet contacts you to say she received a message in the system that says the server has expired.

Facilitator Activity Sheet 8.3.2: Troubleshooting Case Studies

Cut along the dotted lines. Place user problem strips into an envelope (one worksheet of user problem strips per small group). Distribute the different user problem strips to each person in the small group.

Dr Francine Dzombe, Biologist, Lab Supervisor

Dr Dzombe calls you because she cannot generate a patient report from the Lab Information System.

Dr Musa Maseko, Physician

Dr Maseko can connect to the EMR system but he can't access the reports module.

Adele Panja, Lab Technician

Adele contacts you to say that the link to lab results in the LIS doesn't work. She is certain that she could view the results page yesterday afternoon.

Jackson Mwanza, Nurse

Jackson says that he cannot save any patient forms in the EMR.

Helen Kachali, Receptionist

Helen says that she put in her password but the system won't let her in.

Richard Gondwe, Clinical Officer

Richard needs to open the EMR but he can't connect to it.

Violet Chanika, Data Clerk

Violet contacts you to say she received a message in the system that says the server has expired.

KEY to possible responses (do not distribute to participants)

Participants may come up with problems not mentioned here.

Dr Francine Dzombe calls you because she cannot generate a patient report from the Lab Information System.

Possible issues: She chose the wrong patient for whom to generate a report (user error); there is a bug in the software; the printer is out of ink; the computer is not connected to the printer.

Dr Musa Maseko can connect to the EMR system but he can't access the reports module.

Possible issues: He doesn't have the correct permissions (e.g. he was given 'reception' instead of 'clinician'); there is a bug in the software.

Adele Panja contacts you to say that the link to lab results in the LIS doesn't work. She is certain that she could view the results page yesterday afternoon.

Possible issues : She doesn't have the correct permissions (e.g. she was given 'admin' instead of 'technician'); there is a bug in the software; she clicked on the wrong module (user error).

Jackson Mwanza says that he cannot save any patient forms in the EMR.

Possible issues: There is a bug in the software

Helen Kachali says that she put in her password but the system won't let her in.

Possible issues: CAPS LOCK was on when she entered her password; she forgot her EMR password; she used her Gmail password instead of her EMR password.

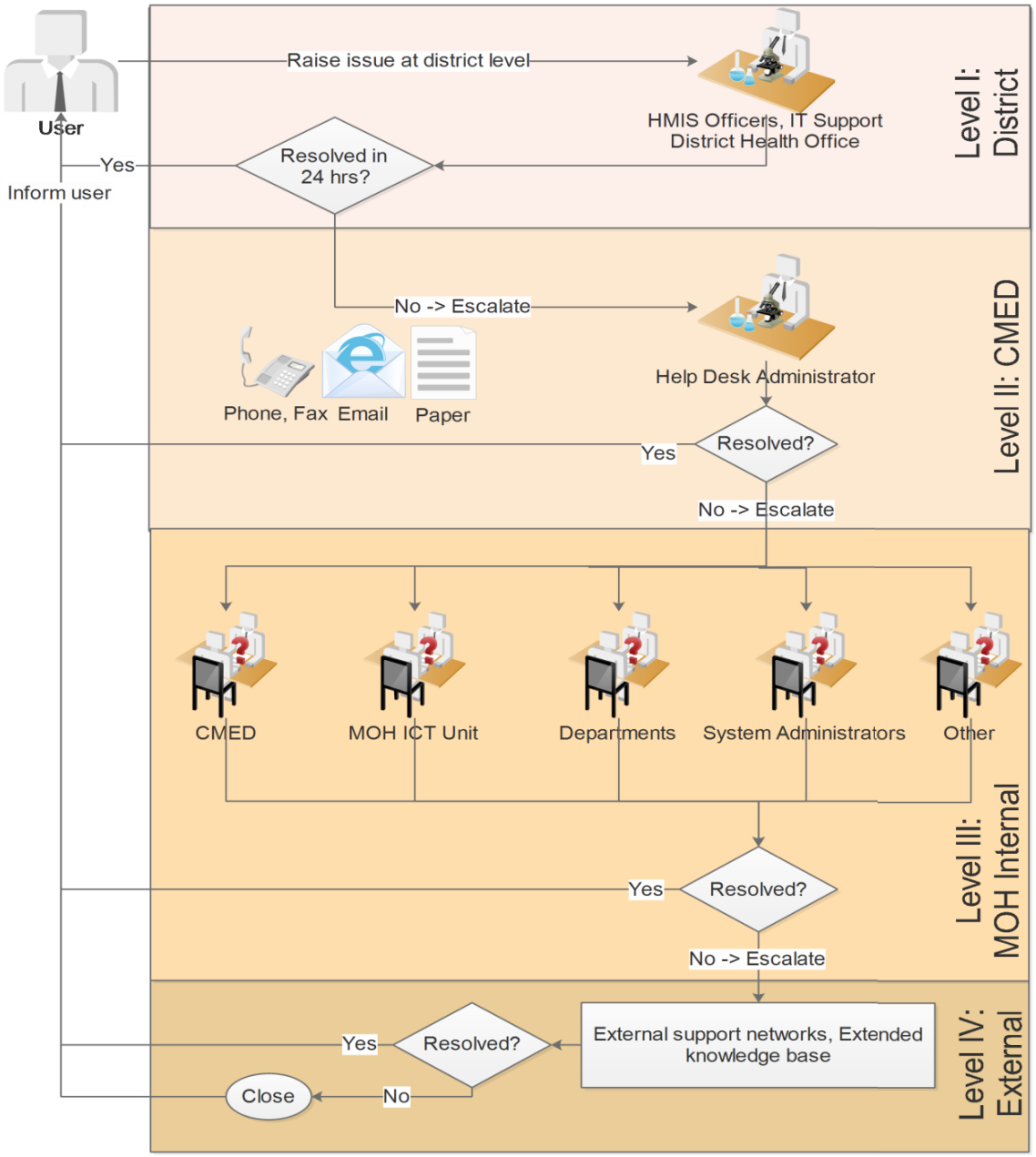
Richard Gondwe needs to open the EMR but he can't connect to it.

Possible issues: CAPS LOCK was on when he entered his password; he used the wrong password; the cable to the router are unplugged; the server was turned off after a power outage; there is a software bug.

Violet Chanika contacts you to say she received a message in the system that says the server has expired.

Possible issues: She mistyped the URL, a cable is loose, the Internet is down/unavailable.

Handout 8.3.3: Malawi MOHP Helpdesk Structure



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