2016

Monitoring and Evaluation of Malaria Programs

Online Course

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President's Malaria Initiative

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MODULE 1: OVERVIEW OF MALARIA

This module provides an introduction to the basics of malaria, including what malaria is and how it is transmitted, the epidemiology and burden of malaria, the global efforts to control malaria and a description of the main interventions for malaria control and prevention.

MODULE OBJECTIVES

By the end of this module, you will be able to:

- Describe malaria and how it is transmitted.
- State how malaria transmission is associated with climate.
- Describe the general epidemiology of malaria.
- Describe the global burden of malaria.
- Describe the global efforts to control malaria.
- Describe the different types of malaria interventions.

Mother holding a child on her lap © Bonnie Gillespie, 2007, Mali

MALARIA BASICS

Malaria is a parasitic infection that is transmitted to humans by the bite of female Anopheles mosquitoes.

There are five parasite species that transmit malaria infection to humans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, and *Plasmodium knowlesi*. *Plasmodium falciparum* and *vivax* are the most common species, and *P. falciparum* is the most deadly of the five. The distribution of the five species varies by region and country. For example, in sub-Saharan Africa, malaria is mainly caused by *Plasmodium falciparum*, but *P. ovale* and *P. malariae* are also present. *Plasmodium vivax* on the other hand, is mainly found in Asia, South America and the Western Pacific region.

Mosquitoes mainly feed and rest indoors; the peak biting time is in the late evening. They breed in shallow collections of freshwater, such as puddles.

Everyone is susceptible to malaria infection; however, pregnant women and children under five bear the greatest burden of malaria. Young children under the age of five are vulnerable because they have not yet developed protective immunity against the most severe forms of the disease. Pregnant women and their newborns also are vulnerable, as malaria infection can increase the risk of miscarriage and low birth weight, as well as maternal and newborn death.

References: 1

TRANSMISSION OF MALARIA

Humans get infected with malaria after they are bitten by a female Anopheles mosquito that is infected with one of the plasmodium parasites. The parasite enters into the human blood stream and goes to the liver. In the liver, the parasite matures and replicates before being released back into the blood stream. This period of time is referred to as the incubation period, where the human does not experience any symptoms. The onset of symptoms typically occurs 9 to 30 days after a person has been bitten by an infected mosquito.

There are many factors related to the vector, parasite, human host, and conditions within the environment that influence the transmission of malaria. For example, transmission is highly dependent upon the climatic conditions, such as the amount and pattern of rainfall in an area, the temperature and humidity.

Transmission in many places is seasonal, meaning that it only occurs or occurs more frequently during certain times of the year and not necessarily year-round. Often there is a peak of malaria transmission during and right after the rainy season. Further, transmission can vary within a country, with certain areas affected year-round, seasonally or not at all. Lastly, transmission can vary from year to year within a place. Thus, tracking transmission is very complex and requires information regarding many of the factors described above, including rainfall, temperature, and humidity, among others. Altitude is another factor that influences transmission. At higher altitudes, malaria transmission will not occur.

WHERE MALARIA IS PREVALENT

Malaria is prevalent in tropical and subtropical climates and is found throughout Central and South America, sub-Saharan Africa, the Eastern Mediterranean and Asia. Currently there are 97 countries that are malaria endemic with ongoing transmission. Of these countries, 19 countries are either in the pre-elimination phase or are currently pursuing elimination of malaria, and 7 have recently succeeded in eliminating malaria and are working to prevent re-introduction of the disease in the country.

Madagascar © Gene Dailey, American Red Cross

However, the majority of the malaria burden is found in sub-Saharan Africa. It is estimated that 74% of people living in Africa live in areas that are highly endemic and 19% of the population lives in epidemic prone areas.

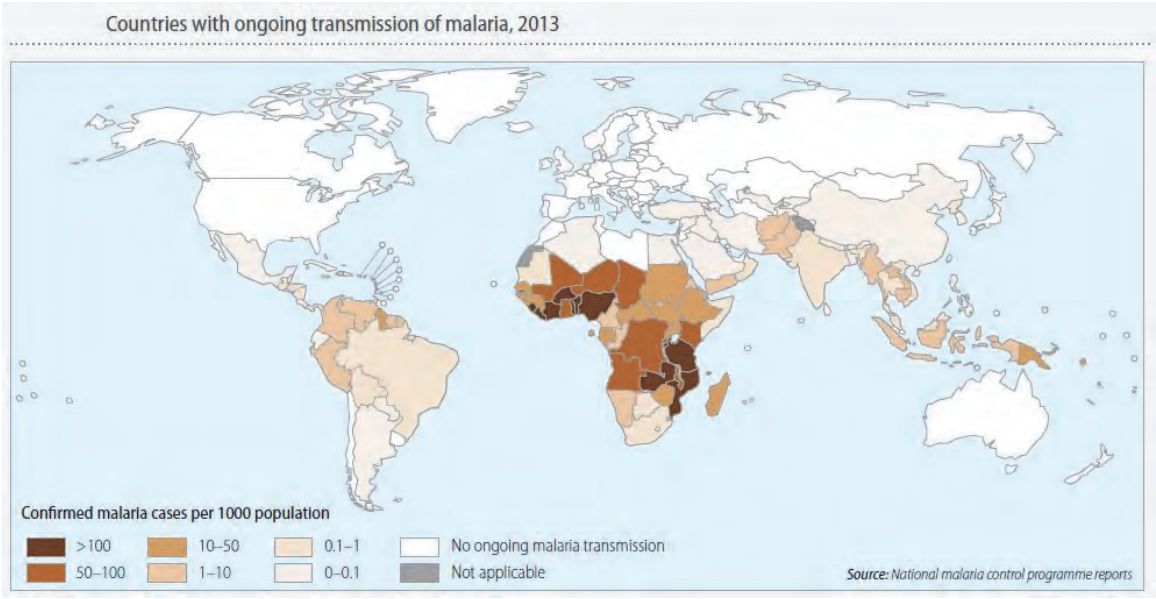
There are 35 countries - 30 in sub-Saharan Africa and 5 in Asia - that account for 98% of global malaria deaths. Ninety percent of malaria deaths occur in sub-Saharan Africa.

References: 2, 3, 10, 12, 21

BURDEN OF MALARIA

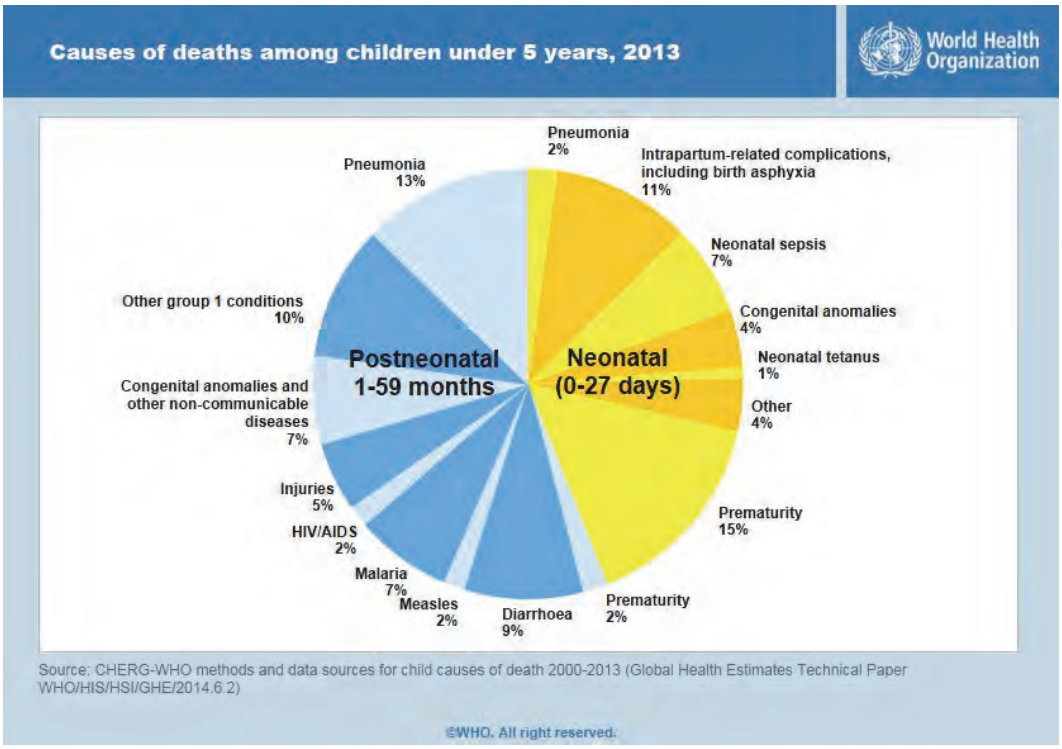
In 2013, there were approximately 198 million cases of malaria and nearly 584,000 deaths were caused by malaria. Malaria accounts for 7% of global deaths in children under five; however, the burden is much greater in Africa, where approximately 1 in every 5 post-neonatal child deaths (21%) is due to malaria.

The economic costs of malaria are tremendous. It is estimated that malaria causes a 1.3% loss in GDP growth per year for Africa. Further, it results in a total of USD 12 billion in direct losses per year. Around 40% of public health spending in Africa is for malaria. The average household spends greater than 10% of their yearly income on malaria prevention and treatment.



Malaria around the world © World Health Organization

Due to large scale-up of malaria prevention and control interventions over the past 15 years, and particularly within the past 10 years, the malaria burden has declined overall worldwide. Between 2000 and 2013, malaria mortality rates have declined significantly, approximately 47% globally and 54% in Africa. Furthermore, an estimated 670 million cases and 4.3 million malaria deaths have been averted worldwide, with 3.9 million of those deaths averted in children under 5 years in sub-Saharan Africa alone.



References: 1, 4, 10, 12, 13, 14, 21

HISTORICAL EFFORTS TO CONTROL MALARIA

In order to understand the efforts against malaria today, it is important to recognize the history of the disease and previous efforts to control and eradicate it.

The World Health Organization launched the Global Malaria Eradication Campaign starting in 1955. The campaign was successful in eliminating malaria from a number of countries, but failed to achieve its ultimate goal of global eradication. Within less than two decades, however, it was recognized that a time-limited eradication program was not practical for all countries and the focus of the program shifted from eradication to malaria control.

During the 1970s and 1980s, malaria received very little attention. It only reemerged as a major international health issue again in the 1990s. With new attention and focus on malaria control, a global malaria control strategy was adopted in 1992. The Roll Back Malaria Partnership, created in 1998, is the global framework for implementing coordinated action against malaria.

In 2000, the Abuja Declaration was signed by 44 malaria-afflicted countries in Africa, declaring their commitment to the effort to halve malaria mortality in Africa by 2010. The Millennium Development Goals (MDG) were also created that year, with MDG 6 reflecting the increased efforts towards malaria control. These initiatives are responsible for the increased efforts and funding for malaria control and prevention over the past 15 years, which have included the U.S. Government's President's Malaria Initiative (PMI), The Global Fund for AIDS, Tuberculosis, and Malaria, Gates Foundation, and The World Bank, amongst others.

References: 1, 5, 6, 7, 8

MALARIA PREVENTION AND CONTROL INTERVENTIONS

Malaria control and prevention efforts focus primarily on reducing human contact with mosquitoes, reducing the overall reservoir of infected persons and on reducing the mosquito population through vector control mechanisms.

There are four main prevention and treatment strategies employed in current programs. The primary methods for prevention include insecticide-treated nets (ITNs) or long-lasting insecticidal nets (LLINs). The other main strategies include indoor residual spraying of households, intermittent preventative treatment for pregnant women (IPTp) and lastly, prompt and effective treatment with antimalarial drugs. Because each country's malaria context is unique, its combination and/or focus of interventions will vary based on what is most appropriate for its particular context.

Insecticide-Treated Nets

Insecticide-treated nets (ITNs) and long-lasting insecticidal nets (LLINs) reduce human contact with mosquitoes by providing a protective shield between the mosquito and the human host during the evening, when mosquitoes typically feed. ITNs, when used appropriately and consistently, reduce all-cause mortality by 17% and malaria cases by 50% at full coverage. The main difference between ITNs and LLINs is that LLINs maintain effective levels of insecticide for at least 3 years, whereas ITNs typically are effective for 12 months.

Indoor Residual Spraying

Indoor residual spraying (IRS) involves spraying the inside of the house, including the walls and roofs with insecticides in order to reduce human-mosquito contact. High coverage of IRS within a community provides increased protection for the entire community, including the households that were not sprayed.

Intermittent Preventive Treatment

Intermittent preventive treatment for pregnant women (IPTp) entails administering an antimalarial drug (currently sulfadoxine-pyrimethamine) to women during their pregnancy in order to prevent and control malaria. It is recommended that IPTp be given to pregnant women during each scheduled routine antenatal care visit beginning in the second trimester, with doses given at least 1 month apart.

Case Management

Effective case management entails ensuring access to diagnostic testing and effective and timely treatment. Prompt parasitological confirmation either by microscopy or rapid diagnostic tests, is recommended in all patients with suspected malaria prior to starting treatment. Prompt and effective treatment entails receiving antimalarial treatment within the first 24 hours after the onset of symptoms of malaria. The best available treatment, particularly for Plasmodium falciparum, is artemisinin-based combination therapy, commonly referred to as ACTs.

References: 1, 9, 10

SUCCESS STORY: ZANZIBAR

The story of malaria in Zanzibar represents one of the greatest achievements to date in sub-Saharan Africa in the fight against malaria. Malaria for many years was Zanzibar's number one public health problem. Malaria in Zanzibar was characterized by perennial stable transmission, with seasonal peaks during and immediately after the rainy seasons. In 2003, malaria accounted for 52% of cases and 53% of deaths among all inpatients. Drug resistance was high, with treatment failure rates found to be around 60%.

A child is treated with ACTs for the adverse effects of Malaria © Bonnie Gillespie, Voices for a Malaria-Free Future

Over the past decade, the island of Zanzibar has experienced a rapid decline in its malaria burden. Malaria prevalence on the island dropped from as high as 70%, to less than 1%, currently. The accelerated decline is attributable to the large scale-up of malaria control and prevention activities.

In 2003, the Zanzibar Ministry of Health and Social Welfare changed malaria treatment guidelines for uncomplicated malaria from chloroquine and sulfadoxine-pyrimethamine to the much more effective artemisinin-based combination therapy (ACTs). ACTs were made available free of charge in all public health facilities in 2003, greatly increasing access to malaria treatment. Rapid diagnostic tests (RDTs) were also made available in health facilities by 2007, further expanding coverage of diagnostic testing.

Furthermore, there has been widespread distribution of LLINs and several rounds of indoor residual spraying have been conducted. These efforts have resulted in a dramatic increase in coverage of ITNs and

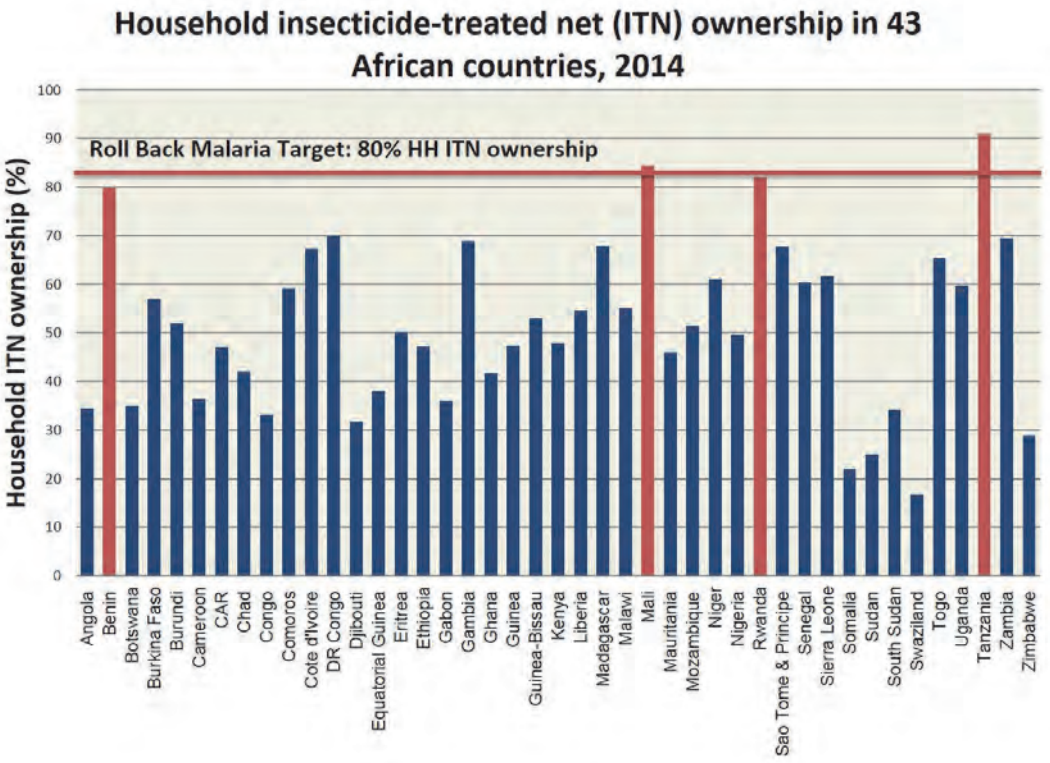
IRS, with the island successfully achieving universal access to ITNs. The story of Zanzibar demonstrates that successful control and reduction of malaria burden is possible in Africa, when large scale coverage of the main malaria control interventions is combined with effective political and donor support. Due to these efforts and successes, Zanzibar has shifted from a malaria control program to one that is now focused on pre-elimination of malaria.

References: 3, 22, 23, 24

COVERAGE OF MALARIA INTERVENTIONS: PART I

Coverage of the four main malaria control and prevention interventions has increased dramatically over the past decade. However, coverage still remains below the key targets for achieving the goals set out by the Roll Back Malaria Partnership, the Millennium Development Goals and the President's Malaria Initiative.

For ITN ownership, as of 2013, it is estimated that 49% of the population at risk for malaria in sub-Saharan Africa had access to an ITN in their household, compared to only 3% in 2004. The proportion of households that own at least one ITN has risen significantly as well, to 67% in 2013. Despite these increases in coverage however, only 29% of households have sufficient ITNs to cover all household members. ITN use has also risen markedly, with an estimated 44% of the population at risk sleeping under an ITN the previous night in 2013, compared to only 2% in 2004; with overall higher use among pregnant women and children under five.



Adapted from World Malaria Report, 2014

References: 3, 10, 12, 21

COVERAGE OF MALARIA INTERVENTIONS: PART II

Indoor residual spraying (IRS) has been widely adopted as an effective vector control measure. Coverage of IRS continues to be targeted to specific settings and the highest coverage is in sub-Saharan Africa. In 2013, over 123 million people were protected by IRS, representing approximately 3.5% of the population at risk. Overall in sub-Saharan Africa, about 50% of the population was protected by at least one vector control intervention – ITN or IRS – in 2013.

Intermittent preventive treatment for pregnant (IPTp) women has been adopted in 37 countries in sub-Saharan Africa, in addition to Papua New Guinea in the Pacific region. In 2013, approximately 57% of pregnant women received at least one dose of IPTp (among 30 reporting countries in Africa), while a median of 43% of pregnant women received two doses of IPTp (among 31 reporting countries in Africa). Despite remarkable gains in coverage in IPTp from 2000, overall coverage of the recommended number of doses during pregnancy remains very low.

Access to ACTs for children in Africa with P. falciparum malaria has slowly increased in the past decade, but overall remains low. In 2013, the proportion of children with malaria that received ACTs was just below 20%, up from less than 5% in 2005.

Scale-up of these proven interventions over the past years has led to a dramatic increase in vector control coverage, but more progress is needed in order to achieve the global targets.

References: 3, 10, 12, 21

Over 67% of households in sub-Saharan Africa owned at least one ITN in 2013.

As of 2013, 50% of the population in sub-Saharan Africa was protected by at least one vector control intervention (ITN or IRS).

In 2013, 44% of the population at risk for malaria slept under an ITN the previous night.

MODULE 1 ASSESSMENT

Questions

Correct answers are provided on page 9.

1. Which species of malaria parasite are more prevalent in sub-Saharan Africa?
   a. *Plasmodium malariae*
   b. *Plasmodium falciparum*
   c. *Plasmodium vivax*
   d. *Plasmodium ovale*
2. Which groups are the most vulnerable to malaria infection? *(Select all that apply.)*
   a. Children under 5 years of age
   b. Men aged 18 years and older
   c. Women who are pregnant
   d. Children aged 5-18 years
   e. Women aged 15-49 years
3. Which of the following factors influences malaria transmission risk?
   a. Humidity
   b. Temperature
   c. Rainfall
   d. All of the above
4. In which region of the world is the burden of malaria the greatest?
   a. South-East Asia
   b. Eastern Mediterranean
   c. Africa
   d. Latin American and the Caribbean
5. Which of the following is NOT one of the main malaria control and prevention strategies?
   a. Using insecticide-treated nets
   b. Administering anti-malarial drugs to pregnant women who are at risk of malaria
   c. Spraying the outside of houses with insecticides
   d. Spraying the interior walls of houses with insecticides

Correct Answers

1. Which species of malaria parasite are more prevalent in sub-Saharan Africa?

   b. *Plasmodium falciparum*

   In sub-Saharan Africa, malaria is mainly caused by *Plasmodium falciparum*, although *P. ovale* and *P. malariae* are also present.

2. Which groups are the most vulnerable to malaria infection? *(Select all that apply.)*

   a. Children under 5 years of age
   c. Women who are pregnant

   Everyone is susceptible to malaria infection; however, pregnant women and children under five bear the greatest burden of malaria.

3. Which of the following factors influences malaria transmission risk?

   d. All of the above (humidity, temperature, and rainfall)

   Transmission is highly dependent upon the climatic conditions, such as the amount and pattern of rainfall in an area, the temperature and the humidity.

4. In which region of the world is the burden of malaria the greatest?

   c. Africa

   The majority of the malaria burden is found in sub-Saharan Africa. It is estimated that 74% of people living in Africa live in areas that are highly endemic and 19% of the population lives in epidemic prone areas.

5. Which of the following is NOT one of the main malaria control and prevention strategies?

   c. Spraying the outside of houses with insecticides

   The primary methods for prevention include insecticide-treated nets (ITNs) or long-lasting insecticide treated nets (LLINs), indoor residual spraying of households, intermittent preventative treatment for pregnant women (IPTp), and prompt and effective treatment with anti-malarial drugs.

MODULE 2: USING DATA FOR DECISION-MAKING

This module covers the purpose and scope of monitoring and evaluation specifically for malaria programs and the importance of using data for decision-making.

MODULE OBJECTIVES

By the end of this module, you will be able to:

- Identify the purpose and scope of M&E.
- Describe the importance of using data to inform decisions.
- Identify strategies for overcoming barriers and ensuring that health-related data are being used to make decisions.

Clinic in Rwanda © Jenn Warren, PSI

INTRODUCTION TO MONITORING AND EVALUATION (M&E)

Monitoring and Evaluation refers to a process by which data are collected and analyzed in order to provide the information necessary for effective program planning and management.

Monitoring	Evaluation
Involves the routine tracking of progress of the implementation of a program's activities and changes in program performance over time. It can be thought of as continuous oversight of the implementation of a program's activities. The purpose of monitoring is to allow the program's stakeholders to understand if the program is achieving its objectives and utilizing its resources efficiently.	Intends to measure how well the program activities have met their expected objectives and/or whether the changes in the outcomes observed can be attributed to the program. Evaluation entails the process of determining the worth or significance of a program or intervention.

Quiz Question

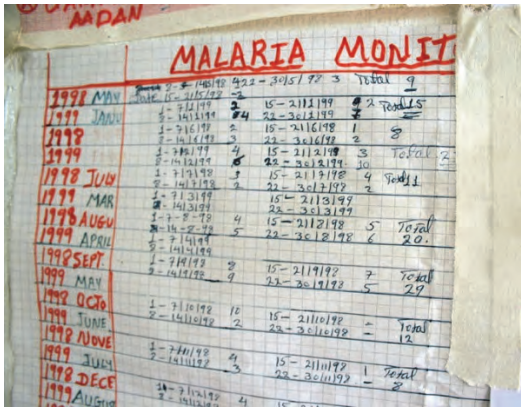
Is it Monitoring or Evaluation? A country director from Ghana is interested in finding out if scaling up the distribution of insecticide treated nets/long-lasting insecticide nets (ITN/LLIN) and indoor residual spraying (IRS) in the northern region has had an impact on the number of malaria cases detected in health facilities in the region.

- Monitoring
- Evaluation

Evaluation: The country director is interested in understanding the impact of the malaria program on reducing the number of malaria cases in the region, which is best measured through an evaluation. Monitoring tracks the program's progress and implementation; it does not measure the impact of your program.

MONITORING

Monitoring seeks to establish if the resources invested (inputs), the activities undertaken, the quality of those activities (processes), and number of activities performed (outputs) are proceeding according to plan. Monitoring includes the regular collection and analysis of data to assist in timely decision-making, to aid in program planning and management, to ensure accountability and lastly, to provide a basis for evaluation and learning.



Monitoring malaria cases in Ethiopia © Bonnie Gillespie, Voices for a Malaria-Free Future

Monitoring can help to answer questions like:

- Was the program implemented according to how it was planned?
- Are the program's activities being implemented similarly across the different sites?
- Is the program making efficient use of its resources?

Monitoring of Malaria Programs

The graphic below is an illustration of what monitoring looks like over the lifetime of a program. It shows how a program indicator, for example, number of rapid diagnostic tests supplied to health facilities, is tracked over time – from the start of a program to the end.

There are a number of components of malaria programs that can be monitored. Below are examples of common malaria program monitoring activities:

- Tracking the number of ITNs that have been distributed by the National Malaria Control Program.
- Collecting data from health facilities on the number of children under five with malaria that received prompt and correct treatment for malaria.
- Reviewing health facility records to track the number of pregnant women that received at least two doses of IPT during their pregnancy.

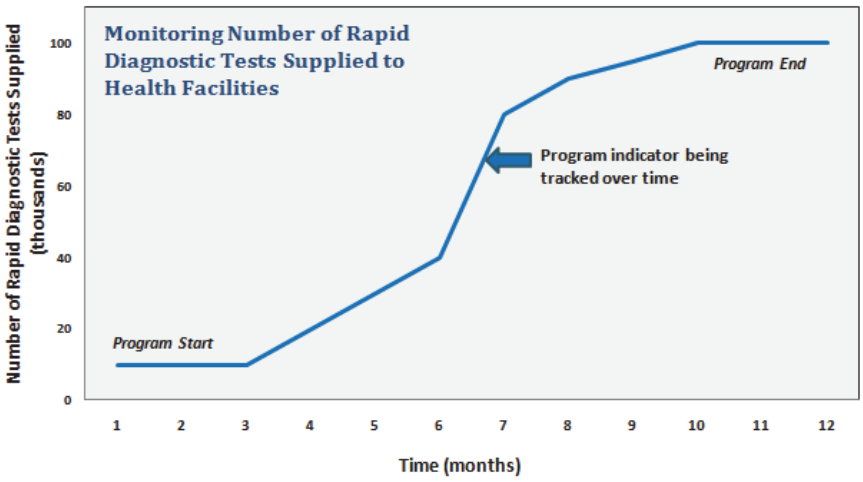


Illustration of Monitoring

EVALUATION

Evaluation is a process that aims to determine as systematically and objectively as possible: the relevance of objectives, the efficiency of resources used, the effectiveness of the program design and implementation, the value-added of a program, the sustainability of results and/or the impact of a program/intervention. Evaluation aims to provide valuable management information, to judge the value of an intervention and to provide lessons for future programs or policies.

Reviewing program data in Uganda © Bonnie Gillespie, Voices for a Malaria-Free Future

Evaluation can help to answer questions like:

- Did the implementation of the program lead to an improvement in health status among the targeted population?
- Did the program improve access to health services for the targeted population?
- Was the program cost-effective?

Evaluation of Malaria Programs

This graphic illustrates the impact of a program on a specific program outcome.

For example, if a program achieved its aim to increase the community's knowledge of the signs and symptoms of malaria, then we would observe a positive change in your program outcome (community knowledge of signs and symptoms) that would otherwise not have been observed if the program was not implemented. The shaded area on the graphic demonstrates the impact the program had on changing the community's knowledge of the signs and symptoms of malaria.

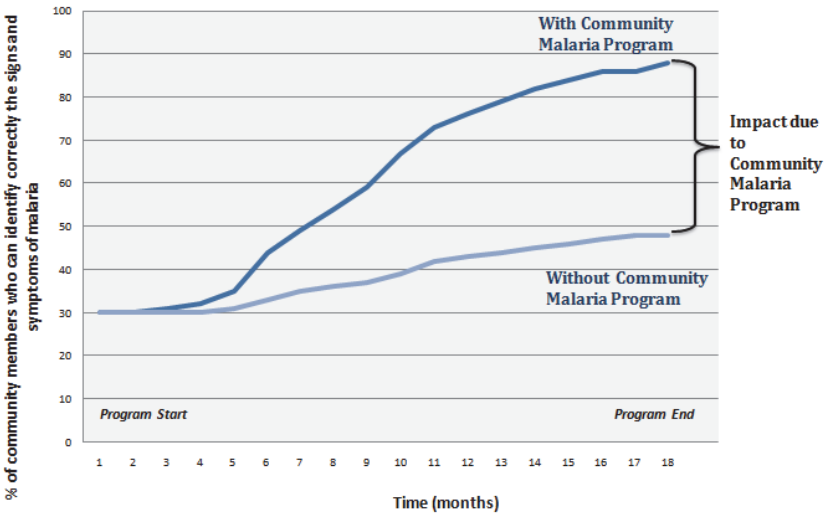


Illustration of Evaluation

Example Evaluation Questions for Malaria Programs:

- Did the ITN national distribution program in Country X reduce inequity in household ownership of insecticide-treated nets?
- Was the program effective in increasing the population's knowledge of the proper use of insecticide-treated nets?
- Did the program's activities to increase access to ACT treatment for children under five lead to a decline in malaria-specific mortality among children under five?

ROLE OF M&E IN THE PROGRAM LIFECYCLE

Monitoring and evaluation is a continuous process that occurs throughout the lifecycle of a program. An M&E plan should be developed at the very beginning of a program with input from all the relevant stakeholders. If there are any changes in the program over time, the M&E plan must be modified accordingly. It is important to remember that an M&E plan is a living document and can be changed over time based on the program's needs.

Source: MEASURE Evaluation

Unlike monitoring, which involves the routine collection of data, evaluation takes place during specified periods of a program. It might take place annually, mid-way through a program or at the end. It is important to remember that for an evaluation to be successful, it MUST be planned from the beginning of a program to ensure that you collect the appropriate data to carry out the evaluation.

Assessment

Prior to designing a program, it is vital to understand the nature of the (health) problem that you want to address. Conducting an assessment of the problem in the specific population you would like to target with your program can help you to identify the nature and severity of the problem. The assessment will serve to provide you with the information and data you'll need to begin strategically planning and designing your program.

Strategic Planning

The second phase in the program lifecycle is to begin planning your program, specifically what the program would like to achieve. The data and information that you collected during the initial assessment will help you to understand the nature of the problem in the community as well as what is feasible in terms of addressing the problem. At this stage you will determine the goal and primary objectives of your program.

Design

The third phase in the program lifecycle is designing your program. The data and information gathered during the assessment will also serve to inform the design of the program. At this stage, you will be deciding upon the different strategies, activities/interventions and approaches that the program will implement in order to achieve the program's goal and primary objectives.

Monitoring

Monitoring occurs throughout the program, from the beginning to the end. It involves the regular collection and analysis of data to assist in timely decision-making, to aid in program planning and management, and to provide a basis for evaluations and learning. Monitoring helps you to know whether your program's activities/interventions are being implemented as designed; whether implementation is consistent throughout different implementation sites; and whether the program can be more effective or efficient.

Evaluation

Evaluation typically occurs only during certain periods of a program's lifecycle, for example annually, mid-way through the program and/or at the end of the program. However, in order to carry out evaluation, it needs to be planned from the beginning. Evaluation serves to inform you on whether your program's strategy is working effectively and if it is making an impact. It allows you to assess whether the program has achieved its objectives and overall goal, and if not, helps you to understand why.

USES OF DATA

There are many important uses of data. Primarily data should be used to inform decision-making, which occurs at multiple levels – from the programmatic level to the policy level. Listed below are a few examples of how data collected from a program or an intervention can be used:

- To help to inform policies, planning or program decisions.
- To raise additional resources for scale-up of programs or for future programs.
- To assess whether a policy, plan or program has produced the desired or intended impacts.
- To strengthen programs by improving their results, their efficiency and/or quality of services provided by the program.
- To identify factors and/or interventions that influence health outcomes.
- To ensure accountability and for reporting purposes.
- To contribute to global lessons learned that can aid other malaria control and prevention programs in implementing effective programs.

Using data for decision-making, Ethiopia © Bonnie Gillespie, Voices for a Malaria-Free Future

"…without information, things are done arbitrarily and one becomes unsure of whether a policy or program will fail or succeed. If we allow our policies to be guided by empirical facts and data, there will be a noticeable change in the impact of what we do."

- National-level Policymaker, Nigeria

DATA FOR DECISION-MAKING

Decision-making occurs at all levels of a program and among all of a program's stakeholders. Because of this, each stakeholder requires different information and data in order to be able to make informed decisions. It is important to engage stakeholders in discussions from the beginning of your program to fully understand all the decisions they make and what the information they will need in order to make those decisions.

While each program will vary, the following table presents an example of all the different stakeholders (and thus decision-makers) in a malaria control and prevention program and the types of information they would be interested in to make informed decisions.

Decision-Maker	Information Needs
Beneficiaries	Effectiveness of program/intervention; quality of services provided.
Community Leaders(s) / Local Government Officials	Effectiveness of program/intervention; quality, equity and coverage of services provided; who are the clientele.
Program Managers / Implementation Partners	Effectiveness of program/intervention; who are the clientele; quality, equity and coverage of services provided.
Policy-Makers	Quality and equity of services; cost-efficiency/effectiveness of program/intervention; information relevant for correcting/improving policy.
Partner Agencies	Effectiveness of program/intervention; policy implications; sustainability of program, cost-efficiency/effectiveness.

STAKEHOLDER DECISION-MAKING

A common misconception is that data is collected only to be used at the top management levels, however, information is demanded and used by stakeholders at all levels. There are important decisions to be made at each level and these require different types of information. See examples below of decisions made by all the different stakeholders.

Beneficiary Level

A family decides whether or not to take their child with a fever to the clinic based upon their impression of the quality of care received during past visits.

Community Level

A health facility director decides how many drugs and supplies to order based on health facility utilization data on average number of monthly malaria cases.

Program Management Level

A program manager decides where to target LLIN distribution campaigns based on malaria endemicity levels.

Policy Level

The Ministry of Health decides on new antimalarial policy based on evidence demonstrating what antimalarial drug(s) have the highest efficacy.

Global Level

Global partners decide whether or not to allocate funding to a specific grant based on the effectiveness of the intervention and past program performance.

COMMON BARRIERS TO DATA USE

There are a number of common barriers to data use within organizations. It is important to recognize the barriers that your organization faces with data use, in order to help identify solutions and create an environment that promotes and facilitates data use within your organization.

Common barriers that organizations can face include:

- Organizational structures within a program can be a constraint to efficient data management processes.
- Decision-makers may not be accustomed to using data to inform their decisions.
- Staff may have low motivation.
- Staff may have limited capacity in M&E and technology use.
- Training on M&E is often ad hoc and does not provide refresher courses or coaching to keep skills fresh and up-to-date.
- Structural constraints may exist within the country, such as poor roads or telecommunication.
- Staff roles may not be clearly defined.
- Poor information flow may exist within the organization.
- Funding for M&E may be limited or insufficient.
- Politics may influence decisions on what data can or should be collected.
- Limited access to computer technology for tracking and analyzing data.

CASE STUDY: COMMON BARRIERS TO DATA USE

Read the following short vignette on a local malaria program in Western Kenya. While reading the vignette, consider what constraints or barriers the local NGO faces to data use and what could be done to improve data use in this situation. After you have read through the vignette, click to the next page to answer a few questions regarding the barriers to data use described in the scenario.

Over the past few years, a local NGO in Western Kenya has been working in partnership with the National Malaria Control Programme (NMCP) to implement a vector control program in their community. The NGO helps to coordinate and carry out ITN distribution campaigns in their community, provide education and/or assistance to families in the surrounding villages to hang ITNs appropriately, in addition to carrying out social and behavior change communication (SBCC) activities to help promote the use of ITNs and seeking of prompt treatment for malaria. The program has been running smoothly for the past 3 years, has distributed over 150,000 ITNs and has carried out a number of great SBCC activities in their community. The program has been well received in the community, receiving praise from the local community leaders.

The NGO's M&E officer, Thomas, is responsible for collecting various data for the malaria program, including data on the number of ITNs distributed, the number of families assisted, the number of households that have ITNs, and the number of people reached with BCC activities, amongst others. On a quarterly basis, Thomas aggregates the program's past quarter's data and writes up a summary report that he sends to the Program Manager, Florence. Since Thomas never receives any feedback on his reports from the manager, he assumes he's doing a good job and continues to carry out his work in the same fashion. Florence looks over the quarterly reports for any clear mistakes before sending them to the NGO's central office in Nairobi. Florence never receives any feedback from the central office after submitting the reports, and therefore assumes her program is on the right track and progressing well. If there is a way her program can improve its daily operations, she expects that this would be communicated to her from her supervisor at the central office in Nairobi.

At the NGO's headquarters in Nairobi, the M&E Manager, aggregates the data from all of the community level reports and writes a summary report that is submitted to the NMCP within the Ministry of Health. Once received by the NMCP, data is extracted from the report and aggregated across all malaria prevention and control programs in the country. A final report is created on the progress of all malaria control and prevention activities in Kenya and sent to the respective donor agencies. Based on the findings of the report, donor agencies engage in discussions with the NMCP to decide what programs to continue funding in the future. At this quarter's meeting, the donors note to the NMCP that while a lot of funding has been provided to the local NGO in Western Kenya for malaria prevention activities for the past 3 years, the number of malaria cases and deaths has not fallen. Based on this information, the donors and the NMCP decide that the program must not be performing well.

Case Study Questions

Answer the following questions about the case study on the previous page.

- What are the main barriers to data use that you see in this scenario?
- Do you think the donor and NMCP's decision that the program was performing poorly was accurate?
- What recommendations would you provide to improve the use of data in this situation?

Case Study Answers

- What are the main barriers to data use that you see in this scenario?
  - The main barrier in this scenario is the local NGO program staff viewing data collection as more of a reporting requirement, rather than the process being seen as useful for informing how to improve their program or to track whether their program is achieving its set goal and objectives. It is common for data to be collected and sent to higher levels in the health system, and not considered or used at the local or district levels to make decisions about future program or service delivery. This barrier could be due to a lack of culture of data use in general across the multiple levels.

    Another barrier in this scenario is the lack of a feedback mechanism at all levels. After the information has been submitted to the next level, there is limited or no feedback to the lower levels in the system. In this scenario, we can see that this lack of feedback causes the program staff to wrongly assume that their program is on track and performing well.

    While not elaborated on in the scenario, it is possible that there are limited M&E skills among program staff in the NGO. Staff might only be trained in data collection, and not necessarily in how to analyze data, or effectively present and use data for decision-making.
- Do you think the donor and NMCP's decision that the program was performing poorly was accurate?
  - It is hard to tell whether the decision of the donors and NMCP was accurate in this instance, since we are not given any specific information on what data they used to inform their decision. We are only told that the data are aggregated at the various levels, and we are not sure what information is actually available and being used to inform the decision. Thus, it could be that there is poor interpretation of the data or insufficient data to make an informed decision at this high level. Or, it could be that the program is not performing well as the donor and NMCP assume. This highlights another issue around data use, that data can be used inappropriately to make decisions.
- What recommendations would you provide to improve the use of data in this situation?
  - In order to improve data use in this situation, it might be important to first take time to build the capacity of the NGO in M&E, and specifically in effective data presentation and data use. This can help to build a culture of data use within the organization, by ensuring that data are shared within the organization among staff and in an effective way that facilitates data use. This will ensure that the program is not reliant upon receiving feedback from other levels for input on their program's progress.

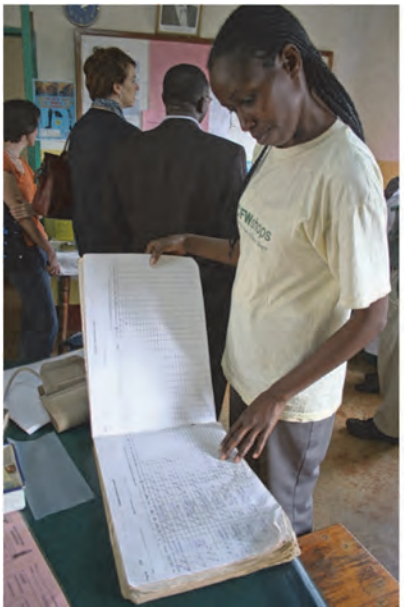
    While it is important to improve the culture of data use within the organization, it is also important to create a culture of data use among all program stakeholders. This can be done by regularly sharing program findings with all program stakeholders and asking for input and feedback on how to improve the program based on the findings. This ensures that all stakeholders are aware of the progress of the program and are able to quickly identify if the program is not performing according to expectations.

INCREASING DATA USE

A good M&E system allows for timely and effective use of data. Collecting data is only a worthwhile effort when the data collected are used for decision-making. While there are a number of common barriers that organizations face in using data, there are many actions organizations can take to help increase the demand and use for data.

Such actions are:

- Involving program staff in monitoring and evaluation activities, such as in data collection and data review.
- Taking time to build the capacity of your organization in data management and use.
- Being sure to package information in user-friendly formats that facilitate use of the information.
- Sharing findings and recommendations with all relevant stakeholders and providing them with timely and regular reports.
- Ensuring good data quality, consistency in the indicators used, and that data are available at all the relevant levels.
- Developing realistic recommendations from data gathered on ways to improve the program.
- Developing an action plan that details how to implement the recommendations.
- Linking your allocation of resources to performance monitoring.



Monitoring progress in Kenya © Bonnie Gillespie, Voices for a Malaria-Free Future

Can you think of any other effective ways for increasing data demand and use in your own program?

SUCCESS STORY: MALARIA DRUG POLICY CHANGE

Since the 1980s, resistance to chloroquine for treatment of *P. falciparum* malaria in malaria endemic areas has risen dramatically, with increasingly higher treatment failure rates found across many countries throughout Africa, Asia and Latin America. The emerging amount of evidence of widespread resistance to chloroquine, in addition to documented increases in morbidity and mortality due to malaria, led many National Malaria Control Programs (NMCPs) to decide to take action to change their current national drug policy for malaria treatment. By gathering and sharing evidence with stakeholders, many NMCPs were able to start a process within their countries to change and implement new national drug policies. Within Africa, Zambia was the first country to use the evidence to push for the change.

In 2002, Zambia implemented a national drug policy change toartemisinin-based combination therapy (ACTs) for first-line treatment of malaria. Based on evidence of increasing malaria morbidity and mortality within Zambia over the previous two decades and from multiple studies carried out from 1995 – 2000 in sentinel sites across Zambia demonstrating the decline in efficacy of chloroquine, Zambia initiated the process to develop and implement a new national drug policy. Due to the recognized challenge of implementing a national policy change, the country formed a Drug Technical Advisory Group to develop a technical framework and advocacy strategy for implementing the drug policy change. Upon review of the evidence, the advisory group concluded that immediate action was required to change the first-line therapy, as well as to ensure access to the treatment. After the decision was made, efforts focused on developing new treatment guidelines, training materials and plans detailing how the new policy would be implemented. While not without its challenges, the successful implementation of the policy change and further increased vector control activities resulted in a dramatic decline in malaria cases and deaths by 2008.

Many other countries across Africa, Asia and Latin America also used the same strategy, leading to the successful use of evidence to advocate for and inform the development of a new drug policy. As of 2013, ACTshave been adopted as a national policy for first-line treatment for malaria in 79 countries where *P. falciparum* is endemic.

References: 17, 18, 19, 20, 21

MODULE 2 ASSESSMENT

Questions

Correct answers are provided on page 23.

1. Which of the following questions would be best answered by an evaluation?
   a. How many pregnant women attending the health facility during the last month received a dose of IPT during their routine antenatal care visit?
   b. What percentage of households did the program cover with IRS during the past year of program implementation?
   c. Did the program's distribution of long-lasting insecticide nets (LLINs) reach the poorest quintile in Community X?
   d. How many LLINs were distributed each month by the National Malaria Control Program?
2. *True or False:* Monitoring and evaluation is a continuous process that occurs throughout the lifecycle of a program.
   a. True
   b. False
3. The Ministry of Health in Uganda would like to know whether the malaria programs being carried out in the Northern region of the country are increasing insecticide-treated net (ITN) use among pregnant women and children under five in that region. This question could be answered by which of the following?
   a. Monitoring
   b. Evaluation
4. At what level are data needed for decision-making? *(Select all that apply.)*
   a. Beneficiary Level
   b. Program Level
   c. Policy Level
   d. Partner Agency Level

Correct Answers

1. Which of the following questions would be best answered by an evaluation?

   c. Did the program's distribution of long-lasting insecticide nets (LLINs) reach the poorest quintile in Community X?

   This question deals with understanding how effective the program was in targeting the distribution of LLINs to those that have the greatest need; therefore it would be answered through conducting an evaluation. Routine program monitoring data does not typically collect more detailed information, like socio-economic status, on the beneficiaries of the program that would be necessary to answer this question.

2. *True or False:* Monitoring and evaluation is a continuous process that occurs throughout the lifecycle of a program.

   a. True

   Monitoring and evaluation occurs throughout the lifecycle of a program; not just at the beginning or end of a program, or at specified times.

3. The Ministry of Health in Uganda would like to know whether the malaria programs being carried out in the Northern region of the country are increasing insecticide-treated net (ITN) use among pregnant women and children under five in that region. This question could be answered by which of the following?

   a. Monitoring

   This question deals with understanding the impact of the Ministry of Health's malaria programs on ITN use among the targeted population, pregnant women and children under five in the Northern region. Monitoring data will not be able to provide an answer to this question; an evaluation will be required.

4. At what level are data needed for decision-making? *(Select all that apply.)*

   a. Beneficiary Level

   b. Program Level

   c. Policy Level

   d. Partner Agency Level

   Data are needed at all levels: beneficiary, program, policy and partner level.

MODULE 3: INTRODUCTION TO MONITORING AND EVALUATION FOR MALARIA PROGRAMS

This module describes who the main players are in M&E for malaria programs, common indicators for monitoring coverage of malaria control and prevention interventions, and challenges for M&E of malaria programs.

A mother and her young child wait to receive treatment at a health clinic in Mali © Bonnie Gillespie, Voices for a Malaria-Free Future

MODULE OBJECTIVES

By the end of this module, you will be able to:

- Identify the main players in M&E of malaria.
- Identify the key goals and targets of the Roll Back Malaria (RBM) Partnership.
- Identify common indicators for M&E of malaria programs.
- State common M&E challenges for malaria programs.

KEY PLAYERS IN MONITORING & EVALUATION OF MALARIA PROGRAMS

Monitoring and Evaluation plays a vital role in all malaria control and prevention programs. There are a number of key players in monitoring and evaluation of malaria that provide valuable guidance and support for M&E within country programs. The following are some of the key players in M&E.

Roll Back Malaria Partnership and Monitoring and Evaluation Reference Group (RBM/RBM MERG)

The MERG advises on M&E of international, regional, and national initiatives, providing technical advice on state-of-the-are approaches to M&E of malaria programs. It provides technical guidance on appropriate indicators, data collection methods, analytic strategies, and dissemination of recommendations on M&E for malaria programs. It also provides technical feedback on critical questions arising from M&E of malaria program efforts.

For more information, visit the RBM MERG website.

President's Malaria Initiative (PMI)

PMI is an interagency initiative led by U.S. Agency for International Development and implemented together with the U.S. Centers for Disease Control (CDC) and U.S. Department of Health and Human Services (HHS). It works in 19 countries that have a high burden of malaria in sub-Saharan Africa. PMI works closely with country National Malaria Control Programs, providing technical support, building capacity, and helping to coordinate M&E efforts within the country.

For more information, visit the PMI website.

Global Fund to Fight AIDS, Tuberculosis and Malaria

The Global Fund is a global public/private partnership that attracts and disburses resources to prevent and treat HIV/AIDS, tuberculosis and malaria. It provides guidelines and helpful tools for M&E of malaria programs.

For more information, visit the Global Fund website.

National Malaria Control Programme (NMCP)

The NMCP is the main institution within a country that is responsible for formulating policies and strategies for malaria control and translating these into interventions. It is in charge of coordinating, supervising, monitoring and evaluating the implementation of these interventions.

M&E GOALS AND TARGETS FOR MALARIA CONTROL AND PREVENTION

The Global Malaria Action Plan provides a global framework for action for all partners working in malaria prevention, control and elimination. It outlines ambitious goals and targets to reduce the malaria burden in the near and mid-term, as well as the global eradication of malaria in the long-term. These goals and targets reflect the efforts of all key initiatives working in malaria control and prevention.

The Global Malaria Action Plan Targets are:

- Achieve universal coverage for all populations at risk with locally appropriate interventions for prevention and case management by 2010 and sustain universal coverage until local field research suggest that coverage can gradually be targeted to high risk areas and seasons only, without risk of a generalized resurgence.
- Reduce global malaria cases from 2000 levels by 50% in 2010 and by 75% in 2015.
- Reduce global malaria deaths from 2000 levels by 50% in 2010 and to near zero preventable deaths in 2015.
- Eliminate malaria in 8-10 countries by 2015 and afterwards in all countries in the pre-elimination phase today.
- In the long-term, eradicate malaria world-wide by reducing the global incidence to zero through progressive elimination in countries.

COMMON INDICATORS FOR M&E OF MALARIA PROGRAMS

There are a number of common household level indicators for monitoring and evaluation of malaria programs based on the four main malaria control and prevention strategies:

- Insecticide-treated bed nets/long-lasting insecticide nets (ITN/LLIN).
- Indoor residual spraying (IRS).
- Intermittent preventive treatment for pregnant women (IPTp).
- Case management.

ITN/LLIN in Madagascar © Gene Dailey, American Red Cross

These indicators monitor the coverage of each of these interventions. Coverage indicators are important indicators that help us to understand how effective a program is, to see if one target group is reached more effectively than another, and to be able to identify underserved areas or regions.

INDICATORS FOR MEASURING ITN AND IRS COVERAGE IN MALARIA CONTROL PROGRAMS

Indicators for Measuring ITN and IRS Coverage in Malaria Programs

The key indicators to measure coverage of ITN ownership and IRS are listed below.

- **Proportion of households with at least one ITN**

  Numerator: Number of households surveyed with at least one ITN/LLIN.
  Denominator: Total number of households surveyed.

- **Proportion of children under five years old who slept under an ITN the previous night**

  Numerator: Number of children under five years old who slept under an ITN/LLIN the previous night.
  Denominator: Total number of children under five years old who spent the previous night in surveyed households.

- **Proportion of households with at least one ITN for every two people**

  Numerator: Number of households with at least one ITN for every two people.
  Denominator: Total number of households surveyed.

- **Proportion of households with at least one ITN and/or have been sprayed by IRS in the last 12 months**

  Numerator: Number of households with at least one ITN and/or have been sprayed by IRS in the last 12 months.
  Denominator: Total number of households surveyed.

Modules 6 and 7 will cover more in-depth information on malaria-related indicators and sources for the data that are used to calculate these indicators.

Indicators for Measuring ITN Use

The key indicators to measure coverage of ITN use are listed below.

- **Proportion of population that slept under an ITN the previous night**

  Numerator: Number of individuals who slept under an ITN the previous night.

  Denominator: Total number of individuals who spent the previous night in surveyed households.

- **Proportion of pregnant women who slept under an ITN the previous night**

  Numerator: Number of pregnant women who slept under an ITN the previous night.

  Denominator: Total number of pregnant women within surveyed households.

- **Proportion of children under 5 years old who slept under an ITN the previous night**

  Numerator: Number of children under five years old who slept under an ITN the previous night.

  Denominator: Total number of children under five years old who spent the previous night in surveyed households.

- **Proportion of existing ITNs used the previous night**

  Numerator: Number of ITNs in surveyed households that were used by anyone the previous night.

  Denominator: Total number of ITNs in surveyed households.

Indicator for Measuring Intermittent Preventive Treatment for Pregnant Women

The key indicator to measure coverage of intermittent preventive treatment for pregnant women is listed below.

- **Proportion of women who received intermittent preventive treatment for malaria during ANC visits during their last pregnancy**

  Numerator: Number of women who received two or more doses of a recommended prophylactic antimalarial drug treatment, at least one of which was received during an antenatal care visit, to prevent malaria during their last pregnancy that led to a live birth within the last two years.

  Denominator: Total number of women surveyed who delivered a live baby within the last two years.

Indicators for Measuring Case Management

The key indicators to measure coverage of case management are listed below.

- **Proportion of children under five years old with fever in the last two weeks for whom advice or treatment was sought**

  Numerator: Number of children under five years old who had a fever in the previous two weeks for whom advice or treatment was sought.

  Denominator: Total number of children under five years old who had a fever in the previous two weeks.

- **Proportion receiving first-line treatment according to national policy among children under five years old with fever in the last two weeks who received any antimalarial drugs**

  Numerator: Number of children under five years old who had a fever in the previous two weeks who received first-line treatment according to national policy.

  Denominator: Total number of children under five years who had a fever in the previous two weeks who received any antimalarial drugs.

- **Proportion of children under five years old with a fever in the last two weeks who had a finger or heel stick**

  Numerator: Number of children under five years old who had a fever in the previous two weeks and had a finger/heel stick.

  Denominator: Total number of children under five years old who had a fever in the previous two weeks.

M&E CHALLENGES

Monitoring and evaluation of malaria programs is not always straightforward. In many cases, it can be quite complex. As you gain more experience in M&E for malaria programs, you will most likely come to face many of these challenges and grow to appreciate and understand all of the complexities.

For this course, we will begin to shed light on some of the main challenges that are faced in M&E, specifically for malaria programs. At this point, the aim is to make you aware of what these challenges are, so that you can take them into consideration when you are developing M&E plans, designing your programs/interventions and analyzing and interpreting your data.

M&E Data Challenges

Challenges for M&E for Malaria Programs: National Malaria Control Programs

A key challenge faced by National Malaria Control Programs is being able to measure the impact of the malaria control and prevention interventions they implement. Measuring impact of country programs has not always been routinely required. However, this is now changing with an initiative to evaluate the impact of these programs by the Roll Back Malaria Partnership and the President's Malaria Initiative.

In order to measure impact of interventions, such as impact on malaria-specific mortality or morbidity, often a rigorous experimental evaluation design is required. Such an evaluation design can be complex and costly to undertake, and can thus potentially pose a challenge to country National Malaria Control Programs (NMCP).

Another common difficulty faced by NMCPs is developing a case definition for malaria that is practical in the field. In places where diagnostic tools for measuring malaria are not available, malaria is measured by onset of fever. In doing so, our precision for measuring malaria incidence and burden drop.

Other common challenges faced by NMCPs are the variation in completeness of reporting over time and location and the low coverage and quality of vital registration systems in developing countries.

These are a few of the main challenges the field of M&E faces for malaria programs. Can you think of others that you have faced in your work?

Challenges to M&E for Malaria Programs: Complexity of Malaria Epidemiology

The complexity of malaria epidemiology also poses challenges to M&E for malaria programs, by adding a layer of complexity to the interpretation of the data collected.

The relationship between transmission and mortality is not a perfect linear relationship. For example, a high level of malaria transmission does not necessarily result in a higher level of malaria-specific mortality. A population that experiences a high level of malaria transmission builds immunity over time with repeated infection with malaria. This immunity helps to lessen the severity of the disease, resulting in fewer deaths. Meanwhile, people who live in areas with less malaria transmission do not build the same level of immunity and therefore, are more vulnerable when they get infected with malaria.

Another important aspect of the disease to take into consideration is the complex relationship between transmission and immunity and how this can affect the severity and symptoms of malaria morbidity. For instance, when there is high malaria transmission, it presents in the population in the form of chronic infections and severe anemia. Whereas, when there is low malaria transmission, often what is seen is higher life-threatening severe malaria. This is because when you have high transmission, the overall population's immunity rises and vice-versa when the transmission is low.

These are a few of the main complexities we must be aware of and take into consideration when we go to interpret the data we have collected.

References: 14

MODULE 3 ASSESSMENT

Questions

Correct answers are provided on page 32.

1. Which key malaria M&E player advises on M&E of international, regional and national initiatives, providing technical advice on state-of-the art approaches to M&E of malaria programs?

   a. National Malaria Control Programs (NMCP)

   b. Roll back Malaria Monitoring and Evaluation Reference Group (RBM MERG)

   c. President's Malaria Initiative (PMI)

   d. The Global Fund

2. Which of the following is NOT a target for the Roll Back Malaria Partnership by 2015?

   a. Global and national mortality is near zero for all preventable deaths and global incidence is reduced by 75% from 2000 levels

   b. At least 8-10 countries currently in the elimination stage will have achieved zero incidence of locally transmitted infection

   c. Global malaria burden is reduced by 50% of the 2000 levels

   d. Universal coverage continues with effective intervention

3. Choose the correct numerator and denominator for the following indicator: Proportion of children under five years old with fever in the last two weeks for whom advice or treatment was sought.

   a. *Numerator:* Number of children with a fever in the last two weeks for whom advice or treatment was sought

      Denominator: Total number of children with fever in the previous two weeks

   b. *Numerator:* Number of children under five years old who had a fever in the previous two weeks for whom advice or treatment was sought

      Denominator: Total number of children under five years old who had a fever in the previous two weeks

   c. *Numerator:* Number of children under five years old for whom advice or treatment was sought

      Denominator: Total number of children under five years old who had a fever

   d. *Numerator:* Number of children under five years old who had a fever in the previous two weeks for whom advice or treatment was sought

      Denominator: Total number of children under five years old

Correct Answers

1. Which key malaria M&E player advises on M&E of international, regional and national initiatives, providing technical advice on state-of-the art approaches to M&E of malaria programs?

   b. Roll back Malaria Monitoring and Evaluation Reference Group (RBM MERG)

   The RBM MERG's role is to advice on M&E of international, regional and national initiatives. It provides technical advice of state-of-the-art approaches to M&E of malaria programs, including providing guidance on appropriate indicators, data collection methods, analytic strategies, and dissemination of recommendation for M&E of malaria programs.

2. Which of the following is NOT a target for the Roll Back Malaria Partnership by 2015?

   c. Global malaria burden is reduced by 50% of the 2000 levels

   To reduce the global malaria burden by 50% of the 2000 levels is a target for the RBM Partnership by 2010, not 2015.

3. Choose the correct numerator and denominator for the following indicator: Proportion of children under five years old with fever in the last two weeks for whom advice or treatment was sought.

   b. *Numerator:* Number of children under five years old who had a fever in the previous two weeks for whom advice or treatment was sought

   ***Denominator:* Total number of children under five years old who had a fever in the previous two weeks**

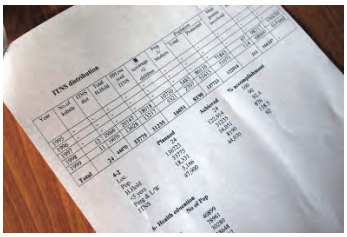
MODULE 4: DEVELOPING M&E PLANS FOR MALARIA PROGRAMS

This module module describes the main functions and essential elements of an M&E plan for malaria programs and the process for developing and implementing an M&E plan.

MODULE OBJECTIVES

By the end of this module, you will be able to:

- Describe the functions of an M&E plan for malaria programs.
- Identify the main elements of an M&E plan for malaria programs.
- Describe the process of developing an M&E plan.
- Describe how to implement an M&E plan.

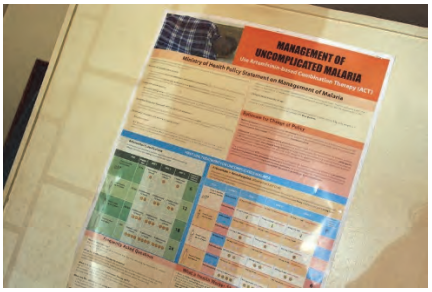


Monitoring Progress in Ethiopia © Bonnie Gillespie, Voices for a Malaria-Free Future

WHAT IS AN M&E PLAN?

An M&E plan is a comprehensive document that describes all monitoring and evaluation activities in an M&E system. It includes all of the following:

- A description of the program objectives, the interventions developed to achieve the stated objectives and procedures to be implemented to determine whether or not the objectives are met.
- The expected results of the program and how they relate to the goals and objectives.
- A list of the data that are needed, how the data will be collected and analyzed.
- A description of how the information will be used, in addition to the resources that will be needed to disseminate the information.
- A description of how the program will be accountable to all stakeholders involved in the program. This includes all levels of stakeholders, such as beneficiaries, program implementers, policy-makers and other donor partners.



Tracking bed net distribution in Uganda © Bonnie Gillespie, Voices for a Malaria-Free Future

Ideally, the M&E plan should be developed at the same time as your program is being developed. In practice however, this is often not the case and M&E plans are developed after the program is already in place. If feasible, aim to develop the two simultaneously.

FUNCTIONS OF AN M&E PLAN

There are a number of functions that an M&E plan serves. First, the plan states how the program will measure achievements, providing accountability for the program. Second, it serves to document the consensus reached from all stakeholders. This provides greater transparency and holds stakeholders responsible for the achievements of the program. Third, the plan helps to guide the M&E implementation over the life of the program, thus standardizing and coordinating all M&E efforts throughout the program. Lastly, the plan helps to preserve institutional memory.

Monitoring in Ethiopia © Bonnie Gillespie, Voices for a Malaria-Free Future

It is important to remember that an M&E plan is a living document. Often programs are modified based on lessons learned during implementation. If your program is modified at any time during the life of the program, it is important to also adjust the M&E plan accordingly.

An M&E plan should strive to be:

- Useful by serving the practical information needs of its intended users.
- Feasible, as well as realistic, diplomatic and frugal.
- Conducted in a legal and ethical manner, with regard to those involved in and affected by the evaluations.
- Accurate, by conveying technically sound information.

COMPONENTS OF AN M&E PLAN

An M&E plan consists of eight main elements:

1. Introduction
2. Description of the program
3. Indicators
4. Data sources and reporting systems
5. Plans for demonstrating program performance, outcome and impact
6. Plans for dissemination and use of information
7. Analysis of data quality constraints
8. Implementation plan

It is important to note that not every plan will conform to this exact outline. Some plans will include other elements or a different arrangement of elements. These elements represent the essential components in an M&E plan that should be thought out and discussed in detail.

Plan Introduction

The Introduction of the M&E plan includes:

- *The purpose of the M&E plan* - for example: "To detail how the program will monitor its progress and evaluate its achievements."
- *A description of how the M&E plan was developed* - describes who the stakeholders are and the process that was undertaken to reach consensus among all the stakeholders.

Program Description

The Program Description includes:

- *A Problem Statement*
  - Addresses what the nature is of the malaria-related issue being addressed by the program.
- *The Conceptual Framework for the Program*
- *Goals and Objectives*
  - Describes the ultimate outcome of the program (goal) and the shorter-term aims (objectives).
- *Program Description*
  - Provides a description of the interventions that will be implemented.
  - Describes the geographic scope of the program and the target population for the Intervention(s).
  - Discusses the expected duration of the program.
- *Logical Framework/Results Framework*

Indicators

This section details which indicators will be measured to track the program's progress and achievements. In order to select the indicators for the program, there are a number of important considerations to take into account.

Indicators should be based on:

- Your program's conceptual and logic framework.
- What strategic information will be needed for decision-making at all relevant levels (global/policy/community/programmatic/beneficiary).
- The specific requirements of the donor.
- What existing data are already available and/or will be feasible to collect.
- The amount of funding the program has allocated for M&E activities.

Here are a few suggested ways in which you can present the indicators within your M&E plan.

- Indicator Matrix: Table that presents the indicators, information on data source, frequency and who is responsible.
- Indicator Reference Sheets: Detailed sheets describing each indicator, how to measure it, underlying assumptions and interpretation considerations. See another example of an indicator reference sheet.

Resources: 17

Data Sources and Reporting Systems

The data sources and reporting systems section of the M&E plan describes from where the information for each of the indicators will come, how that information will be reported and how the M&E team will go about collecting the information.

It typically includes a description of each of the following:

- The specific sources from which you will get your data for each of the indicators.
- A framework that details the data collection, processing, analysis and reporting system.
- What your data collection tools will be; for example: patient records or registers, survey instruments or commodity management forms.
- The management of the M&E activities, including the roles and responsibilities of each group and/or member of the reporting system.

Plans for Demonstrating Program Outcome and Impact

It is important to include within your M&E plan a detailed account of how you will demonstrate the outcomes and impact of your program. This essentially entails building in an evaluation into your program from the start in order to measure the outcome/impact over the life of the program. Typically, it is best to build in an evaluation that would take measures at baseline (at the start of the program) and compare them to the same measures either at the end of the program or on-going through the life of the program. Other special studies can be included within the M&E plan that take place after or during the program. This type of evaluation is less ideal than the former; however, in some cases it will be the most feasible option.

This section of the M&E plan includes:

- The methodology that will be used for the evaluation on the program's outcome/impact.
- The protocol(s) for any other special study planned for the program.

Plans for Dissemination and Use of Information

It is critical to include a section within the M&E plan that discusses how the data and information collected will be disseminated, to what audiences and stakeholders it will be disseminated, and how it will be used for decision-making purposes. Clarifying from the start of the program how the data will be used at all levels (across all stakeholders) for decision-making will help to create a "culture" for using data for decision-making among stakeholders.

This section of the M&E plan includes:

- How the data and other information collected will be stored to ensure confidentiality and who will be the users of the data.
- How the information/results from the evaluation(s) and special studies will be disseminated and used.
- The different methods envisioned for disseminating the information. For example, with reports, different media outlets (radio, TV) or other speaking events.

Analysis of Data Quality Constraints and Potential Solutions

The M&E plan should include a description of what constraints you expect to encounter throughout the implementation of the program, and potential solutions/actions that will be undertaken by the program to avoid these constraints. it is important to show that you have considered and planned for possible constraints in the quality of the data collected by the program or in the system's overall performance.

Implementation Plan

This section of the plan describes what capacity is needed to implement the functions of the M&E unit and how those will be addressed. It also includes a detailed work plan for how the M&E plan will be implemented.

The work plan includes:

- Each M&E activity, including any potential updates of the M&E plan.
- The timing of each activity and where it fits along the lifecycle of the program.
- The party responsible for each activity.
- The budget needed for each activity.

PREPARING AN M&E PLAN

There are a number of steps involved in the process of developing and preparing an M&E plan, beyond just drafting the actual document. These steps are outlined below.

1. Identify your program's stakeholders and involve them in the development and implementation of the M&E plan.
2. Assess your program's strategic information needs.
3. Assess existing system's capabilities to address your strategic information needs. If current systems are unable to gather the information you need, decide on what mechanisms/systems will need to be put in place in order to collect that information.
4. Gather baseline data for the indicators chosen in the M&E plan.
5. Develop a mechanism for M&E plan development and review among stakeholders.
6. Prepare a budget for the implementation of your M&E plan.
7. Achieve consensus and commitment among stakeholders on all of the following:
    a. Resources for implementation of the M&E plan;
    b. Indicators and their definitions;
    c. Data collection, analysis, processing systems/mechanisms;
    d. A reporting structure, timeline and format(s);
    e. The roles and responsibilities of all stakeholders for the implementation of the M&E plan.
8. Prepare a draft of the M&E plan.
9. Review and achieve consensus from program stakeholders.
10. Finalize the M&E plan.

TIPS FOR IMPLEMENTING THE M&E PLAN

Here is a list of important tips to remember for effective implementation of your M&E plan.

1. It is important to continually engage and involve your program's stakeholders in the implementation of the M&E plan.
2. It is essential at the beginning of the process to clarify the roles and responsibilities of each stakeholder for carrying out the M&E plan.
3. The program should regularly organize and interpret program results to ensure that the program is being implemented as planned and is achieving the expected results.
4. The program should regularly prepare and disseminate reports/presentations for stakeholders on the results of the program.
5. When possible, the program should facilitate and/or support stakeholders to use the information for decision-making.
6. Remember to update the M&E plan whenever there are changes to your program and share these changes with program stakeholders.

ROLE OF THE M&E UNIT

There are a number of important roles that the M&E unit of a program or of an organization plays in the development and implementation of an M&E plan.

The main roles include the following:

- Building consensus among all of the stakeholders in the program, including beneficiaries, program managers, policy-makers and donors around the proposed M&E plan.
- Coordinating M&E efforts with the implementation of program activities.
- Managing and manipulating the data, which includes all data entry, analysis and interpretation.
- Reporting of the results and disseminating the information to all stakeholders in a user-friendly and easily accessible format.
- Taking appropriate steps to ensure data quality, including auditing data to assess its quality.
- Training staff and building their capacity in M&E.

M&E Plan Development: Tips for Building Consensus
Make sure your stakeholders know what you are trying to achieve consensus on in the M&E plan (e.g., which indicators to be used, the roles and responsibilities for implementation of the M&E plan, etc.)
Ensure that all stakeholders are involved early in the process of developing the M&E plan. This will ensure that they will have ample opportunity to provide input into the development of the plan.
Provide stakeholders with the opportunity to provide input and receive feedback on the plan.
Consistently promote the message that M&E provides the means to demonstrate the extent to which a program is achieving its objectives and provides valuable information for improving your program.

IMPORTANT TIPS

Here are a few tips to keep in mind while you are preparing your M&E plan:

Do	Don't
Start early.	Collect information that will not be used.
Involve stakeholders at all stages in the process.	
Assess current capacity and use what is already available.	
Avoid duplication of data collection and reporting.	Underestimate the importance of stakeholder buy-in and ownership at each step of the process.
Budget for M&E plan appropriately.	
Report results in an easily accessible format and in a timely manner.	

MODULE 4 ASSESSMENT

Questions

Correct answers are provided on page 40.

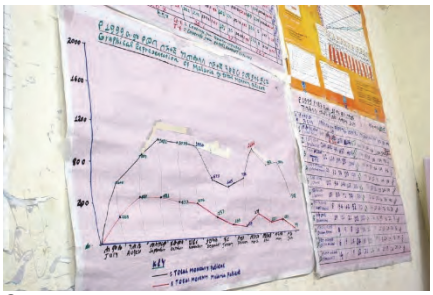
1. Which of the following is NOT an essential element of an M&E plan?

   a. A detailed description of the program's activities/interventions, including a timeline and implementation plan.

   b. The different data sources that will be used for collecting all the indicators.

   c. A plan for how to implement the M&E plan.

   d. An analysis of potential data quality constraints.



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2. *True or False:* Once an M&E plan is developed, it is important to stick to the plan throughout the life of the program, even if there are small modifications to your program.

   a. True

   b. False

3. Which of the following is NOT one of the main functions of an M&E Plan?

   a. To state how a program will measure achievements.

   b. To show stakeholders how the program plans to carry out its M&E activities.

   c. To guide the monitoring and evaluation implementation over the life of the program.

   d. To document exactly how M&E activities will be carried out in order to avoid having to make any changes later.

4. *True or False:* Typically, it is best to include all stakeholders in the process of developing a program's M&E plan.

   a. True

   b. False

Correct Answers

1. Which of the following is NOT an essential element of an M&E plan?

   a. A detailed description of the program's activities/interventions, including a timeline and implementation plan.

   A brief description of the program's activities, its goals and objectives is an essential element, but it is not necessary to include a long and detailed description of the program's activities/interventions, how and by whom they will be implemented, and a timeline. This information can be found in the program's work plans and other related documents.

2. *True or False:* Once an M&E plan is developed, it is important to stick to the plan throughout the life of the program, even if there are small modifications to your program.

   b. False

   If there are any changes or small modifications to your program over time, then the M&E plan will need to be modified accordingly to reflect those changes.

3. Which of the following is NOT one of the main functions of an M&E Plan?

   d. To document exactly how M&E activities will be carried out in order to avoid having to make any changes later.

   It is important to document how M&E activities will be carried out, but if your program changes over time (as often happens), the M&E plan will need to be modified accordingly. The point is not to document it from the beginning so that no changes have to be made later on.

4. *True or False:* Typically, it is best to include all stakeholders in the process of developing a program's M&E plan.

   a. True

   It is important for all stakeholders to be part of the process of developing a program's M&E plan because different stakeholders will need different information for decision-making, thus their input is essential. Furthermore, it is important that there is consensus from stakeholders on how the program will track progress and its measure its achievements.

MODULE 5: MONITORING AND EVALUATION FRAMEWORKS FOR MALARIA PROGRAMS

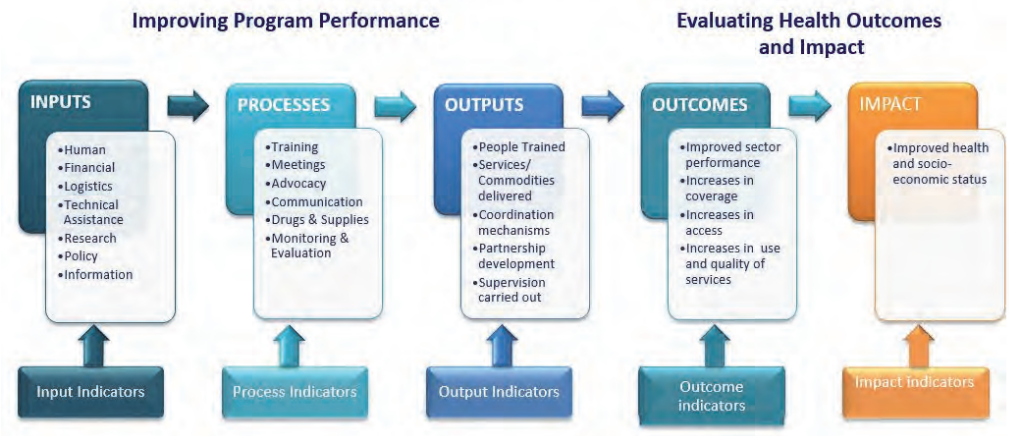
This module provides an overview of the different frameworks used for monitoring and evaluation planning for malaria-specific intervention programs. It will cover the main functions of M&E frameworks, how they are used for M&E planning and the four main frameworks used in malaria program planning. It will also go over definitions of SMART goals and objectives.

MODULE OBJECTIVES

By the end of this module, you will be able to:

- State the main functions of a framework.
- Differentiate between conceptual frameworks, results frameworks, logical frameworks and logic models.
- Differentiate between goals and objectives for malaria-specific intervention programs.
- State how frameworks are used for M&E planning.

Basic Monitoring and Evaluation Framework



Source: RBM Monitoring and Evaluation Reference Group

WHAT IS AN M&E FRAMEWORK?

Frameworks provide a detailed depiction of the components of a program and the sequence of steps/processes that go into achieving the desired outcomes of a program. Designing a framework assists in developing clear program goals and measurable objectives. It also helps to define the relationships between each of the components or factors of a program, as well as other internal and external factors that could potentially influence the program's desired outcomes.

In summary, frameworks allow you to understand how a program is supposed to work. Another important function of a framework is to help guide program implementation and M&E plans.

There are four common types of frameworks that vary by function and/or by type of program. There is not one perfect framework that will fit the needs of every program. Each of the different frameworks will allow you to think about how to monitor and evaluate your program in a different way. It is good to have an understanding of all four frameworks, as different partner organizations use and require different types of frameworks.

The four main types of frameworks are:

1. Conceptual Framework
2. Results Framework
3. Logical Framework
4. Logic Model

Conceptual Framework

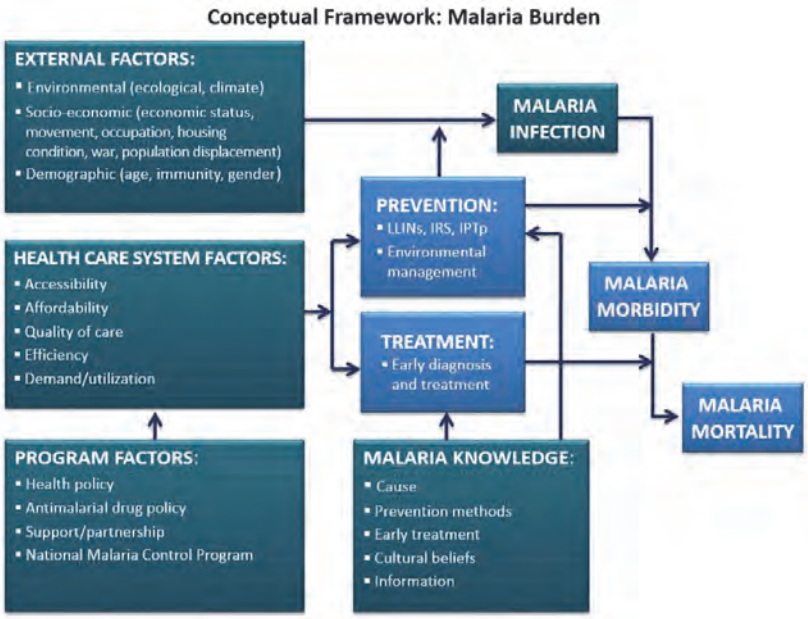
A conceptual framework is a diagram that identifies and illustrates the relationships between all relevant systemic, organization, individual, or other salient factors that may influence program operation and the successful achievement of the program's goals. In the example conceptual framework (on the next page), we are able to observe the multiple factors (external, health care system, program, knowledge) that influence malaria infection rates, as well as the prevention and treatment of malaria. Ultimately, these factors then have an impact on overall malaria morbidity and mortality within the targeted population.

A conceptual framework serves the following purposes:

- To show where the program fits within the wider context/environment.
- To clarify the assumptions about causal relationships upon which the program is based.
- To show how the different program components will operate to influence outcomes.
- To guide identification of indicators that the program will use to monitor and evaluate its progress, outcomes and impact.
- To guide impact evaluation based on the defined relationships among the different program factors/components.

Conceptual Framework: Malaria Burden

Below is an example of a conceptual framework for reducing malaria mortality.



Results Frameworks

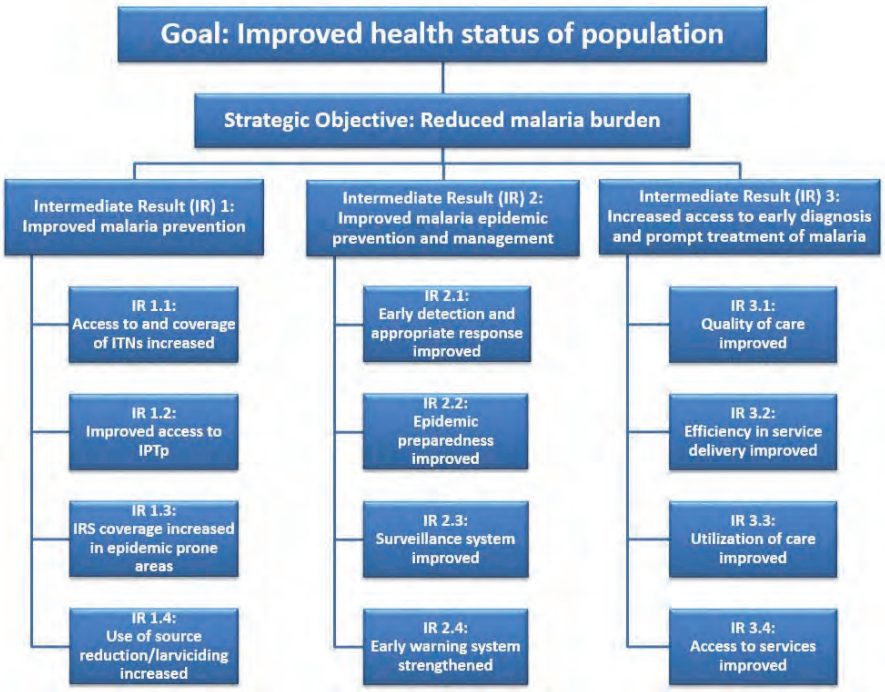
A results framework is a diagram that maps the direct causal relationships between incremental steps or results of key activities all the way up to the overall objective and goal of the program or intervention. It includes an overall goal, strategic objectives and intermediate results. A strategic objective is an outcome that is the most ambitious result that can be achieved and for which the organization is willing to be held responsible. An intermediate result is a discrete result or outcome that is necessary in order to achieve a strategic objective. The goal and strategic objectives are at the top of the framework, signifying that in order to achieve the broader strategic objectives, the intermediate results must be reached first. As illustrated in the example results framework (on the next page), in order to achieve the strategic objective of reducing the malaria burden and the overall goal of improving the population's health status, all the intermediate results must be achieved first.

The main purposes that a results framework serves are:

- To show the causal relationships that connect the incremental achievement of intermediate results to the comprehensive program impact.
- To clarify the relationships between different program factors and to provide a basis for objectively measuring the program or intervention's desired outcomes.

Results Framework: Malaria Burden

Below is an example of a results framework for a malaria prevention and control program.



Logical Frameworks

A logical framework is a table that presents a standardized summary of the program and its logic. In the malaria program example (on the next page), it states the goal, purpose and objectives of the program along with performance indicators, data sources and assumptions for each.

A logical framework serves the following purposes:

- To summarize what the project intends to do and how.
- To clarify the key assumptions that went into the design of the program and how the program is intended to work.
- To describe the key outputs and outcomes that will be monitored and evaluated.

Logical Framework: Malaria Control

Below is an example of a logical framework.

Logical Framework: National Malaria Control Program			
	Performance indicators	**Means of verification**	**Assumptions**
Goal: Reduced malaria morbidity and mortality	• Malaria incidence and prevalence rates • Malaria-specific death rates	•Annual reports •Surveys •Health & Demographic Surveillance System •Demographic & Health Surveys	• Political stability • Environmental stability (no natural disasters)
Purpose: To reduce malaria morbidity and mortality by 50% by 2015.	• Coverage of control interventions	• Annual reports • Surveys • Record reviews	• Problem of drug resistance will be reduced through effective and affordable drugs
Objectives: 1. To increase the proportion of children under 5 and pregnant women who are sleeping under a treated net by 10% every two years.	1.1 % of children under-5 who slept under LLIN the previous night 1.2 % of pregnant women who slept under LLIN the previous night Outcome: Increase in proper LLIN use by pregnant women and children under 5.	• Community surveys	• Availability of LLINs • Subsidies for LLINs • High community awareness and acceptance of LLIN

Logic Models

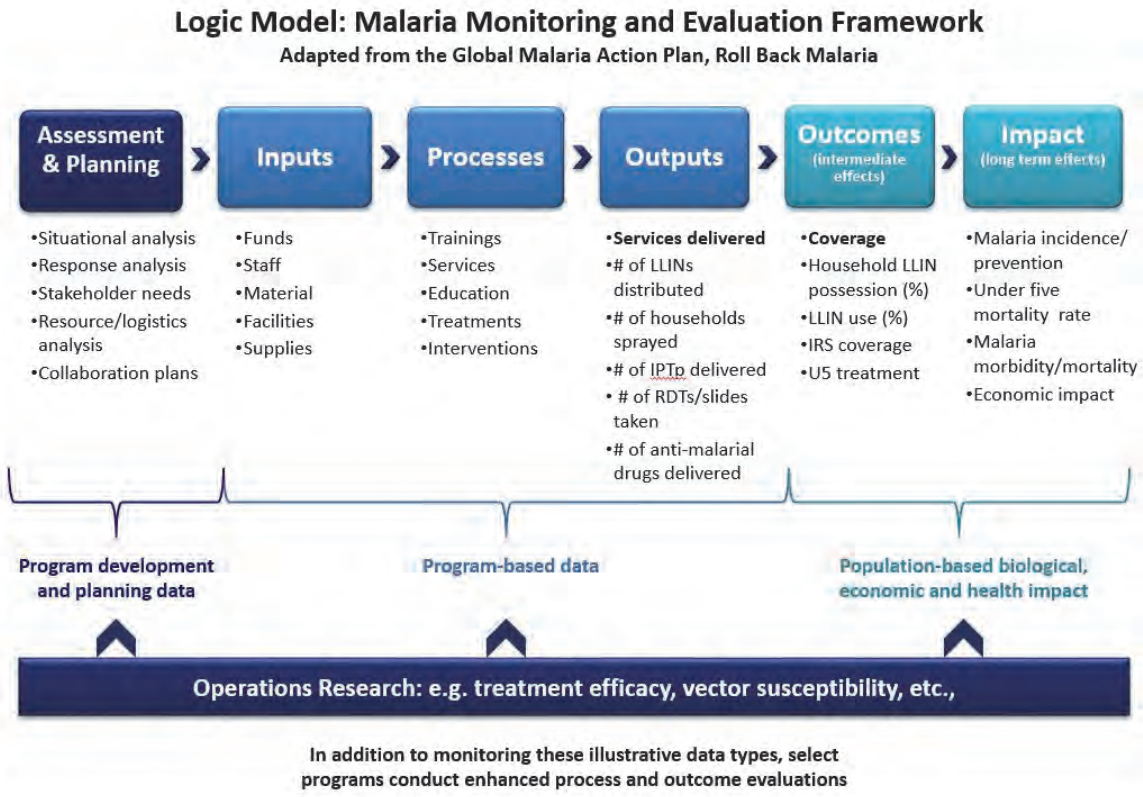
Logic models are diagrams that identify and illustrate the linear relationships from program inputs, processes, outputs and outcomes to impact. The diagram serves to show how the inputs affect processes, which work to produce immediate results or outputs that ultimately lead to longer-term or broader impact. In the example (on the next page), we can see that the inputs and processes are linked to achieving the broader outcome of increasing coverage of malaria prevention interventions, which is linked to reducing malaria incidence and malaria morbidity and mortality.

A logic model serves the following purposes:

- To provide a streamlined interpretation of planned use of resources and desired ends.
- To clarify the program's assumptions about linear relationships between key factors relevant to desired outcomes.

Logic Model: Malaria M&E

Below is an example of a logic model.



SUMMARY OF DIFFERENT M&E FRAMEWORKS

Test your knowledge of frameworks by answering the questions in the quiz below. Your responses will not be graded.

Framework Summary

Correct answers are provided on page 49.

1. Match each framework to its description.

Conceptual framework	Logically links program objectives to outputs and activities
Results framework	Logically links a program's inputs, processes, and outputs to the outcomes and impact
Logical framework	Logically links the program objectives
Logic model	Describes the interaction of various factors on the outcome

2. Match the type of framework to each program management description.

Conceptual framework	Shows the casual relationship between inputs and objectives
Results framework	Determines which factors the program will influence
Logical framework	Shows the casual relationship between program objectives
Logic model	Shows the casual relationship between activities and objectives

3. Match the type of framework with its M&E function

Conceptual framework	Basis for M&E at the objective level
Results framework	Basis for M&E at the output and objective level
Logical framework	Basis for M&E at all stages of the program
Logic model	Not a basis for M&E; however, it can help to explain results

Framework Summary Answers

1. Match each framework to its description.

Conceptual framework	Describes the interaction of various factors on the outcome
Results framework	Logically links the program objectives
Logical framework	Logically links program objectives to outputs and activities
Logic model	Logically links a program's inputs, processes, and outputs to the outcomes and impact

2. Match the type of framework to each program management description.

Conceptual framework	Determines which factors the program will influence
Results framework	Shows the casual relationship between program objectives
Logical framework	Shows the casual relationship between activities and objectives
Logic model	Shows the casual relationship between inputs and objectives

3. Match the type of framework with its M&E function

Conceptual framework	Not a basis for M&E; however, it can help to explain results
Results framework	Basis for M&E at the objective level
Logical framework	Basis for M&E at the output and objective level
Logic model	Basis for M&E at all stages of the program

GOALS AND OBJECTIVES

M&E frameworks help to increase understanding of a program's goal and objectives by demonstrating how the different components of a program and the sequence of steps or processes work toward achieving the ultimate desired outcomes of a program. It is important to understand the difference between a goal and an objective, as both are key elements within M&E frameworks. A goal is a broad statement of a desired, long-term outcome of a program, whereas an objective is a statement of a desired, specific, realistic and measurable program result.

Read each statement in the quiz and decide whether it represents a goal or whether it is an example of an objective. Your responses will not be graded. *Correct answers are provided on page 49.*

1. To reduce malaria morbidity and mortality among children under five years old.
   a. Goal
   b. Objective
2. At least 85 percent of pregnant women have access to intermittent preventive treatment in Community X by January 2016.
   a. Goal
   b. Objective
3. Eighty percent of children who present with fever in the health clinic in Community Y receive the appropriate anti-malarial treatment according to the current drug policy each month.
   a. Goal
   b. Objective

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Now think of your own malaria project; what is your program's overarching goal and objectives? Can you think of other effective ways for increasing data demand and use in your own program?

Correct Answers for Goals and Objectives

1. To reduce malaria morbidity and mortality among children under five years old.

   a. Goal

2. At least 85 percent of pregnant women have access to intermittent preventive treatment in Community X by January 2016.

   b. Objective

3. Eighty percent of children who present with fever in the health clinic in Community Y receive the appropriate anti-malarial treatment according to the current drug policy each month.

   b. Objective

SMART OBJECTIVES

Your program's stated goal and objectives should be written "SMART." In other words, they should meet the "SMART" – Specific, Measurable, Appropriate, Realistic and Time-based – criteria.

Your program goal and objectives should aim to be:

- **Specific:** identifies concrete events or actions that will take place.
- **Measurable:** quantifies the amount of resources, activity or change.
- **Appropriate:** logically relates to the overall problem statement and desired effects of the program.
- **Realistic:** provides a realistic dimension that can be achieved with the available resources and plans for implementation.
- **Time-based:** specifies a time within which the objective will be achieved.

PUTTING SMART OBJECTIVES INTO ACTION

Test your knowledge of SMART objectives by determining whether the following statements meet the SMART criteria. Your responses will not be graded. *Correct answers are provided on page 53.*

1. *True or False:* The following statement meets the SMART criteria: "To ensure that at least 80% of people sleep under ITNs in every district."
2. *True or False:* The following statement meets the SMART criteria: "At least 80 percent of pregnant women have access to the package of interventions to reduce the burden of malaria in pregnancy by December 2015."
3. *True or False:* The following statement meets the SMART criteria: "At least 85 percent of people sleep in insecticide sprayed structures in eligible areas of the 36 selected districts by December 2017, an upward revision from the 15 initially planned districts in the 2015-2020 National Malaria Strategic Plan."

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4. *True or False:* The following statement meets the SMART criteria: "One hundred percent of malaria patients in all districts are receiving treatment according to the national policy within 24 hours of onset of symptoms by the end of next month."

Correct Answers for SMART Objectives

1. *True or False:* The following statement meets the SMART criteria: "To ensure that at least 80% of people sleep under ITNs in every district."

   False: This objective statement does not meet all of the SMART criteria. It does not include a time frame for when the objective should be met.

2. *True or False:* The following statement meets the SMART criteria: "At least 80 percent of pregnant women have access to the package of interventions to reduce the burden of malaria in pregnancy by December 2015."

   False: This objective statement does not meet all of the SMART criteria. It is not specific; it should include a definition of what is meant by the "package of interventions" for reducing the malaria burden. When an indicator is not specific, it also makes it very difficult to measure.

3. *True or False:* The following statement meets the SMART criteria: "At least 85 percent of people sleep in insecticide sprayed structures in eligible areas of the 36 selected districts by December 2017, an upward revision from the 15 initially planned districts in the 2015-2020 National Malaria Strategic Plan."

   True: This objective is SMART, it meets all of the five criteria - it's specific, measurable, appropriate, realistic and time-bound.

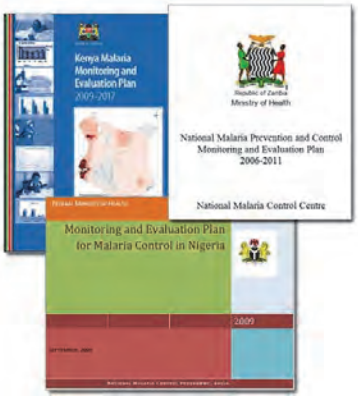
4. *True or False:* The following statement meets the SMART criteria: "One hundred percent of malaria patients in all districts are receiving treatment according to the national policy within 24 hours of onset of symptoms by the end of next month."

   False: This object does not meet all of the SMART criteria. It is not a realistic objective, as ensuring that all malaria patients receive prompt and effective treatment within 24 hours according to the current drug policy most likely will take a very long time to accomplish and will not realistically be achieved within one month.

USING FRAMEWORKS FOR M&E PLANNING

Frameworks serve to guide the M&E planning process. They help to clarify the program's assumptions, goals and the interrelationships between factors, and to define the program's objectives. The framework can be used to select and plan activities, as well as to define the different levels of performance and desired results of the planned activities.

M&E plans are based off of the program's framework. The plans incorporate the program's assumptions, objectives and a description of how the program is intended to work. Furthermore, a framework aids in the identification and selection of appropriate indicators to measure the progress and impact of the program.



Monitoring and evaluation plans from different countries

FRAMEWORK SUMMARY

The table below provides a good summary of the four main M&E frameworks, illustrating their main purposes and how they each differ slightly in their focus and function.

Type of Framework	Brief Description	Program Management	Basis for Monitoring and Evaluation
Conceptual	Interaction of various factors on the outcome	Determine which factors the program will influence	No – However it can help to explain results
Results	Logically linked program objectives	Shows the causal relationship between program objectives	Yes – at the objective level
Logical	Logically linked program objectives, outputs, and activities	Shows the causal relationship between activities and objectives	Yes – at the output and objective level
Logic model	Logically links inputs, processes, outputs, outcomes, and impact.	Shows the causal relationship between inputs and the objectives	Yes – at all stages of the program from inputs to process to outputs to outcomes/ objectives

MODULE 5 ASSESSMENT

Questions

Correct answers are provided on page 54.

1. *True or False:* A framework serves to provide a detailed depiction of the components of a program and the sequence of steps/processes that go into achieving the desired outcomes of a program.
   a. True
   b. False
2. The following is a description of what type of Framework: "A diagram that illustrates the causal relationships linking all levels of a program's objectives, from the intermediate results to the broader strategic objectives."
   a. Conceptual Framework
   b. Results Framework
   c. Logical Framework
   d. Logic Model
3. Which of the following statements represents a SMART objective?
   a. To reduce malaria mortality in children under five by 50%
   b. At least 90% of all health workers in Districts X and Y receive training on how to properly diagnose and provide the correct antimalarial treatment for children who present with fever in the clinic by the end of the year
   c. To increase use of ITNs among pregnant women and children under five by 50%.
   d. All pregnant women in Community Y receive 2 doses of intermittent preventative treatment during their pregnancy. – *You did not select the correct response.*
4. *True or False:* A logical framework guides the monitoring and evaluation process, by helping to clarify the program's assumptions, objectives and desired levels of performance or desired outcomes.
   a. True
   b. False
5. Which of the following objective statements represents a SMART (Specific, Measureable, Appropriate, Realistic and Time-based) objective?
   a. At least 80 percent of children under five who present with fever at the health clinics in District X receive the appropriate antimalarial treatment by December 2016.
   b. Health providers receive training on correct diagnosis and treatment of malaria in children under five.
   c. All pregnant women have access to intermittent preventive treatment (IPTp).
   d. At least 75% of households are sprayed with insecticides in Community Y.

Correct Answers

1. *True or False:* A framework serves to provide a detailed depiction of the components of a program and the sequence of steps/processes that go into achieving the desired outcomes of a program.

   a. True. Frameworks provide a detailed depiction of the components of a program and the sequence of steps/processes that go into achieving the desired outcomes of a program.

2. The following is a description of what type of Framework: "A diagram that illustrates the causal relationships linking all levels of a program's objectives, from the intermediate results to the broader strategic objectives."

   b. A results framework is a diagram that illustrates the causal relationships linking all levels of a program's objectives, from the intermediate results to the broader strategic objectives.

3. Which of the following statements represents a SMART objective?

   b. At least 90% of all health workers in Districts X and Y receive training on how to properly diagnose and provide the correct antimalarial treatment for children who present with fever in the clinic by the end of the year.

   This statement is an example of an objective, since it states a desired, specific, realistic and measurable, and time-bound program result.

4. *True or False:* A logical framework guides the monitoring and evaluation process, by helping to clarify the program's assumptions, objectives and desired levels of performance or desired outcomes.

   a. True. A framework helps to guide the monitoring and evaluation process, by helping to clarify the program's logic (and assumptions), objectives and desired levels of performance or desired outcomes.

5. Which of the following objective statements represents a SMART (Specific, Measureable, Appropriate, Realistic and Time-based) objective?

   a. At least 80 percent of children under five who present with fever at the health clinics in District X receive the appropriate antimalarial treatment by December 2016.

   This objective is a SMART objective because it is specific, measurable, appropriate, realistic and time-bound.

MODULE 6: MONITORING AND EVALUATION INDICATORS FOR MALARIA PROGRAMS

This module walks learners through how to identify and develop good indicators for malaria programs. Specifically, it will cover the criteria for selecting good indicators, how to critique indicators, how indicators are linked to frameworks and different sources for the main indicators for malaria programs.

MODULE OBJECTIVES

By the end of this module, you will be able to:

- Identify the strengths and weaknesses of indicators for malaria programs.
- Identify criteria for selection of sound indicators.
- State how indicators are linked to the frameworks (logic models, conceptual, results and logical frameworks).
- Identify sources for predefined malaria-related indicators that are in line with global standards.

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WHAT IS AN INDICATOR?

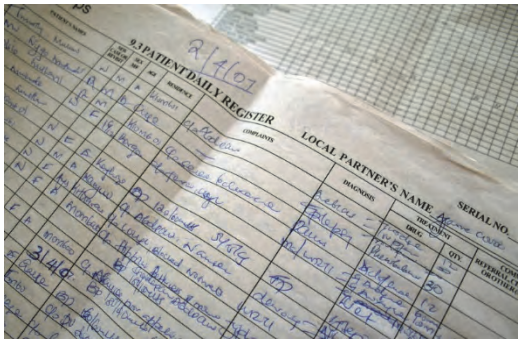
An indicator is a variable that measures one aspect of a program, project or health outcome. It serves to measure the value of change over time in meaningful units, allowing comparison between a baseline value and a future value. Indicators are most commonly expressed in a quantitative form, as either a percentage or number.

Since indicators measure only one aspect of a program, project or health outcome, an appropriate set of indicators will include at least one indicator for each significant aspect of the program or project. In many cases, there will be 2-3 indicators for each aspect of the program or project in order to obtain the necessary information for decision-making.

Common Indicator Metrics
Counts *Examples:* number of providers trained; number of insecticide-treated nets distributed
Calculations Percentages, rates and ratios *Example:* proportion of children under five who slept under a bed net the previous night
Index Composite measures *Example:* wealth index
Threshold Presence or absence; a cut-off point; a pre-determined level or standard *Example:* epidemic threshold for early detection

FUNCTION OF INDICATORS

Indicators are central to M&E efforts, as they allow you to reduce a large amount of data down to its simplest form. They provide vital information for a program/project, by signaling the need for corrective management action, evaluating the effectiveness of various management actions and providing evidence as to whether or not the program or project's objectives are being achieved.



Clinic logbook for monitoring patient care © Bonnie Gillespie, Voices for a Malaria-Free Future

CHARACTERISTICS OF A GOOD INDICATOR

A good indicator includes the following characteristics:

Valid

An indicator that is an accurate measure of a behavior, practice or task. In other words, it measures what it is intended to measure.

Reliable

The indicator can be consistently measured in the same way by different observers.

Measureable

The indicator is quantifiable using available tools and methods.

Precise

An indicator that is operationally defined in clear, well-specified terms.

Timely

The indicator provides a measurement at time intervals that are relevant and appropriate in terms of program goals and activities.

Programmatically important

An indicator is linked to a public health impact or to achieving the objectives that are needed for impact.

EXAMPLES OF INDICATORS

It is important to check that the indicators that you have selected for your program/project meet each of these criteria. Using these characteristics as your guide and considering the objective trying to be met, identify the potential strengths and weaknesses of the indicators listed out below. Can you think of any other potential limitations of these indicators?

Example 1

Objective: To reduce malaria-related morbidity within Community Z.

Indicator: Prevalence rate of parasitemia in Community Z.

Limitations: This indicator is not necessarily a valid measure of malaria-related morbidity within a community. It is possible that you could test positive for malaria parasites, but have no symptoms in an area that has stable malaria transmission. it is important to take into account these nuances, as malaria is a complex disease, making monitoring and evaluation of malaria prevention and control programs challenging.

Example 2

Objective: To increase the knowledge of prevention and treatment of malaria among adults aged 15 and above in Community X.

Indicator: Number of people reached by Behavior Change Communication (BCC) campaigns.

Limitations: In this example, measuring the proportion of adults aged 15 and older exposed to malaria prevention and treatment-related messages (in target population) would be a more valid and precise measure of this objective. The indicator is not measuring the outlined objective, making it an invalid measure. It is measuring how many people were reached by the campaign, not the knowledge of malaria prevention and treatment within the community. Furthermore, the indicator is not precise. The objective is to increase knowledge about adults aged 15 and above. The indicator only states "number of people" and is not specific to the age group targeted.

Example 3

Objective: To increase ITN ownership in Community Y.

Indicator: Number of ITNs that were distributed by the health clinic in community Y.

Limitations: In this example, measuring the proportion of households with at least one ITN would be a more valid and precise measure of this objective. The indicator is not valid or precise. First, the indicator does not measure what it is intended to measure, actual household ownership of ITNs. Second, the indicator is vague and not precise, in that it is only collecting how many ITNs were distributed by the health clinic and does not take into account whether there were other programs distributing ITNs that could have also increased ITN ownership in the community.

Example 4

Objective: At least 80% of pregnant women that have an antenatal care visit at clinic Y each month receive intermittent preventive treatment.

Indicator: Number of pregnant women who received intermittent preventive treatment at their last antenatal care visit.

Limitations: In this example, measuring the proportion of pregnant women who received intermittent preventive treatment at their last antenatal care visit during the last month would be a better way to measure this objective. The indicator does not state how frequently the measurement is to take place, thus the timing of data collection might not allow the indicator to capture whether or not the program is achieving its objective.

SELECTING INDICATORS FOR YOUR MALARIA PROGRAM

There are a number of factors that are important to consider when you are selecting indicators for your malaria program:

- Is the indicator linked to your program/project framework?
- Does it match your programmatic needs and provide valuable information for decision-making?
- Do you have the resources necessary to be able to collect the data? Be sure to consider if you have the human resources necessary.
- What are the external requirements of the program/project, for example, does the government or donor have other specific reporting requirements?
- Are the data available/accessible?
- Are there standardized indicators that you could use that would facilitate sharing and comparing data across other programs?

Common Pitfalls in Selecting Indicators
1. Indicators are not linked to the program activities.
2. Selecting indicators that do not currently exist and cannot be realistically collected.
3. Process indicators are used to measure outcomes or impact of a program.
4. Indicator is not very sensitive to change.
5. Selecting too many indicators.
6. Indicator does not accurately represent the program's desired outcome.
7. Indicator is difficult to interpret or too vague and poorly defined.
8. The data needed for the indicator is not available.

LEVELS OF INDICATORS

There are a number of different levels of indicators. The main levels of indicators for malaria programs include global, national, sub-national, district and health facilities. Indicators at different levels are used for distinct purposes. Most often, the number and type of indicators at each level varies because stakeholders at each of these levels have different information needs. For example, at the national and global levels, typically the indicators focus on measuring program outputs, outcomes, and impact. Overall, fewer indicators are reported, whereas at the district and facility level, more indicators are typically collected in order to capture the necessary information for program management purposes.

In most cases, indicators at the high levels are linked to those at the lower levels. In many cases, data will be collected at lower levels (province/district) and then passed up to the national level and then on up to the global level.

District or Facility

At the district and health facility level, the information requirements are much greater. At this level, more information is typically collected on inputs into programs (i.e. human resources, drugs and supplies, etc.), different program processes (i.e. trainings for staff), and outputs of programs (i.e. number of their staff that are trained in malaria diagnostics). This information is useful for programmatic decision-making as well as for informing managers on how they can improve their programs. For example, hospital managers may collect information to assess the quality and costs of their services in order to decide what needs to be done to improve them. District managers, on the other hand, may need information on provision and utilization of health services within their district for future planning and budgeting of services.

National/Sub-National

The national/sub-national level refers to agencies or organizations that are responsible for supporting malaria efforts at the national or regional/provincial levels within a country. An example of a national level agency would be a National Malaria Control Program housed within the Ministry of Health. At this level, an agency

might require information regarding assessments of coverage to justify further investments in their program and to assess what areas in the country have the greatest need for specific malaria interventions.

Global

The global level refers to international agencies, such as the World Health Organization or the Global Fund to Fight AIDS, TB and Malaria. These agencies typically collect information on coverage and impact of malaria prevention and control interventions, to assess countries and regions progress over time as well as to be able to compare country progress. Further, they collect information in order to be able to assess their investments in malaria programs.

OPERATIONALIZING INDICATORS

After selecting the indicators for your program, the next step is to establish exactly how each indicator will be measured. In other words, once you have your indicators selected you must operationalize them. This is done by first, defining each indicator in precise terms and establishing what metric will be used for calculating the indicator. The second step is to define how exactly the indicator will be calculated. For proportions or percentages, this means that you will need to define both the numerator and the denominator. For example, if our indicator was the proportion of the population that slept under an ITN the previous night, the numerator and denominator would be defined as follows:

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Numerator: Number of individuals who slept under an ITN the previous night.

Denominator: Total number of individuals who spent the previous night in surveyed households.

Defining an indicator and how to calculate it as precisely as possible will help to ensure that anyone using the same data will arrive at the same indicator value. Once you have defined the indicator and how it should be calculated, the next step is to clearly write out detailed instructions for how to collect, analyze, and report on your indicators. Often programs develop an Indicator Reference Sheet for each indicator they are responsible for measuring. Indicator reference sheets provide detailed information on the indicator definition; how the indicator will be measured; plans for data collection; plans for data analysis, reporting and review; potential data quality issues to consider; and a performance data table that includes the baseline and program targets for that specific indicator. Click here to see an example of a completed Indicator Reference Sheet.

LINKING INDICATORS TO FRAMEWORKS

The indicators that you select should be linked directly to the framework that you use for designing your program, project or intervention. If the indicators are not linked to the framework, then it won't be possible to assess the progress of your program or intervention or whether it met its stated objectives.

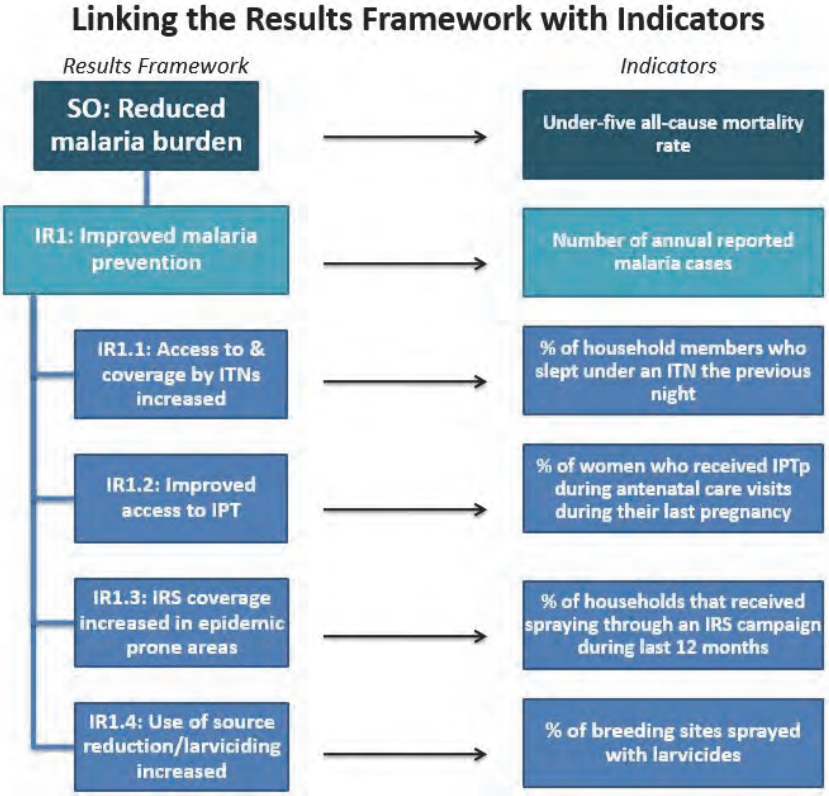
In the example logic model presented here, you would want to select at least one indicator for each of the elements of the framework. In some cases, it is possible that you would need multiple indicators per element if you are unable to measure the element completely with only one indicator. The amount of indicators per program will vary and will be based on what is needed, the resources available and what is feasible.

The graphic below demonstrates which indicators are linked to the different elements within the logic model.

Logic Model →	Indicators
Input	
Human resources	Number of community health workers in program catchment area
Financial resources	Annual program funding ($)
ITNs	Number of ITNs purchased for distribution
Process	
Training for community Health Workers (CHWs) on ITN delivery	Number of trainings for Community Health Workers
Establish distribution points for selling ITNs	Number of distribution points of ITNs established
Develop educational communication campaigns on proper use of ITNs	Number of educational communication campaigns developed
Output	
Trained CHWs on ITN delivery	Number of CHWs trained on ITN delivery
ITNs sold at distribution sites	Number of ITNs sold at distribution sites
ITNs delivered by CHWs	Number of ITNs delivered by CHWs
Educational communication campaigns implemented	Number of educational communication campaigns implemented
Outcome	
Household ownership of ITNs	Proportion of households with at least one ITN
Household use of ITNs	Proportion of children under five years of age who slept under an ITN the previous night
Impact	
Malaria mortality	Reported annual number of malaria cases
Malaria morbidity	Reported annual number of malaria deaths

LINKING INDICATORS TO FRAMEWORKS EXAMPLE

Here is another example of how indicators are linked with a results framework. In this example, you can see that an indicator is developed for the intermediate result (IR) as well as for each of the sub-intermediate results which are linked towards achieving the higher IR.



LINKING INDICATORS TO FRAMEWORKS GUIDELINES

As a general rule of thumb for selecting indicators for your program:

- Select at least one to two indicators per key activity or result area within your framework. Ideally, the data for your selected indicators will come from different data sources and not from just one source.
- Select at least one indicator for every core activity of your program.
- There should be no more than 8-10 indicators per area of significant program focus.
- When possible, use a mix of data collection strategies and/or sources to strengthen data quality.

Selecting too many indicators to monitor your program can be a huge burden and will likely result in the data not being used.

It is important to remember not to select too many indicators for your program, but enough to be able to monitor and evaluate the key activities and results areas as defined in your program's framework. If you have too many indicators, collecting data to monitor them can be a burden on time and program resources. If you select indicators that follow your program's framework, then they will provide the necessary information for program improvement and programmatic decision-making.

SOURCES FOR MALARIA-RELATED INDICATORS

Indicators do not need to be newly developed for every new program or project. It is helpful to use indicators that have already been pre-defined if possible. A few good sources to keep in mind when you are in the process of selecting indicators are:

- Indicators that were used in the past years of the program. By using the same indicators over time, it allows data to be compared over many years.
- Indicators from related or similar programs. This has the advantage of allowing for comparison between programs that provide similar services or conduct similar activities.
- Global or other recommended indicators, from the Roll Back Malaria MERG, WHO, Global Fund, President's Malaria Initiative and other key partners. Click on the following links for resources on these indicators:

  Household Survey Indicators for Malaria Control

  Global Fund Indicator Guide

  President's Malaria Initiative Monitoring and Evaluation Indicators

  Malaria Behavior Change Communication (BCC) Indicator Reference Guide

  World Health Organization Surveillance Guidelines for Malaria Control

  World Health Organization Surveillance Guidelines for Malaria Elimination

INDICATOR STRENGTHS AND LIMITATIONS

While there are indicators that are much better and more appropriate than others, it is important to remember that all indicators have limitations. Even the indicators that we commonly use in malaria programs have their own limitations. It is essential that one is aware and understands those limitations.

Bed nets in Ghana © Bonnie Gillespie, Voices for a Malaria-Free Future

For example, the commonly used indicator for measuring coverage of IRS is subject to recall bias that can end up resulting in what is referred to as "heaping" of dates. This occurs when subjects are not able to recall exactly the correct date when something happened in the past and they round up to a more common date. For example, instead of stating that their house was sprayed 11 months ago, they round up and say 1 year ago.

Another example is for the indicator used to measure insecticide-treated net/long-lasting insecticidal nets use among children under five and pregnant women. This indicator is subject to two main types of bias. Since the indicator is based on self-reported data, it can be subject to social desirability bias, which can happen, for example, when the subject being interviewed reports what he/she feels the interviewer would like to hear, rather than reporting accurately. The second is the bias that occurs due to the timing of when the survey is implemented relative to the malaria transmission season. Malaria transmission is higher during the rainy season than during the dry season, and therefore may affect ITN/LLIN usage levels. Thus, the season during which the survey is implemented must be taken into account when analyzing your data.

MODULE 6 ASSESSMENT

Questions

Correct answers are provided on page 64.

1. If an indicator measures exactly what it was intended to measure, which of the following characteristics would it represent?

   a. Reliable – You did not select the correct response. An indicator that is reliable means that the indicator can be consistently measured in the same way by different observers. If an indicator measures exactly what it is intended measure, then it would be valid.

   b. Precision – You did not select the correct response. An indicator that is precise means that the indicator is operationally defined in clear and well-specified terms. If an indicator measures exactly what it is intended measure, then it would be valid.

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   c. Programmatically important – You did not select the correct response. An indicator that is programmatically important refers to an indicator being linked to a public health impact or to achieving the objectives that are needed for impact. If an indicator measures exactly what it is intended measure, then it would be valid.

   d. If an indicator measures exactly what it is intended to measure, then it is valid.

2. *True or False:* It is important to have at least one indicator for each significant aspect, component or activity of your program.

   a. True

   b. False

3. Operationalizing indicators involves all of which of the following actions, except:

   a. Establishing how a given concept or behavior will be measured.

   b. Developing a precise definition and metric for the indicator.

   c. Defining how the value will be reliably calculated.

   d. Training M&E staff in how to collect the indicators.

4. *True or False:* It is not necessary to link your indicators to the framework that you designed for your program/project.

   a. True

   b. False

Correct Answers

1. If an indicator measures exactly what it was intended to measure, which of the following characteristics would it represent?

   d. If an indicator measures exactly what it is intended to measure, then it is valid.

2. *True or False:* It is important to have at least one indicator for each significant aspect, component or activity of your program.

   a. True: An appropriate set of indicators for a program will include at least one indicator for each significant aspect of the program. In many cases, there will be 2 - 3 indicators for each aspect of the program in order to obtain the necessary information for decision-making.

3. Operationalizing indicators involves all of which of the following actions, except:

   d. Training M&E staff in how to collect the indicators.

   Operationalizing indicators refers to establishing exactly how a given concept or behavior will be measured, then developing a precise definition and metric for the indicator and defining how the value will be reliably calculated.

4. *True or False:* It is not necessary to link your indicators to the framework that you designed for your program/project.

   a. True: The indicators that are chosen to monitor and evaluate your program should be directly linked to your program's framework. Since your framework lays out the program's logic and how and what will be achieved, it is essential that the indicators you choose, link directly to your program's framework.

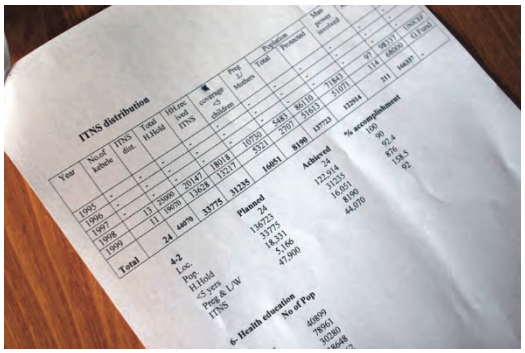
MODULE 7: MALARIA M&E DATA SOURCES

This module introduces the common data sources and systems for malaria programs, and specifically discusses the different types and sources of data, the strengths and weaknesses of these sources of data and different issues affecting data quality for malaria programs.

MODULE OBJECTIVES

By the end of this module, you will be able to:

- Identify different data sources and systems for M&E.
- Differentiate between routine and non-routine data sources.
- Identify strengths and weaknesses of common malaria data sources.
- Identify different issues affecting data quality for malaria programs.
- Identify strategies for linking malaria-related data sources.



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INTRODUCTION TO MALARIA-RELATED DATA SOURCES

Programs need data to keep track of activities, to follow the program's progress over time, to make program management decisions and to use for program improvement. To collect this data, a program first requires a framework that outlines how the program is to work. Indicators should then be selected based on the framework, while also taking into account the different data sources that are available.

There are a number of different malaria-related data sources to utilize as demonstrated in the example on the next page. A few of the most common data sources for malaria programs include health information systems, health facility and population-based surveys, and surveillance systems. It's important to remember that in order for data sources to be useful, they must be: complete, accurate, relevant and/or representative, and timely.

POTENTIAL DATA SOURCES

A list of potential data sources for malaria programs are listed below, along with more information about each of the sources.

Health Management and Information Systems

A system that collects and aggregates all health-related information and data at the multiple administrative levels within a country.

Operational/Special Research

The systematic and objective assessment of the availability, accessibility, quality, and/or sustainability of services designed to improve service delivery.

National Household Surveys

A large-scale, nationally representative survey carried out at the household level.

Geographic Information Systems, Satellite Data

A system that captures, stores, analyzes, manages, and presents data that are linked specifically to a location.

Surveillance Systems

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health.

Health & Demographic Surveillance Systems

A set of field and computing operations to handle the longitudinal follow-up of well-defined entities or primary subjects (individuals, households, etc.) and all related demographic and health outcomes within a clearly circumscribed geographic area.

Activity Monitoring Systems

A system that collects data related to the progression or implementation of a program's activities.

National Census

A procedure for systematically acquiring and recording information about the members of a population at a national level.

Rapid Assessments

A smaller-scale survey that uses a small, reliable sample, and is carried out over a short duration and typically examines only a small select set of variables.

Meteorological Data

Data related to weather conditions, for example it includes information on air temperature, winds, humidity, precipitation, etc.

Focus Group Discussions/Key Informant Interviews

A qualitative data collection method for obtaining in-depth information on concepts and perceptions about a certain topic through group discussion that is guided by a facilitator.

Health Facility Surveys

Surveys of a representative sample of facilities. The aim of facility surveys is usually to assess the provision and quality of services provided within the health facility.

Vital Registration Systems

A national system for registering all births and deaths of citizens and residents of a country, including the cause of death.

BASIC DATA TYPES: PART I

Data is most frequently classified as either routine or non-routine.

Routine vs. Non-Routine

Routine data refers to data that is continuously or regularly collected. In this case, it would include data that is collected daily, weekly or monthly. For example, it could include weekly reports on how many ITNs were distributed in health facilities in a community, or how many children under five came into the health center and were diagnosed with malaria.

Examples include:

- Health information systems (HIS)
- Surveillance
- Routine service reporting
- Administrative systems
- Vital registration systems

Non-routine data is data that is only periodically collected. For example, it is collected quarterly, annually, or every few years. A good example of a non-routine data source is a population-based survey which is conducted every 3 to 5 years. Because these types of surveys are large scale, they require a lot of resources and time and therefore it is only possible to carry them out every few years.

Examples include:

- Special program reporting systems
- Facility surveys
- Household surveys
- Censuses
- Interviews
- Focus groups
- Direct observations
- Research and special studies
- Rapid assessments

BASIC DATA TYPES: PART II

Data is also classified as either qualitative or quantitative data.

Qualitative vs. Quantitative

Qualitative data is descriptive and deals with aspects that cannot be measured numerically. It is most often used in order to help understand why something is happening. For example, in order to understand why ITN use is not common in a community, a researcher might conduct qualitative interviews with members of the community to better understand why they do not use ITNs.

Examples include:

- In-depth interviews
- Key informant interviews
- Focus group discussions
- Direct observations

Quantitative data measures characteristics numerically; for example, by using a count or a scale. This type of data allows for statistical analysis that helps to understand different trends or the relationships between different factors.

Examples include:

- Health information systems (HIS)
- Surveillance
- Facility surveys
- Household surveys
- Censuses
- Routine service reporting
- Vital registration systems
- Geographic information systems (GIS)
- Remote sensing

WHICH TYPE OF DATA SOURCE?

Think back to the examples of data source types on the previous pages, and answer the questions in the quiz. Your responses will not be graded. *Correct answers are provided on page 71.*

Data Source Types Quiz

1. Select all of the following data sources that are classified as ROUTINE.
   a. Surveillance
   b. Facility surveys
   c. Administrative systems
   d. Focus groups
2. Select all of the following data sources that are classified as NON-ROUTINE.
   a. Censuses
   b. Routine services reporting
   c. Direct observations
   d. Vital registration systems
3. The following is an example of which two data types?

   "Interviews conducted with household head members to understand why insecticide-treated nets are not used in Community Y."

   a. Quantitative
   b. Routine
   c. Non-Routine
   d. Qualitative
4. The following is an example of which two data types?

   "Carrying out a nationally-representative household survey to gather information on the country's population, health and nutrition."

   a. Qualitative
   b. Quantitative
   c. Routine
   d. Non-Routine
5. The following is an example of which data type?

   "Monthly reports from health facilities on the total number of deaths from malaria are sent to the district health office where they are compiled and aggregated before sending to the national level."

   a. Qualitative
   b. Quantitative

6. The following is an example of which data type?

   "Monthly reports from health facilities on the total number of deaths from malaria are sent to the district health office where they are compiled and aggregated before sending to the national level."

   a. Routine

   b. Non-Routine

7. True or False: The following statement is an example of a QUANTITATIVE data source.

   "Focus group discussions with caregivers about their perceptions of the quality of care at the local health facility are conducted in order to understand why use of health services in the community is so low."

   a. True

   b. False

8. True or False: The following statement is an example of a NON-ROUTINE data source:

   "Focus group discussions with caregivers about their perceptions of the quality of care at the local health facility are conducted in order to understand why use of health services in the community is so low."

   a. True

   b. False

Data Source Types Answers

1. Select all of the following data sources that are classified as ROUTINE.

   a. Surveillance

   c. Administrative systems

   In addition to surveillance and administrative systems, other examples of routine data sources include Health information systems (HIS), routine service reporting, and vital registration systems.

2. Select all of the following data sources that are classified as NON-ROUTINE.

   a. Censuses

   c. Direct observations

   In addition to censuses and direct observations, other examples of non-routine data sources include special program reporting systems, facility surveys, household surveys, interviews, focus groups, research and special studies, and rapid assessments.

3. The following is an example of which two data types?

   "Interviews conducted with household head members to understand why insecticide-treated nets are not used in Community Y."

   c. Non-Routine

   d. Qualitative

   The information collected is regarding perceptions and beliefs about malaria transmission and prevention; it is not information that can be numerically measured. This type of information would also not be collected on a regular basis, given that attitudes and beliefs do not change quickly or frequently. Therefore, this type of data source is considered a qualitative, non-routine data source.

4. The following is an example of which two data types?

   "Carrying out a nationally-representative household survey to gather information on the country's population, health and nutrition."

   b. Quantitative

   d. Non-Routine

   The information collected is on characteristics (population, health and nutrition) that can be measured numerically, and is only collected every 3 to 5 years due to the tremendous amount of effort and resources needed to conduct the surveys. Therefore, this type of data source is considered a quantitative and non-routine data source.

5. The following is an example of which data type?

   "Monthly reports from health facilities on the total number of deaths from malaria are sent to the district health office where they are compiled and aggregated before sending to the national level."

   b. Quantitative. Reported deaths from malaria can be measured numerically and therefore, is considered to be a quantitative data source.

6. The following is an example of which data type?

   "Monthly reports from health facilities on the total number of deaths from malaria are sent to the district health office where they are compiled and aggregated before sending to the national level."

   a. Routine. In this case, since the reports are sent on a regular basis from the health facility to the district health office, the data is considered to be a routine data source.

7. *True or False:* The following statement is an example of a QUANTITATIVE data source.

   "Focus group discussions with caregivers about their perceptions of the quality of care at the local health facility are conducted in order to understand why use of health services in the community is so low."

   b. False. The information gathered during the focus group discussions is on caregivers' perceptions, attitudes and beliefs about the quality of care, and thus is considered descriptive and cannot be measured numerically. Therefore, this would be considered a qualitative data source.

8. *True or False:* The following statement is an example of a NON-ROUTINE data source:

   "Focus group discussions with caregivers about their perceptions of the quality of care at the local health facility are conducted in order to understand why use of health services in the community is so low."

   a. True. These discussions most likely would occur once and not on a regular basis; thus, this would be considered a non-routine data source.

DATA SOURCES

When you are developing your M&E plan and deciding upon what the appropriate data sources will be for your specific program, it is helpful to also ask the following questions in order to determine whether it is an appropriate or feasible source to use:

- Does the data exist for the specified or required time period?
- Does the data exist for the specified population? For example, is data available for most-at-risk or special populations or disaggregated by gender or specific age groups?
- Does the data exist for the specified geographic area? For example, is data available at the sub-national or program area levels?
- Does the data exist for the appropriate administrative or functional level? For example, is there data available at the following levels:
  - Policy and Program
  - Service Environment
  - Client
  - Population
  - Spatial/geographic
- If the data does not currently exist, will it be feasible and do you have the resources to set up the necessary structures in order to collect the data?

Data Sources: Health Information Systems

A health information system (HIS) is a data system that collects and aggregates all health-related information and data at the multiple administrative levels within a country from a number of different sources. While the information varies by country, generally it includes information about the delivery, cost and use of health services, patient demographics and health status.

The table below lists some of the main strengths and weaknesses of health information systems in developing countries:

Strenths	Weaknesses
Ideally reflective of and integrated within health systems activities.	Data not representative of population.
Collected continuously, so is suitable for frequent reporting.	Difficult to determine population at risk/denominators for coverage estimates.
Systems already exist: • Need fewer resources for new infrastructure/systems. • Helps build local capacity and is sustainable.	Indicators determined centrally by Ministry of Health and may not be easily altered to answer new questions.
Typically available at lowest administrative levels.	Quality and completeness of reporting frequently varies.
	May only cover government facilities.
	Potential for double-counting, both within and between facilities.

Data Sources: Heath Facility Surveys

Health facility surveys collect data specifically on the type and quality of services, as well as on outcomes and impact of services provided at health facilities. They are typically conducted on a non-routine basis, and can be conducted in both public and private health facilities.

The table below lists some of the main strengths and weaknesses of health facility surveys in developing countries:

Strenths	Weaknesses
Can be nationally or regionally representative.	Overall is less sustainable and is not carried out routinely: • Data collection is periodic and less connected to ongoing program decision-making. • Information can become rapidly outdated. • Requires devoted personnel, resources and time.
Can be tailored to specific program needs.	Survey sampling design and analysis can be complex.
Quality control may be easier than in routine systems.	Coverage and sample size constraints exist: • National vs. sub-national coverage. • May not have enough of a specific type of facility to be completely representative.
Provides more detailed data than is typically available in routine systems.	May have small client sample sizes for some services.
Timing can coincide with program implementation.	
Can cover both public and private health facilities.	
Can combine with a population survey for outcome monitoring and impact evaluation.	

Data Sources: Population-Based Surveys

Population-based surveys are large, nationally representative surveys conducted typically every 3 to 5 years. They provide important population and health data at the outcome and impact levels. Examples of common population-based surveys include the Demographic and Health Survey (DHS), the Malaria Indicator Survey (MIS) and the Multiple Indicator Cluster Survey (MICS).

The table below lists some of the common strengths and weaknesses of population-based surveys.

Strenths	Weaknesses
Representative of the general population, which helps to eliminate selection bias if the sample is truly random.	Very expensive and time-consuming to conduct; thus, are typically carried out only every 3-5 years.
Can collect a wide range of outcome level indicators, such as program coverage.	Is not suitable for some types of data. For example, if collecting retrospective data, the data will be subject to **recall bias**.
Questionnaires can be adapted to cover specific issues/topics.	Does not provide input/process level data.
Involves well-tested instruments with good quality control.	May not be adequately powered for sub-national or district-level estimates.
	Cannot detect small changes or changes over short periods of time without large sample sizes.

Data Sources: Surveillance

Surveillance refers to the ongoing, systematic collection, analysis and interpretation of health data. It aims to provide accurate and timely information for decision-making purposes in order to facilitate rapid medical and programmatic response. It also serves to track outbreaks, monitor progress towards malaria elimination and evaluate control and prevention activities.

See the table below for some of the strengths and weaknesses of a surveillance system.

Strenths	Weaknesses
Very flexible and can be adapted to cover specific topics to collect data that is otherwise hard to obtain.	Expensive and resource-intensive because it's necessary to do the following: • Identify sites and adequately resource them • Train staff at sites. • Create a system to monitor and transfer data to central authorities.
Can collect a wide range of data from input to impact.	Active surveillance is even more resource-intensive.
Especially useful and necessary when the events being monitored are rare and when a rapid response is required.	

Data Sources: Sentinel Surveillance

Sentinel surveillance is the ongoing, systematic collection, analysis and interpretation of health data carried out in a limited number of health facilities. Sentinel surveillance is useful for when:

- The routine information system is inadequate.
- There is a need for high quality data to monitor trends.
- Disease outbreaks need to be rapidly identified.
- Geographical distribution of malaria varies greatly.

There are a number of limitations of sentinel surveillance to consider:

- It can be very costly to equip and operate.
- Requires frequent supervision.
- The limited number of sites is not representative of all health facilities and patients are not necessarily representative of the community; thus, the data is not generalizable.
- Record keeping can be burdensome to facility staff.
- Changes in use of health services can bias trend data.

Data Sources: Health and Demographic Surveillance Systems

A Health and Demographic Surveillance System (HDSS) is a longitudinal follow-up of individuals and/or households and all related demographic and health outcomes within a clearly defined geographic area. It allows you to assess demographic dynamics with the defined geographic region; provides risk sets and outcome measures for evaluating interventions as well as up-to-date sampling frames for identifying target populations for appraisal, intervention and monitoring. The International Network for the Demographic

Evaluation of Populations and Their Health (INDEPTH) is an example of a network of Health and Demographic Surveillance Systems, with currently 52 HDSS field sites in 20 countries (Map of HDSS sites).

The basic concepts behind an HDSS include:

- Conduct a baseline or initial census.
- Regularly update data on households and individuals on the following events: marriages, pregnancies, births, deaths and in- and out-migration as well as on education and vaccination records.
- Can carry out verbal autopsies on all deaths to determine cause of death profiles.
- Can conduct morbidity surveys involving biomarkers.

HDSS ADVANTAGES AND CHALLENGES

The table below outlines the advantages and challenges of carrying out Health and Demographic Surveillance Surveys.

Advantages	Challenges
Monitoring vital events in the demographic surveillance area: births, deaths, migrations, morbidity, socioeconomic development (poverty).	High maintenance cost.
Can assess progress and impact of intervention.	Community fatigue.
Can define population denominator.	Only covers a small area; thus, is unrepresentative of the national population.
Could be linked with the HMIS.	Has either a weak link or no link at all to the Health Information management Systems (HIMS).
Could serve as sentinel sites.	Potential bias from over study of the population.
Could serve as operational research sites.	Data is not easily accessible.
Most field sites include malaria on their research agenda.	Set up to address specific research questions, not necessarily set up for malaria M&E.
Multi-disciplinary team.	
Ideal environment for training.	

PUTTING IT INTO PRACTICE: SCENARIO 1

Read the following scenario and decide what data source would be the most appropriate. Remember to consider the type of data, the timing and level or scale at which the information is needed when trying to determine what will be the most appropriate data source.

A donor would like to be able to determine whether their program has been able to improve coverage of prompt and effective treatment for children under five with malaria. Thus, the donor wants to know how many children under five in their program's intervened areas received antimalarial treatment within 24 hours of the onset of malaria. What would be the most appropriate data source to use to provide the answer? *Correct answer is provided on page 77.*

1. Health Information System (HIS)
2. Health Facility Surveys
3. Population-based Surveys
4. National Census

Correct answer in bold below:

1. **Health Information System (HIS): The HIS is the most appropriate data source since the donor only wants to know how many children received antimalarial treatment (as opposed to a percentage which would require data on all children who had malaria). The HIS also has information on confirmed cases and this data is accessible for the specific intervened areas in the HIS. Lastly, HIS will not require extra resources to obtain the data.**

2. Health Facility Surveys: A health facility survey could answer the donor's question; however, it is very resource-intensive to carry out. In this scenario, the HIS is the most appropriate data source since the donor only wants to know how many children received antimalarial treatment (as opposed to a percentage which would require data on all children who had malaria). Further, it would be specific to the intervened areas.

3. Population-based Surveys: A population-based survey would not be an appropriate data source in this scenario for many reasons. First, these types of surveys are only conducted every 3 – 5 years; it would be difficult in terms of timing. Second, these surveys provide nationally representative data and percentages, not the absolute number of children who had received antimalarial treatment. Further, it would be specific to the intervened areas. In this scenario, the HIS is the most appropriate data source because the donor only wants to know how many children received antimalarial treatment.

4. National Census: A national census would not provide information on the number of children who had received prompt and effective treatment with antimalarial drugs. In this scenario, the HIS is the most appropriate data source since the donor only wants to know how many children received antimalarial treatment (as opposed to a percentage which would require data on all children who had malaria). Further, it would be specific to the intervened areas.

PUTTING IT INTO PRACTICE: SCENARIO 2

Read the following scenario and decide what data source would be the most appropriate. Remember to consider the type of data, the timing and level or scale at which the information is needed when trying to determine what will be the most appropriate data source.

The National Malaria Control Programme wants information on the percentage of homes that own at least one insecticide-treated bed net (ITN). What would be the most appropriate data source to use to provide the answer? *Correct answer is provided on page 78.*

1. Health Information System (HIS)

2. Health Facility Surveys

3. Population-based Surveys

4. National Census

Correct answer in bold below:

1. Health Information System (HIS): A HIS generally includes information about the delivery, cost, and use of health services and patient demographics and health status. It would not provide information regarding household ownership of ITNs. In this scenario, population-based surveys, like the Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS) would be the most appropriate source for providing the answer. In most cases, it will provide a national and regional estimate of the percentage of household ITN ownership.

2. Health Facility Surveys: A health facility survey would not be an appropriate data source, as it does not capture information on household ITN ownership and it would also not provide an accurate reflection of all households, since it only collects data on those that attend health facilities. In this scenario, population-based surveys, like the Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS) would be the most appropriate source for providing the answer. In most cases, it will provide a national and regional estimate of the percentage of household ITN ownership.

3. **Population-based Surveys: In this scenario, population-based surveys, like the Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS) would be the most appropriate source for providing the answer. In most cases, it will provide a national and regional estimate of the percentage of household ITN ownership.**

4. National Census: A national census gathers data on the members of a population, and thus would not provide information regarding household ownership of ITNs. In this scenario, population-based surveys, like the Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS) would be the most appropriate source for providing the answer. In most cases, it will provide a national and regional estimate of the percentage of household ITN ownership.

DATA QUALITY: WHY IS IT IMPORTANT?

Data quality refers to the worth and accuracy of the data collected. The quality of the data essentially determines how useful the data are. Ensuring that data quality is maintained throughout the data collection, analysis, interpretation and dissemination process is critically important. When data quality is high, the data reflect true performance and can provide vital information for decision-making and program improvement. If data quality is poor it can cause the following:

- Erroneous program management decisions and the use of additional program resources to take corrective actions.
- Missed opportunities for identifying program strengths and weaknesses.
- Reduced stakeholder confidence and support.

Monitoring progress in Kenya © Bonnie Gillespie, Voices for a Malaria-Free Future

DIMENSIONS OF DATA QUALITY

There are six main data quality criteria that we need to consider and ensure that we are meeting throughout the entire data collection process.

1. **Validity**
   Data clearly, directly, and adequately represent what was intended to be measured.
2. **Reliability**
   Data are collected regularly using the same methodology and if we repeat the same procedure over and over we end up with the same results or findings.
3. **Integrity**
   Data are truthful. In other words, they are free from willful or unconscious error due to manipulation or through the use of technology.
4. **Precision**
   The ability to reproduce measurements consistently and to minimize random error.
5. **Timeliness**
   Ability to have regularly collected, up-to-date data available when it is needed.
6. **Completeness**
   Data collected and reported are complete.

DATA QUALITY ASSURANCE

Data quality assurance mechanisms should be implemented at every stage of the data management process. This includes during data collection, management, analysis, interpretation and dissemination. For more information on data quality assurance methods and different data quality assessment tools, visit the MEASURE Evaluation website.

Here are some steps your program can follow in order to improve the quality of the data that you collect.

1. Provide written instructions for how to use data collection instruments and tools. Include these instructions on each of the instruments and tools. This will help to ensure that no matter who is collecting the data, it will be collected in the same way.
2. Document processes for data entry, cleaning and management.
3. Provide continuous monitoring of data collection activities and perform routine checks to ensure that instructions are being followed properly.
4. Randomly sample data and verify that it is accurate.
5. Take proactive steps to report, document, correct and communicate problems that compromise the quality of the data.
6. Be transparent in the data analysis techniques used and the assumptions that data are based upon.

LINKING DATA SOURCES

Linking data refers to connecting two or more data types and/or sources in order to:

- Provide context by increasing understanding and informing analyses.
- Help corroborate data quality, trends and associations within your data. In essence, it helps to provide further evidence on a specific program/project output, outcome or impact. This is also often referred to as triangulating data.
- Attribute causality by linking process level data with impact/outcome level data helps to establish causality.

Data can be linked from different sources, across different levels, over time, across geography and across different sectors. For example:

- **Sources:** Linking health facility survey or HIS data with a household survey data to establish change in impact or outcome.
- **Levels:** Linking HIS data from the district, regional and national levels to check data quality.
- **Time:** Linking data on service provision for antenatal care with birth outcomes.
- **Geography:** Linking malaria cases with GIS data to assess foci of transmission.
- **Sectors:** Linking malaria cases from HIS with agricultural data on rainfall levels.

It is important to remember that linking data appropriately requires advanced planning, preferably prior to data collection. It should be done when sufficient, good quality data that is plausibly connected exists, and should NOT be done if there is no logical connection between the data.

MODULE 7 ASSESSMENT

Questions

Correct answers are provided on page 82.

1. Data and information serve which main purpose for programs? *(Select all that apply.)*
   a. To keep track of program activities
   b. To make program management decisions
   c. To provide evidence to improve programs
   d. To demonstrate a program's progress and achievements
2. The ongoing, systematic collection, analysis and interpretation of health data carried out in a limited number of health facilities refers to which common malaria-related data source?
   a. Health Information System
   b. Surveillance
   c. Sentinel Surveillance
   d. Population-based Surveys
3. A routine data source refers to data that is continuously or regularly collected. Which of the following data sources is NOT an example of a routine data source?
   a. Health Information Systems
   b. Facility Surveys
   c. Surveillance
   d. Vital Registration Systems
4. Linking different data sources serves all of the following purposes, except:
   a. Helps to determine if your data are of poor quality
   b. Provides context by increasing understanding and informing analyses
   c. Helps to attribute causality by linking process level data with impact/outcome level data to establish causality
   d. Helps to corroborate data quality, trends and associations observed within your data

Correct Answers

1. Data and information serve which main purpose for programs? *(Select all that apply.)*

   a. To keep track of program activities

   b. To make program management decisions

   c. To provide evidence to improve programs

   d. To demonstrate a program's progress and achievements

   a) keep track of program activities; b) make program management decisions; c) provide evidence to improve programs; d) demonstrate a program's progress and achievements.

2. The ongoing, systematic collection, analysis and interpretation of health data carried out in a limited number of health facilities refers to which common malaria-related data source?

   c. Sentinel surveillance refers to the ongoing, systematic collection, analysis and interpretation of health data within a limited number of health facilities.

3. A routine data source refers to data that is continuously or regularly collected. Which of the following data sources is not an example of a routine data source?

   b. Facility surveys are not carried out continuously or on a regular basis; therefore, they are considered a non-routine data source.

4. Linking different data sources serves all of the following purposes, except:

   a. Linking data sources does not help you necessarily to determine whether or not your data are of poor quality. Data quality checks and audits can help you to determine if your data are of poor quality. Linking different data sources serves the following purposes: provides context by increasing understanding and informing analyses; helps to attribute causality; and helps to corroborate data quality, trends and associations observed within your data.

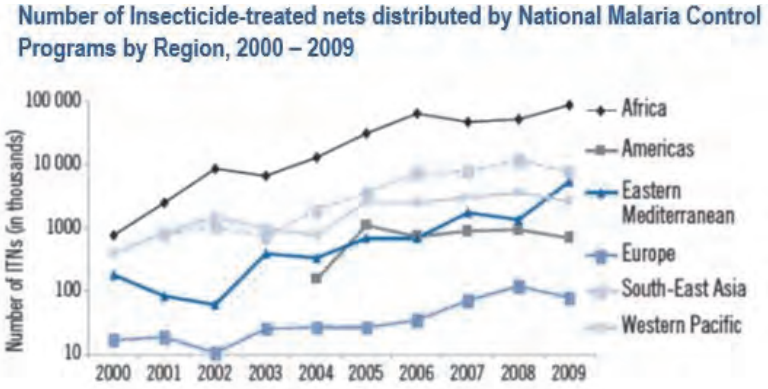
MODULE 8: ANALYSIS, INTERPRETATION, AND PRESENTATION OF MALARIA DATA

T module provides an introduction to the functions and common concepts for data analysis and interpretation. It also covers how to present data effectively, walking learners through how to select an appropriate graphic for presenting data and key tips for good data presentation.

MODULE OBJECTIVES

By the end of this module, you will be able to:

- Identify the functions of data analysis and data interpretation.
- State common concepts for data analysis and interpretation.
- Identify appropriate graphics for presenting various types of data.
- Differentiate between what characterizes good data presentation and poor data presentation.



World Malaria Report 2010

WHAT IS DATA ANALYSIS AND INTERPRETATION?

Data analysis refers to the process of inspecting, cleaning, transforming and modeling data for the purpose of highlighting useful information. In other words, data analysis is taking the raw *data* that you've collected for your program and transforming it into *information* that can be used for decision-making.

Data analysis helps to provide answers to questions being asked about your program or other research studies. It means taking the data that you collect and looking at it in comparison to the questions you would like to answer. For example, if you want to know whether your program is meeting its objectives – or if it's on track – you would look at your program targets and compare them to the actual program performance.

Data interpretation goes a step beyond data analysis. Interpretation is using the analysis to further understand your findings and the implications for your program. It is the process of adding meaning to information by making connections and comparisons, by exploring causes and consequences, and by explaining patterns or trends observed within the data.

Quiz Question

(Correct answer is provided on page 84)

Which question can be answered through data analysis?

a. In which site did the malaria program achieve greater coverage of insecticide-treated nets?

b. Why did the malaria program fail to achieve its target of 80% coverage of insecticide-treated nets in community A?

Correct answer:

a. This question can be answered through data analysis, comparing the coverage of insecticide-treated nets in each of the different program sites.

ANALYSIS OF MALARIA DATA

There are a number of different types of analyses that you can perform at the program level. It will depend on what information you need to be able to manage your program effectively and to track its progress. Here are three examples of common types of analyses that will help you to track your program's progress.

1. **Actual Performance vs. Program Target:** In this example, we are comparing our program's actual performance in terms of the number of persons trained on malaria case management to the target that was set for the program by June 1st, 2016. In this case, we case see that our progress over the first year of the program (from January 2015 – December 2015) is not progressing at the pace we would expect in order to meet the program target of 100 persons trained on malaria case management by June 2016. In order for the program to meet the target, an additional 85 people need to be trained in the next 6 months of the program.
2. **Current Performance vs. Previous Performance:** In this example, we are comparing our program's current performance (2015) in terms of the number of insecticide-treated nets (ITNs) that were distributed to the previous three years (2012 - 2014). As we can see for 2015, the program is outperforming all previous three years by a substantial number. It is clear that the current performance is better than previous performance for this program.
3. **Comparison of Performance Between Different Sites or Groups:** In this example, we are comparing the performance of the program in District A vs. the performance in District B in terms of the number of fever cases tested for malaria in the health clinics. Here we can see that District B has tested 8,000 fever cases for malaria, compared to only 3,500 in District A. While it appears that District B is performing better than District A, it is hard to interpret these results without further information about the two districts. For example, we would want to also know the different target populations in each of the districts, as well as more information on the malaria endemicity in each district to see if they were comparable.

COMMON MEASURES FOR ANALYSIS

There are some basic statistical measures that are important to understand, calculate, and interpret. These include the following measures:

- Measures of Central Tendency
  - Mean
  - Median
  - Mode
- Measures of Variation
  - Range
  - Variation and Standard Deviation
  - Interquartile Range
- Ratio, Rate
- Proportion, Percentage

The following sections provide explanations and examples for each of the measures.

COMMON MEASURES FOR ANALYSIS: PART I

Measures for Central Tendency

There are some basic statistical measures that are important to understand, calculate, and interpret.

Mean

The most commonly investigated characteristic of a data set is its center, or the point around which the observations tend to cluster. The mean is the most frequently used measure to look at the central values of a data set.

Definition: The sum of the values divided by the number of cases or observations. It is also referred to as the average.

Calculation: Mean = Sum of values / number of observations

Example: What was the mean number of malaria cases per month in during the past year?

- Sum of malaria cases (January - December): 1,110
- Number of observations: 12
- Mean: 1,110 / 12 = 92.5 average number of malaria cases per month in the past year

Median

Definition: The median is the middle value in an ordered set of values.

Calculation: The first step is to sort the data from the lowest to the highest value. The second step is to choose the middle observation within the data set. For data sets with an even number of values, the median is the average (mean) of the two middle values.

Example 1: What is the median number of malaria cases per month during 2013?

1. Sort the observations.
2. Select the two middle numbers since there are an even number of observations in the data set.
   - Middle numbers: 45 and 45
3. Add the two numbers and divide by two: (45 + 45) / 2 = 45.

Example 2: What is the median number of malaria cases per month during 2014?

1. Sort the observations.
2. Select the middle number, as there are an odd number of observations in the data set. This number represents the median, which is 49 in this case.

Mode

Definition: The mode is the value that occurs most frequently in your data set.

Calculation: Select the value in your data set that occurs most frequently.

Example: What is the mode for the number of malaria cases in 2013 and 2014?

- Mode for number of malaria cases in 2013: 45
- Mode for number of malaria cases in 2014: 40

Out of the three measures of central tendency - mean, median, and mode - the mean is the most frequently used measure to look at the central values of a data set. The mode is the least useful and thus, the least used measure of the three.

COMMON MEASURES FOR ANALYSIS: PART II

Measures of Variation

There are some basic statistical measures of variation that are important to understand, calculate, and interpret.

Range

Definition: The range represents the difference between the highest and lowest values within your distribution (data set).

Example: What is the range for the number of malaria cases in 2013 and in 2014?

- Range for number of malaria cases in 2013: 36 - 69
- Range for number of malaria cases in 2014: 35 - 64

Variance & Standard Deviation

Definition of Variance: Variance is a measure of how far a set of numbers are spread out from each other. It *helps to describe how far the numbers lie from the mean.*

Calculation of Variance: Variance (s2) is the sum of the squared deviations from the mean divided by the number of observations minus 1.

Definition of Standard Deviation: Standard deviation is a measure that shows how much variation there is from the mean. A low standard deviation thus indicates that the data points tend to be very close to the mean, while a large standard deviation indicates the opposite - that the data are spread out over a large range of values.

Calculation of Standard Deviation: The standard deviation (s) is the square root of the variance.

Interquartile Range

Definition: The interquartile range (IQR) is a measure of statistical dispersion. It is equal to the difference between the third and first quartiles, and thus represents the middle 50% of the data. Quartiles divide data into four equal groups, with the lower quartile (Q1) being the 25th percentile, the middle quartile being the 50th percentile, and the upper quartile being the 75th percentile (Q3). Since the IQR uses the middle 50% of the data, it is not affected by outliers or extreme values.

Calculation: IQR = Q3 - Q1

Example:

- Q3 = 42
- Q1 = 18
- IQR = 42 - 18 = 24

COMMON MEASURES FOR ANALYSIS: PART III

Other Common Measures

There are some basic statistical measures that are important to understand, calculate, and interpret.

Ratio

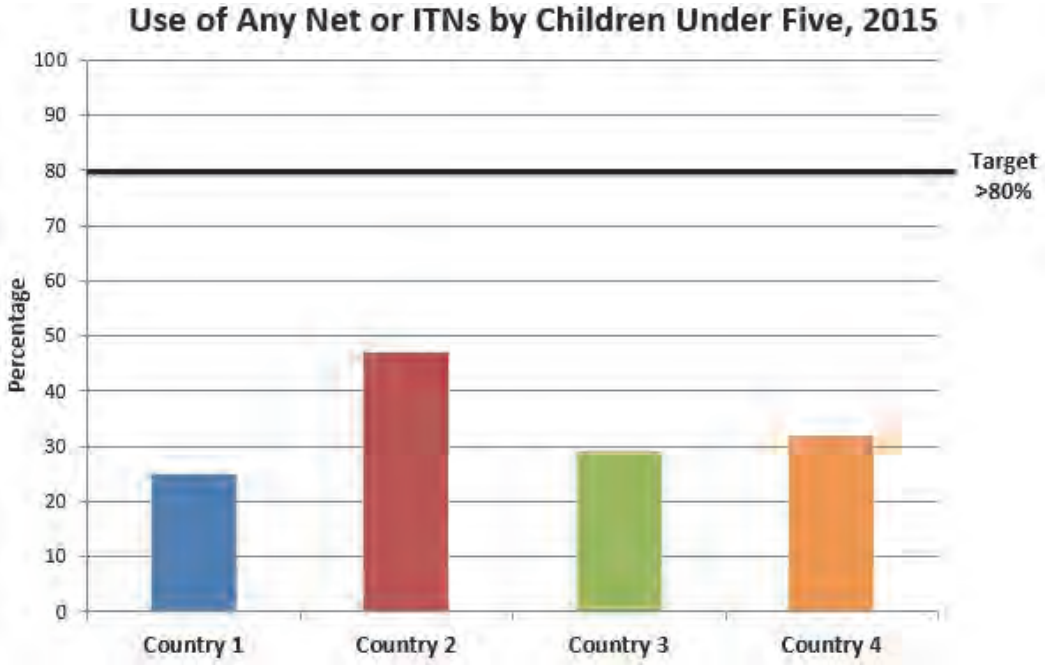
Definition: A ratio is a comparison of two numbers, expressed in one of the following ways: "a to b"; "a per b"; and "a:b".

Examples:

- 2 household members per (one) mosquito net
- Women are slightly more likely to sleep under an ITN than men, with a ratio of 1.2:1

DATA INTERPRETATION

After data have been analyzed, the next step is interpreting the information. In essence, interpretation is really trying to make sense of your information and understanding what the implications are for your program. In many cases, additional information is needed in order to be able to understand your findings. In the graphic below on use of ITNs by children under five, the target is to have greater than 80% of children under five years old sleep under an ITN every night. From the graph, we observe that this goal has not been achieved. Country 2 is the closest in terms of attaining the goal, but no country has yet met the goal.



INTERPRETING GRAPHS

In interpreting the graph, there are a few questions that we might want to understand. For example:

- *Why haven't all the countries met the target goal of greater than 80% ITN usage among children under five?*
- *What are the reasons behind it – is it because the program is not distributing enough ITNs? Is it because our health education and behavior change communication interventions are not effective?*

We might also want to know why some countries are doing better than others in terms of progress toward the goal. For example, *what is different about country 2 compared to country 1?*

In order to understand the finding, we need to look at other relevant data that can help us to answer our questions. In this case, we could look at household ownership of ITNs or at the coverage and effectiveness of health education and behavior change communications interventions in the countries. Sometimes in order to interpret our findings, it might require that we conduct further analyses.

CHALLENGES WITH INTERPRETATION OF COMMON MALARIA INDICATORS

There a number of issues that need to be taken into consideration when you are interpreting findings for common malaria indicators. These issues can pose a challenge in understanding what your program findings mean, and in many cases, other data may need to be collected to be able to better understand your findings. Two of the main issues to consider when interpreting malaria-related data are seasonality and malaria endemicity.

Seasonality

Malaria transmission in many places is seasonal, meaning that transmission occurs or occurs more frequently during certain times during the year and not necessarily year round due to changing climatic conditions. Given that transmission can fluctuate dramatically within a setting within the year or across different years, it is important to take into account the season when your data were collected.

Intervention coverage and usage levels for the four main malaria prevention interventions (ITN/LLIN, indoor residual spraying, intermittent preventive treatment for pregnant women and receiving prompt and effective treatment) may differ slightly between seasons. For example, during the rainy season more people will likely sleep under an ITN/LLIN because they perceive the threat of getting malaria to be higher since there are more mosquitoes.

Seasonality will also affect malaria morbidity and mortality. We expect malaria morbidity and mortality to be higher during and for several weeks after the rainy season since there is higher malaria transmission. Thus, interpretations of your data must take into account the season in which the data were collected.

Malaria Endemicity

Malaria endemicity can affect the interpretation of the core malaria indicators, since each involves the definition of the target population. In other words, each indicator is intended to be measured only among the target population, which is defined as those that are at risk for malaria.

In countries where malaria is endemic or epidemic-prone throughout the country, this issue should not be a particular concern in the interpretation of findings. However, in countries where malaria endemicity varies within the country and thus not all of the population is at risk for malaria, it is important to take this into consideration when you are collecting data and interpreting your findings.

Populations that are not at risk for malaria should not be included within your target population. In these situations, it may be necessary to collect additional information to establish what areas are within or outside of a malaria risk area. However, this is not always possible and this needs to be taken into consideration when you interpret your findings.

For example, if you collect data at the national level on household ownership of ITNs/LLINs, you need to consider if you are including data from non-malarious areas. If you do include data from non-malarious areas, then it is likely that your data will underestimate the national coverage level of ITNs/LLINs. This is because you have overestimated your target population (those actually at risk for malaria).

EFFECTIVE DATA PRESENTATION

Regardless of what communication format you are using, whether it is an annual progress report or a presentation, the information should be presented in a clear and concise way with key findings and recommendations that are actionable. When data are presented in this way, it helps to facilitate their use for decision-making. When data are presented in an unclear manner, or when too much information or irrelevant information is provided, then there is less likelihood that the information will be used for programmatic decision-making. It is also important to always remember who your audience is when you are thinking of how to present information. This means that you should tailor the information presented to your audience, so that it is useful, clear and actionable to them.

SUMMARIZING DATA: TABLE

There are really two main ways to summarize and present data, through tables and graphs. Both of these forms are useful for conveying a message and for portraying trends, relationships and comparisons.

A table is the simplest way of summarizing a set of observations. It has rows and columns containing data which can be in the form of absolute numbers or percentages, or both. In the example table, the number of deaths is listed for years 2009 – 2013, for countries that are considered to have a low burden of malaria transmission. This table allows you to see the trend in the number of malaria deaths over the five year period within a country and to make comparisons across the six countries over the five years.

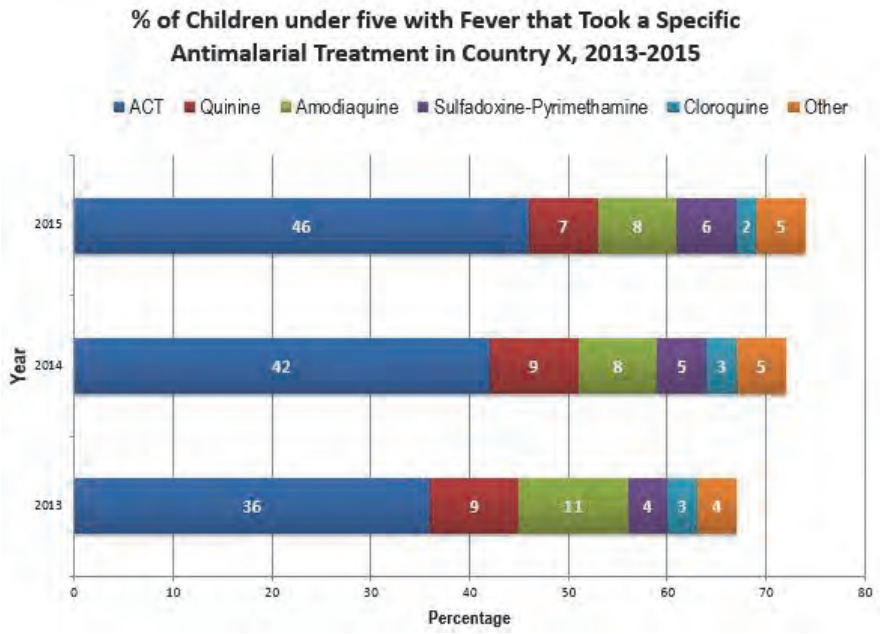
Number of Malaria Deaths
Reported by Low Transmission Countries, 2009-2013

	Botswana	Cape Verde	Namibia	South Africa	Swaziland	Zimbabwe
2009	6	2	10	45	2	108
2010	8	0	63	83	8	40
2011	8	1	2	54	1	451
2012	1	1	4	1	3	351
2013	7	0	8	105	4	352

Source: World Malaria Report 2014

SUMMARIZING DATA: CHART

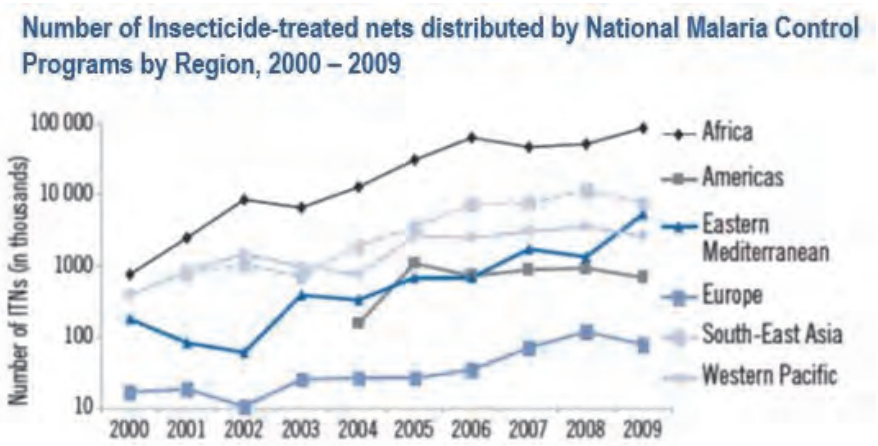
Graphs are pictorial representations of numerical data and should be designed to convey a pattern or trend of the data. For example, in this stacked bar chart, we are able to compare the use rates of different antimalarial treatments among children under five with a fever within Country X over three years to see the changes in uptake of treatment, as well as changes in the type of treatment taken.



Source: HMIS Data

SUMMARIZING DATA: GRAPH

In this line graph, there are two main messages being conveyed. First, we are able to see a trend in the number of ITNs distributed by National Malaria Control Programs over the 10 year period in each region of the world. Overall in each region, the number of ITNs has increased over the years. Second, we are also able to compare the number of ITNs distributed across the different regions. Here we can clearly see that the most ITNs have been distributed in the Africa and South-East Asia regions, and the least have been distributed in the European region.



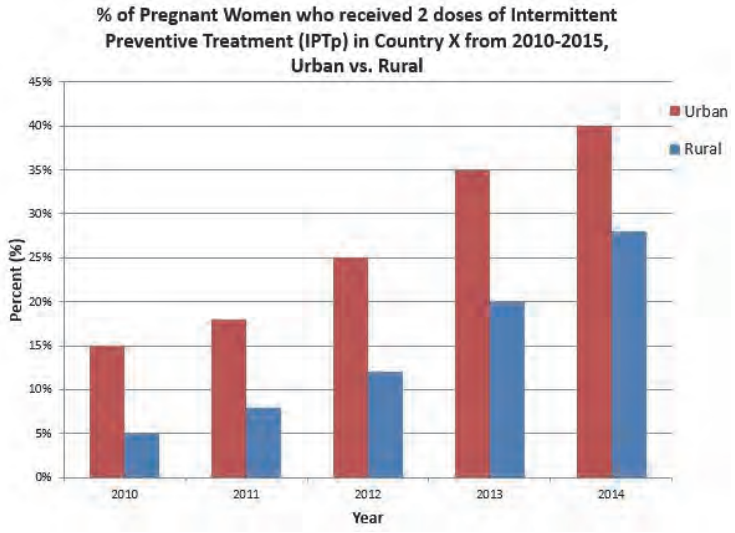
Source: World Malaria Report 2010

PRESENTING DATA

There are four main charts and graphs used to present data. Each chart and graph has a specific use/function, which is important to keep in mind when you are deciding the best way to present your data.

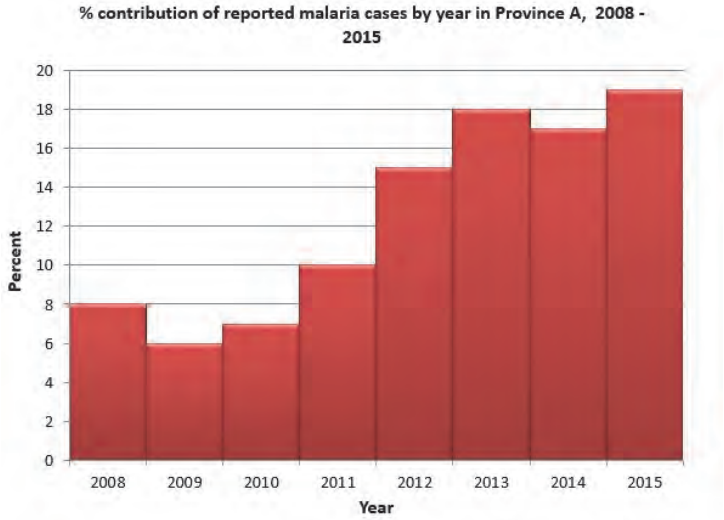
Bar Chart

A bar chart is used to compare data across categories. The chart has rectangular bars with lengths that are proportional to the values they represent. They are used to plot data that has discrete values and is not continuous. In the example, we are able to compare the percent of women who received 2 doses of IPTp in Country X across the five year time span as well as compare the differences between pregnant women in the rural areas versus the urban areas in terms of access to IPTp.



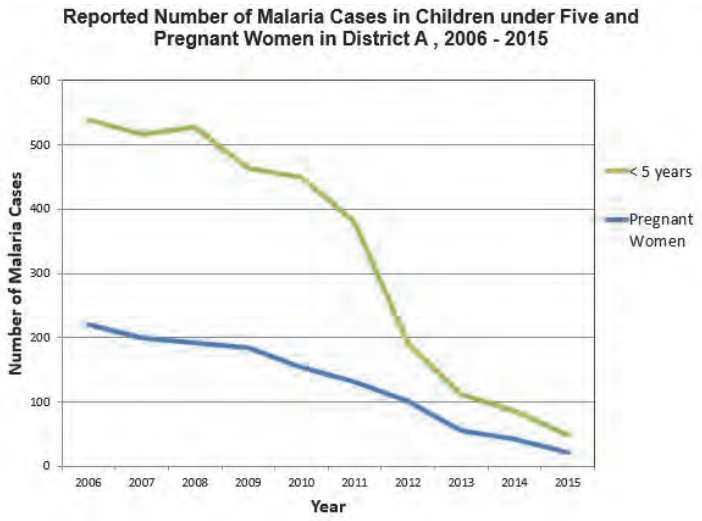
Histogram

A histogram represents the relative frequency of continuous data. In other words, it is a graph that shows a visual representation of the distribution of data. It consists of tabular frequencies, shown as adjacent rectangles, that are positioned over discrete intervals, whose area is equal to the frequency of the observations in the interval. The total area of the histogram is equal to the number of data. In the example here, we see the distribution of malaria cases by month for the year of 2010 in District Y.



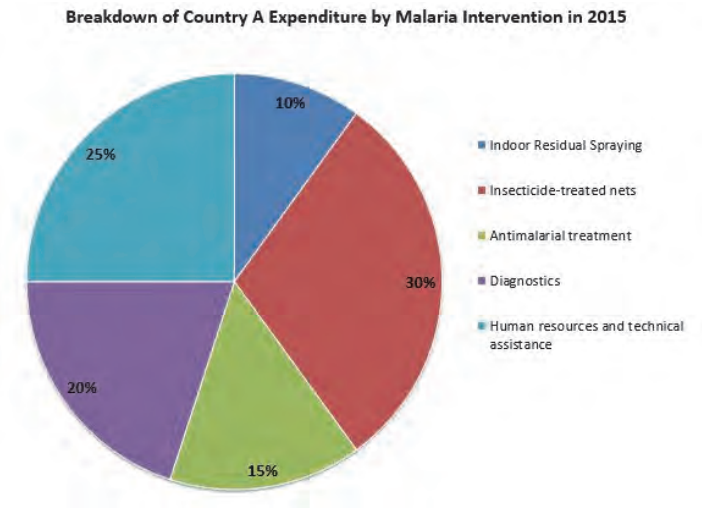
Line Graph

A line graph is a graph that displays a trend or trends over time for continuous data. In the example, we are able to observe the declining trend in the number of malaria cases over the past 10 years for both children under five and pregnant women in District A.



Pie Chart

A pie chart is a circular chart that is divided into sections that represent the proportion or contribution of each value to a total. The size of the section is proportional to the quantity it represents. In this example, we are able to observe the relative proportion of Country A expenditure by the type of malaria intervention. Thus, we can see that the greatest proportion of the budget in the Country is spent on insecticide-treated nets (30%), while only 10% of the Country's budget is spent on indoor residual spraying.



PRESENTING DATA QUIZ

To complete the quiz, select an answer for each statement. *Correct answer is provided on page 94.*

It's important to remember that each of the four main charts and graphs have specific uses for presenting data. To check your understanding of their uses, read each statement and decide which chart or graph would be the most appropriate to use to convey the information.

a. *Line Graph* – The prevalence of malaria in Ghana over the past 30 years.

b. *Bar Chart* – Data that is comparing the prevalence of malaria in 10 different countries during one year in sub-Saharan Africa.

c. *Pie Chart* – Data on the reported reasons why individuals do not use insecticide-treated nets (ITNs) among the individuals surveyed that were not currently using ITNs.

d. *Histogram* – The distribution of patients tested for malaria by parasite density.

Correct answer:

a. A line graph is the most appropriate way to show the prevalence of malaria in Ghana over the past 30 years, as it will be able to visually convey the trend the 30 year time span in the country. A bar chart is the most appropriate chart to use to be able to make the comparisons in prevalence of malaria across the 10 different countries. A pie chart is the most appropriate chart to visually show the reported reasons why individuals do not use ITNs, in relative proportion to one another. A histogram is the most appropriate graph to show the distribution of patients tested for malaria by parasite density.

KEY TIPS FOR GOOD DATA PRESENTATION

Here are some key tips to remember to ensure good data presentation:

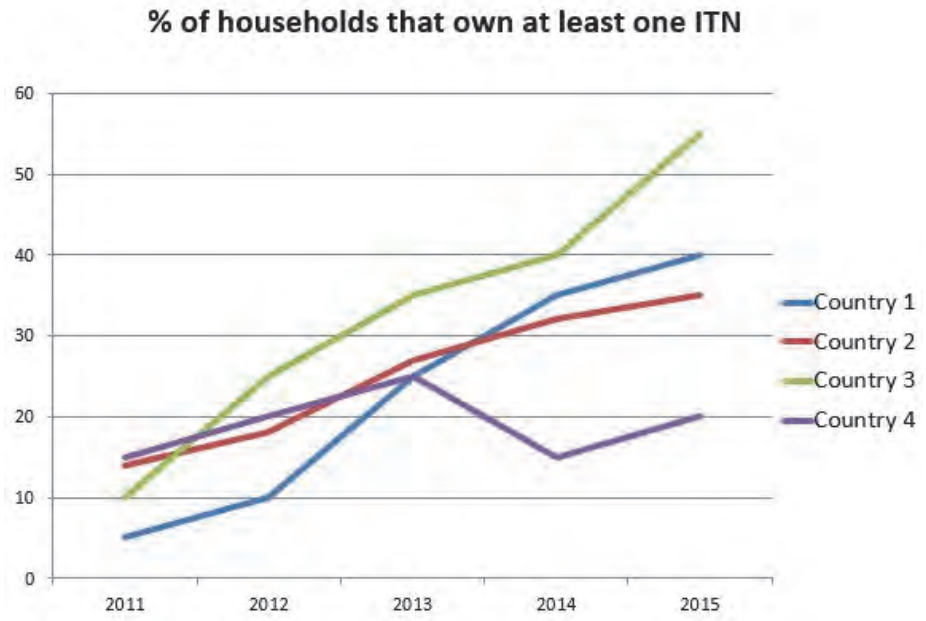
1. *Use the appropriate graphic* – Make sure to use the right graphic (table, chart or graph) for your data, which will be based on the message you want to convey.
2. *Know your audience* – Present your information in a way that is clear, concise, practical and actionable.
3. *Label all the components of your graphic* – All graphs and tables should have a title. The title should express the who, what, when and where. Graphs and charts should have clearly labeled axes, and when appropriate, should include legends.
4. *Provide all relevant information* – Your graphic should be self-explanatory. This means that you should include the source(s) and date(s) for the data presented in your graphic. If something needs clarification or further explanation, include a footnote that helps to bring clarity to the graphic. For good data presentation, it is essential that your audience has all the information they need to understand the message being conveyed in the graphic.

DATA PRESENTATION EXAMPLES

Keeping in mind the four tips for good data presentation, take a look at the following graphics. Are they presented well? If not, what is wrong with the way in which they are presented?

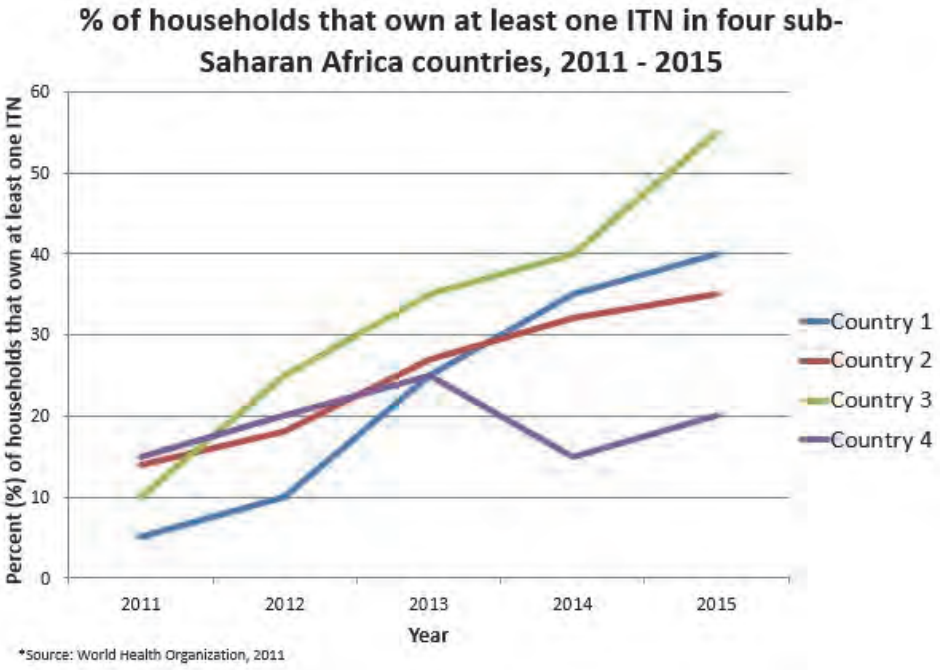
Example 1

What are the ways in which the data on this line graph could be presented more effectively?



A better way to represent the data includes the following elements:

- The title of the graph includes information on "when" and "where."
- The axes are properly labeled.



Example 2

What are the ways in which the data in this table could be presented more effectively?

Table 1

Year	(n)	Relative frequency (%)
2008	4,216,531	8
2009	3,262,931	6
2010	3,319,339	7
2011	5,338,008	10
2012	7,545,541	15
2013	9,181,224	18
2014	8,926,058	17
2015	9,610,691	19
Total	51,400,323	100.0

A better way to represent the data includes the following elements:

- The title explains the data contained in the table.
- The columns are clearly labeled.
- The information data source is included.

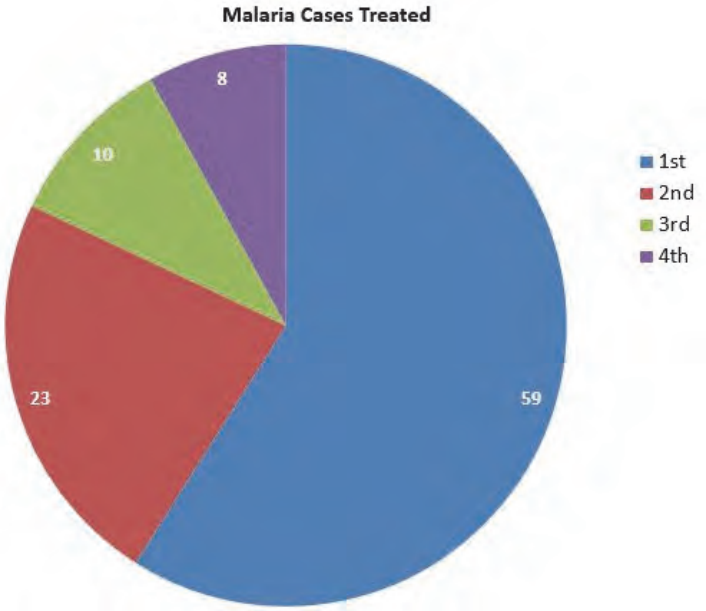
Table 1: Percent contribution of reported malaria cases by year in Country A, 2008 – 2015

Year	Number of malaria cases (n)	Relative frequency (%)
2008	4,216,531	8
2009	3,262,931	6
2010	3,319,339	7
2011	5,338,008	10
2012	7,545,541	15
2013	9,181,224	18
2014	8,926,058	17
2015	9,610,691	19
Total	51,400,323	100.0

Source: World Health Organization

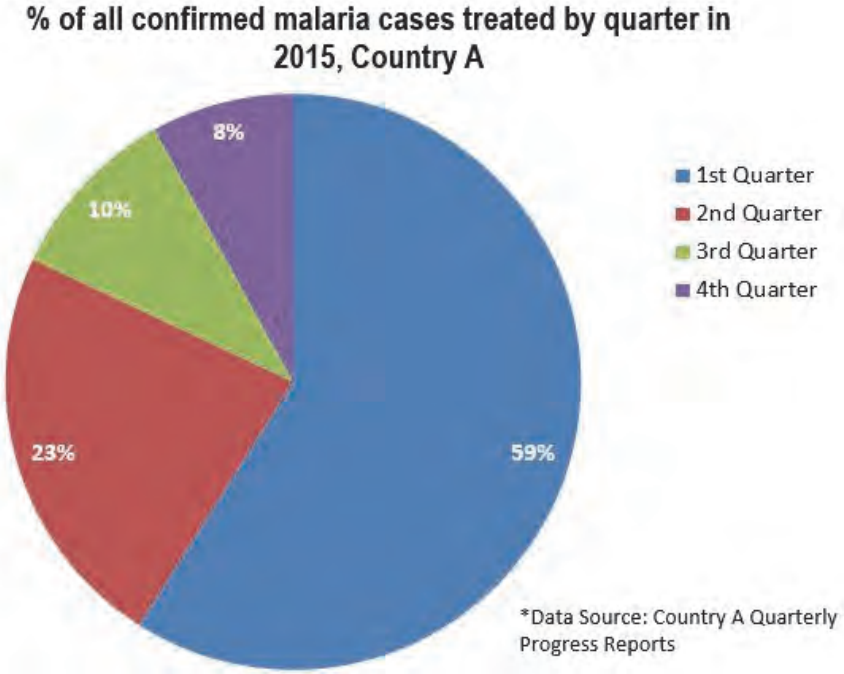
Example 3

What are the ways in which the data in the pie chart could be presented more effectively?



A better way to represent the data includes the following elements:

- The title of the chart is clear and specific.
- The numbers on the chart are clearly labeled.
- The chart legend is descriptive.
- The information data source is included.



MODULE 8 ASSESSMENT

Questions

Correct answers are provided on page 100.

1. Which of the following questions cannot be answered through simple data analysis, but would need further information and interpretation to be able to answer?

   a. What was the annual number of malaria admissions in District A health facilities in 2015?

   b. Which country has the highest coverage (proportion) of households that own at least one insecticide-treated net?

   c. Why did the proportion of people sleeping under insecticide-treated nets decline dramatically from last year?

   d. Which health facility in District B provided greater coverage of intermittent preventive treatment for pregnant women?

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2. Based on the data presented in the table for annual number of insecticide-treated nets distributed by the National Malaria Control Program in Country X from 2002-2010, what is the mean, the median and mode for the data set (in that order)?

   a. Mean: 140, Median: 174.67, Mode: 135

   b. Mean: 174.67, Median: 140, Mode: 135

   c. Mean: 135, Median: 140, Mode: 174.67

   d. Mean: 175, Median: 135, Mode: 140

Annual Number of Insecticide-treated Nets Distributed by the National Malaria Control Program in Country X, 2007 - 2015

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
# of ITNs Distributed (thousands)	125	135	140	132	135	150	155	250	350

3. If you wanted to present a graphic comparing the proportion of households that have been sprayed with insecticides within the past 12 months across 15 high burden countries, which would you use?

   a. Table

   b. Pie Chart

   c. Histogram

   d. Bar Chart

4. Annual parasite incidence (API) which is defined as the total number of confirmed malaria cases during one year (X 1000) divided by the total population under surveillance, represents which common statistical measure?

   a. Rate

   b. Proportion

   c. Mode

   d. Percentage

Correct Answers

1. Which of the following questions cannot be answered through simple data analysis, but would need further information and interpretation to be able to answer?

   c. Why did the proportion of people sleeping under insecticide-treated nets decline dramatically from last year?

   A simple data analysis will only tell you that the proportion of people sleeping under ITNs declined this year compared to last year. To understand why, further information would need to be collected in order to determine why the proportion declined.

2. Based on the data presented in the table for annual number of insecticide-treated nets distributed by the National Malaria Control Program in Country X from 2002-2010, what is the mean, the median and mode for the data set (in that order)?

   b. Mean: 174.67, Median: 140, Mode: 135

   Mean: 1572 / 9 (observation) = 174.67; Median: 125, 132, 135, 135, 140, 150, 155, 250, 350 = 140; Mode: 135

3. If you wanted to present a graphic comparing the proportion of households that have been sprayed with insecticides within the past 12 months across 15 high burden countries, which would you use?

   d. Bar Chart

   A bar chart is used for comparing data across different categories. In this case, you are comparing the difference in proportion of households that have sprayed insecticides across the 15 high burden countries.

4. Annual parasite incidence (API) which is defined as the total number of confirmed malaria cases during one year (X 1000) divided by the total population under surveillance, represents which common statistical measure?

   a. Rate

   Annual parasite incidence represents a rate, since a rate is ratio between two measurements. In this case, it is a ratio of the total number of confirmed malaria cases during one year (x 1000) divided by the total population under surveillance.

GLOSSARY

Term	Definition
Plasmodium falciparum	(*P. falciparum*) is a protozoan parasite, one of the species of *Plasmodium* that cause malaria in humans. It is transmitted by the female Anopheles mosquito. *P. falciparum* is the most dangerous of these infections as *P. falciparum* malaria has the highest rates of complications and mortality.
Plasmodium knowlesi	(*P. knowlesi*) is a simian malaria parasite that can transmit malaria infection to humans. It is transmitted by the female Anopheles mosquito and is commonly found in Southeast Asia. It can cause severe malaria.
Plasmodium malariae	(*P. malariae*) is a protozoan parasitic that causes malaria in humans. It is closely related to *Plasmodium falciparum* and *Plasmodium vivax*, which are responsible for most malarial infection. While found worldwide, it is a so-called "benign malaria" and is not nearly as dangerous as that produced by *P. falciparum* or *P. vivax*. *P. malariae* causes fevers that recur at approximately three-day intervals, longer than the two-day intervals of the other malarial parasites.
Plasmodium ovale	(*P. ovale*) is a species of parasitic protozoa that causes malaria in humans. It is closely related to *Plasmodium falciparum* and *Plasmodium vivax*, which are responsible for most malaria. It is rare compared to these two parasites, and substantially less dangerous than *P. falciparum*. It is found mostly in Africa, especially West Africa, and the islands of the western Pacific.
Plasmodium vivax	(*P. vivax*) is a protozoan parasite and a human pathogen. *P. vivax* is carried by the female Anopheles mosquito. The most frequent and widely distributed cause of recurring malaria, *P. vivax* is one of the four species of malarial parasite that commonly infect humans. It is less virulent than *Plasmodium falciparum*, which is the deadliest of the four, and is seldom fatal. It has dormant liver stages that can activate and invade the blood several months or years after the infecting mosquito bit. It is found mostly in Asia, Latin America, and in some parts of Africa.
Administrative records	These include a wide range of documents that relate to the administrative running of service delivery and can be from civil society organizations, government structures/institutions, and/or the private sector. They can include documents such as stock cards, inventory sheets, training records, pharmacy records, legal documents, national health strategies, budget documents, and regulations and guidelines that relate to the management, organization, and financing of the health sector.
Conceptual framework	Diagram that identifies and illustrates the relationships between all relevant systemic, organizational, individual, or other salient factors that may influence program/project operation and the successful achievement of program or project goals. Purposes: To show where program fits into wider context. To clarify assumptions about causal relationships. To show how program components will operate to influence outcomes. To guide identification of indicators. To guide impact analysis (causal pathways).
Conceptual model	A diagram that identifies and illustrates the relationships between all relevant systemic, organizational, individual, or other salient factors that may influence a program's operation and the successful achievement of the program's goals. It is the foundation of project design, management and monitoring. Conceptual models can also be referred to as conceptual frameworks.
Controlling malaria	Reducing the malaria disease burden to a level at which it is no longer a public health problem.
Data sources	The resources used to obtain the data needed for M&E activities. These sources may include, among many others, official government documents, clinic administrative records, staff or provider information, client-visit registers, interview data, sentinel-surveillance systems, and satellite imagery.
Demographic and Health Surveys (DHS)	Nationally-representative household surveys that provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition. For more information about Demographic and Health Surveys, please visit the DHS website.

Term	Definition
Elimination of malaria	The interruption of local mosquito-borne malaria transmission; reduction to zero of the incidence of infection caused by human malaria parasites in a defined geographical area as a result of deliberate efforts; continued measures to prevent re-establishment of transmission are required.
Endemic (disease)	A disease that is constantly present to a greater or lesser degree in people within a given geographic area.
Epidemic (disease)	The occurrence of more cases of a disease than would be expected in a community or region during a given time period.
Evaluation	A process that attempts to determine as systematically and objectively as possible the relevance, effectiveness, and impact of activities in light of their objectives. Evaluation refers to measuring how well program activities have met their expected objectives. It also aims to attribute program outcomes to their causes.
Facility surveys	Surveys of a representative sample of facilities. The aim of facility surveys is usually to assess the provision and quality of services provided within the health facility (e.g. basic infrastructure, drugs, quality of delivery of services). The content of facility surveys can vary, but they typically include facility inventory, health worker interviews, client exit interviews and client-provider observations. An example of a facility survey is the Service Provision Assessment (SPA) Survey.
Focus group discussion	A qualitative data collection method for obtaining in-depth information on concepts and perceptions about a certain topic through group discussion that is guided by a facilitator.
Framework	A tool for project planning, design, management, and performance assessment. Frameworks help to identify project elements (goals, objectives, outputs, and outcomes), their causal relationships, and the external factors that may influence success or failure of the project. A framework provides an overview of key project information that allows assessment of project logic as well as performance monitoring and evaluation.
Geographic Information System (GIS)	A system that captures, stores, analyzes, manages, and presents data that are linked to specifically to location.
Goal	A broad statement of a desired, long-term outcome of the program. Goals express general program intentions and help guide a program's development. Each goal has a set of related, more specific objectives that, if met, will collectively permit program staff to reach the stated goal.
Health and Demographic Surveillance Systems (HDSS)	A set of field and computing operations to handle the longitudinal follow-up of well defined entities or primary subjects (individuals, households, etc) and all related demographic and health outcomes within a clearly circumscribed geographic area.
Health facility surveys	Surveys of a representative sample of facilities. The aim of facility surveys is usually to assess the provision and quality of services provided within the health facility (e.g. basic infrastructure, drugs, quality of delivery of services). The content of facility surveys can vary, but they typically include facility inventory, health worker interviews, client exit interviews and client-provider observations. An example of a facility survey is the Service Provision Assessment (SPA) Survey.
Health Information System/Health Management Information System (HIS/HMIS)	A data system that collects and aggregates all health-related information and data at the multiple administrative levels within a country. The information collected varies by country, but typically includes population data, vital statistics, health service statistics, information on health outcomes, human resources, financing and expenditure for health services, and equipment, supplies, and infrastructure.
Household survey	A large-scale, nationally representative survey carried out at the household level. Common examples of household surveys are the Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS).
Impact	The anticipated end results or long-term effects of a program. For example, changes in health status such as reduced disease incidence or improved nutritional status.

Term	Definition
Impact Evaluation	A set of procedures and methodological approaches that show how much of the observed change in intermediate or final outcomes, or "impact," can be attributed to the program. It requires the application of evaluation designs to estimate the difference in the outcome of interest between having or not having the program.
Indicator	Quantitative or qualitative measures of program performance that are used to demonstrate change and that detail the extent to which program results are being or have been achieved. Indicators are variables that measure one aspect of a program, such as an input, process, output, outcome or the impact.
Indoor Residual Spraying (IRS)	A highly effective malaria control measure, that involves the spraying of indoor walls of houses with insecticides. The insecticides kill mosquitoes that land on the walls. The insecticides that are sprayed last typically 4 – 10 months, depending on the type of insecticide used and the specific type of structure of the house.
Inputs	The human and financial resources, physical equipment, clinical guidelines, and operational policies that are the core ingredients of programs and enable programs to be delivered.
Insecticide-Treated Nets (ITNs)	ITNs are bednets that have been treated with insecticides to provide protection by repelling mosquitoes and killing those that land on it. The net is hung over the sleeping area in order to prevent biting by mosquitoes. ITNs require re-treatment with insecticides approximately every six months in order to maintain their effectiveness.
Integrity	Refers to data that are free of "untruth," from willful or unconscious error due to intentional manipulation or through the use of technology.
Intermediate result (IR)	An important, measurable result that is an essential step to achieving a strategic objective (SO) in a results framework. IRs themselves may capture a number of other discrete or more specific results. IRs may also help to achieve other IRs.
Intermittent Preventive Treatment for Pregnant Women (IPTp)	A preventive control measure against malaria that entails administering a dose of an antimalarial drug, (currently sulfadoxine-pyrimethamine) at least twice during pregnancy to all pregnant women. IPTp is given during routine antenatal care visits, beginning in the second trimester and doses should be taken at least 1 month apart. It is provided regardless of whether or not the woman is infected with malaria.
Key Informant Interview (KII)	A key informant interview is a loosely structured conversation with someone who has specialized knowledge about a topic you wish to understand.
Logic model	A program design, management, and evaluation tool that describes the main elements of a program and how these elements work together to reach a particular goal. The basic elements in describing the implementation of a program and its effects are: inputs, activities or processes, outputs, outcomes, and impacts. A logic model graphically presents the logical progression and relationship of these elements. Logic models are also sometimes referred to as M&E frameworks or Logical Frameworks. Purposes: Provides a streamlined interpretation of planned use of resources and desired ends. Clarifies project/program assumptions about linear relationships between key factors relevant to desired ends. Also known as M&E Frameworks or Logical Frameworks
Logical framework	A dynamic planning and management tool that logically relates the main elements in program and project design and helps ensure that an intervention is likely to achieve measurable results. It helps to identify strategic elements (inputs, outputs, purposes, goal) of a program, their causal relationships, and the external factors that may influence success or failure. It can provide the basis for monitoring progress achieved and evaluating program results. Logical frameworks are sometimes referred to as logframe matrixes.
Long-Lasting Insecticidal Nets (LLINs)	LLINs are bednets that have been treated with insecticides to provide protection by repelling mosquitoes and killing those that land on it. The net is hung over the sleeping area in order to prevent biting by mosquitoes. LLINs are different from ITNs in that they have insecticide bound to the netting material during production, enabling them to extend their protection to approximately 3 years before requiring re-treatment.
Measurable	Indicators that are quantifiable using available tools and methods.

Term	Definition
Meteorological data	Data related to weather conditions, for example it includes information on air temperature, winds, humidity, precipitation, etc.
Metric	The precise calculation or formula that provides the value of an indicator.
Millennium Development Goals	The Millennium Development Goals (MDGs) are eight international development goals that were adopted by world leaders in 2000 during the Millennium Summit. The goals, which provide concrete, numerical benchmarks for talking extreme poverty in its multiple dimensions, were set to be achieved in 15 years, by the end of 2015. The eight goals include eradicating extreme poverty; achieving universal primary education; promoting gender equality and empowering women; reducing child mortality and improving maternal health; combating HIV/AIDS, malaria and other diseases; ensuring environmental sustainability; and developing a global partnership for development. The MDGs provide a framework for the international community to work together towards common goals. The MDGs break down into 21 quantifiable targets that are measured by 60 indicators. For more information, visit the United Nations Development Programme website.
Monitoring	The routine process of data collection and measurement of progress toward program objectives. It involves tracking what is being done and routinely looking at the types and levels of resources used; the activities conducted; the products and services generated by these activities, including the quality of services; and the outcomes of these services and products.
Monitoring and Evaluation (M&E) Plan	A comprehensive document that describes all M&E activities in an M&E system. It usually includes all of the following elements: 1) program objectives, interventions developed to achieve these objectives, and procedures to be implemented to determine whether or not the objectives are met; 2) expected results of the program and how they relate to goals and objectives; 3) data needed and how it will be collected and analyzed; 4) information used including data resources; 5) how the program will be accountable to stakeholders.
National census	A procedure for systematically acquiring and recording information about the members of a population at a national level.
Non-routine data source	Refers to data that is periodically collected, for example, collected on a monthly, annual or biannual basis.
Objective	A statement of a desired, specific, realistic and measurable program result. Objectives are results that contribute to the program's overall goal(s) and provide a general framework for more detailed planning of specific programs.
Operational research	The systematic and objective assessment of the availability, accessibility, quality, and/or sustainability of services designed to improve service delivery. It assesses factors that are under the control of program managers, such as improving the quality of services, increasing training and supervision of staff members, and adding new service components.
Outcomes	The changes measured at the population level in the program's target population, some or all of which may be the result of a given program or intervention. Outcomes refer to specific knowledge, behaviors, or practices on the part of the intended audience that are clearly related to the program, can reasonably be expected to change over the short-to-intermediate term, and that contribute to a program's desired long-term goals.
Outputs	The results of activities achieved at the program level, in two forms: the number of activities performed (e.g., number of service providers trained) and measures of service utilization (e.g., number of insecticide-treated nets distributed).
Population-based surveys	Large-scale national health surveys that are statistically representative of their target populations. A common population-based survey is the Demographic and Health Survey (DHS).
Precise	Indicators that are operationally defined in clear terms are precise.
Precision	The ability to minimize random error, or the ability to reproduce measurements consistently.

Term	Definition
Pre-elimination	Pre-elimination consists of the period of reorientation of malaria control programs between the sustained control and elimination stages, when coverage with good quality laboratory and clinical services, reporting and surveillance are reinforced, followed by other program adjustments to halt transmission nationwide.
President's Malaria Initiative	The President's Malaria Initiative (PMI) was launched in 2005, as a five-year commitment of $1.2 billion U.S. Government resources to reduce the burden of malaria and help relieve poverty on the African continent. The goal of PMI is to reduce malaria-related deaths by 50% in 15 focus countries that have a high burden of malaria, by expanding coverage of four highly effective malaria prevention and treatment measure to the most vulnerable populations. These four interventions include: insecticide-treated mosquito nets, indoor residual spraying with insecticides, intermittent preventive treatment for pregnant women and prompt use of artemisinin-based combination therapies for those that have been diagnosed with malaria. More information on the President's Malaria Initiative will be covered in Module 3. Additional information can be found on the President's Malaria Initiative website.
Problem statement	A statement in an M&E plan that describes the nature and extent of the problem to be addressed by an intervention. It clearly states the specific problem and includes a quantitative element that describes the magnitude of the problem and its impact on society. The statement should also include a description of other efforts that are addressing the problem and definitions of relevant terms.
Process Evaluation	A type of evaluation that focuses on program implementation. Process evaluations usually focus on a single program and use largely qualitative methods to describe program activities and perceptions, especially during the developmental stages and early implementation of the program. These assessments may also include some quantitative approaches, such as surveys about client satisfaction and perceptions about needs and services. In addition, a process evaluation might provide understanding about a program's cultural, socio-political, legal, and economic contexts that affect the program. Synonyms: formative evaluation, mid-term evaluation.
Processess	The multiple activities, both planning and implementation, carried out to achieve the program's objectives.
Program/Activity Monitoring System	A system that collects data related to the progression or implementation of a program's activities.
Programmatically important	Indicators that are linked to a public health impact or to achieving the objectives needed for impact.
Programmatically important	Indicators that are linked to a public health impact or to achieving the objectives needed for impact.
Prompt and effective treatment	Refers to providing effective anti-malarial treatment within the first 24 hours after the onset of malarial symptoms. The best available treatment, particularly for *Plasmodium falciparum* malaria is artemisinin-based combination therapy, commonly referred to as ACT.
Qualitative data	Data that is descriptive and deals with aspects that cannot be numerically measured. It can help you to understand why something is happening.
Quantitative data	Data that measures characteristics numerically and allows for possible statistical analysis.
Rapid assessment	A smaller-scale survey that uses a small, reliable sample, and is carried out over a short duration and typically examines only a small select set of variables.
Recall bias	A type of systematic bias that is due to the differences in subjects' ability to recall past events or experiences accurately or completely.
Reliable	Indicators that are consistently measurable in the same way by different observers are reliable.

Term	Definition
Results framework	A diagram that identifies steps or levels of results and illustrates the causal relationships linking all levels of a program's objectives. A results framework is usually depicted with the main goal at the top, each of the main objectives in their own boxes under the goal, and the results feeding into each objective from the bottom to the top. Results frameworks are also sometime referred to as strategic frameworks.
Roll Back Malaria Partnership (RBM)	The Roll Back Malaria (RBM) Partnership is the global framework to implement coordinated action against malaria. The partnership's main purpose is to mobilize for action and resources and forge consensus among partners. It is comprised of over 500 partners, including partners from malaria endemic countries, bilateral and multilateral development partners, the private sector, nongovernmental organizations, community-based organizations, foundations, and research and academic institutions. More information on the Roll Back Malaria Partnership will be covered in Module 3. Additional information can be found on the Roll Back Malaria website.
Routine data source	Refers to data that is continuously collected. It is often collected on a daily, weekly or monthly basis.
Sentinel surveillance	The ongoing, systematic collection, analysis and interpretation of health data undertaken in a limited number of health facilities.
Strategic objective (SO)	An outcome that is the most ambitious result that can be achieved and for which the organization is willing to be held accountable.
Surveillance system	Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. Updated Guidelines for Evaluating Public Health Surveillance Systems
Timely	Indicators that provide a measurement at time intervals relevant and appropriate in terms of program goals and activities are timely.
Valid	Indicators that are an accurate measure of a behavior, practice, or task, and measure what they are intended to measure are valid.
Vital Registration System	A national system for registering all births and deaths of citizens and residents of a country, including the cause of death. The vital registration system is an important component of a country's Health Information System (HIS).

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