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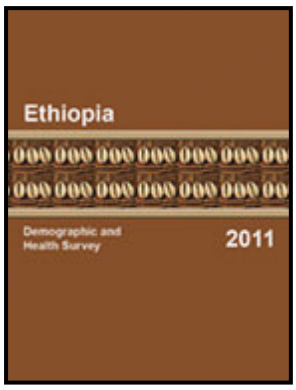
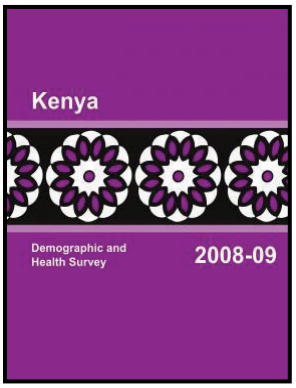
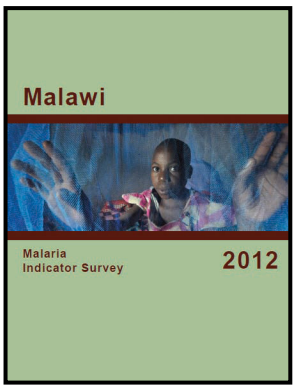
MODULE 7

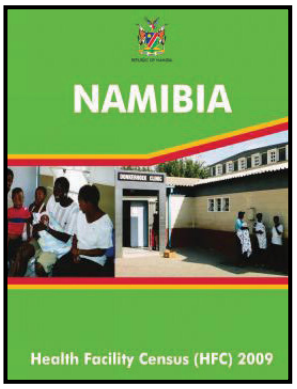
Understanding and Using the Demographic and Health Surveys

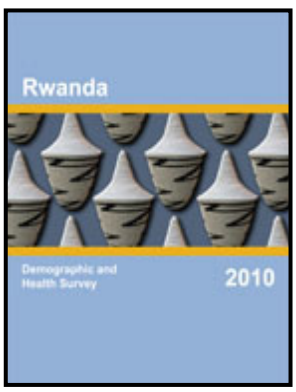
DHS Curriculum
Facilitator's Guide
August 2016

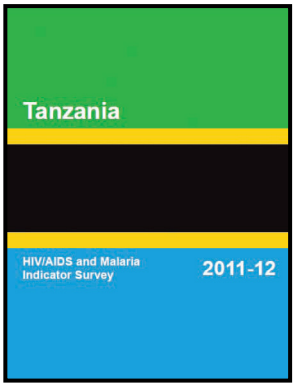


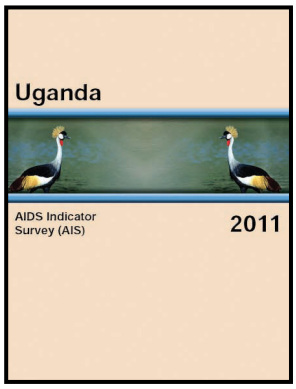


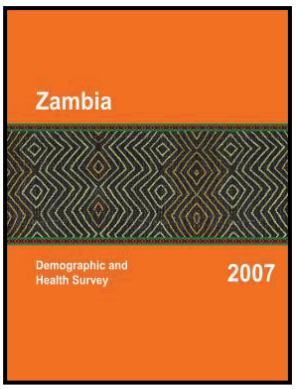












About the DHS Curriculum Facilitator's Guide

The following persons (in alphabetical order) have contributed to developing, reviewing, and editing *Understanding and Using the Demographic and Health Surveys – DHS Curriculum Facilitator's Guide*: Sarah Balian, Thada Bornstein, Sarah Bradley, Anne Cross, Joy Fishel, Lia Florey, Debbie Gachuhi, Hannah Guedenet, Kiersten Johnson, Shane Khan, Laurie Liskin, Erica Nybro, Cameron Taylor, Annē Linn and Sally Zweimueller

The DHS Curriculum Facilitator's Guide is a comprehensive package of ready-made training materials about understanding and using Demographic and Health Survey reports. The curriculum is designed for use in African universities and with public health program staff. Over 25 hours of instruction are divided into eight stand-alone modules designed to be a course on its own or customized and integrated into existing curricula. Each module is complete with instructor guides, Power Point slides, exercises, handouts, pre and post tests and answer keys. The DHS Curriculum Facilitator's Guide is available in both print and electronic versions.

Questions and comments regarding the DHS Curriculum can be sent to curriculum@dhsprogram.com

About The DHS Program

The DHS Program assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. Funded by the U.S. Agency for International Development (USAID) under the terms of Contract No. GPO-C-00-08-00008-00, The DHS Program is implemented by ICF Macro in Rockville, Maryland. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development.

The main objectives of The DHS Program are:

1) to provide decision makers in survey countries with information useful for informed policy choices
2) to expand the international population and health database
3) to advance survey methodology
4) to develop in participating countries the skills and resources necessary to conduct quality demographic and health surveys

Information about The DHS Program or the status of The DHS Program surveys is available on the Internet at http://www.dhsprogram.com or by contacting:

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Module 7: Collecting Data on Malaria in National Surveys

PREPARATION

Review Instructor Guide

Equipment, Materials, Supplies

- LCD projector and screen
- Flipchart or writing board
- Markers
- PowerPoint presentation
- Malaria Trivia Game PowerPoint Presentation

Handouts

Make copies for each student of:

- Handout 7.1- *Malaria Resources*
- Handout 7.2 - *Core Outcome and Impact Malaria Indicators*
- Activity 7.1 – *Malaria Trivia Game Instructions*

Room Arrangements

Participants should be seated at tables in groups of four to seven, if possible.

PURPOSE

This module explains indicators for malaria, how the DHS estimates malaria prevalence, and discusses DHS results on malaria from six countries in sub-Saharan Africa.

OBJECTIVES

By the end of this module, participants should be able to:

- Discuss malaria epidemiology in Sub-Saharan Africa
- Describe DHS surveys and how The DHS Program estimates malaria and anemia prevalence
- Discuss the type of data and indicators The DHS Program collects
- Discuss the latest DHS malaria indicators in six countries

TIME

3 hours (including optional exercise)

MODULE OVERVIEW

Session 1	Malaria Epidemiology in Sub-Saharan Africa	30 minutes
Session 2	The DHS Program Malaria-related Surveys & Methodology	30 minutes
Session 3	Key Malaria-related Data Collected by The DHS Program	1 hour
Session 4	Malaria Indicators: Results from Six Countries	30 minutes
Session 5 (optional)	Malaria Trivia Game	30 minutes

Session 1 30 Minutes	**Malaria Epidemiology in Sub-Saharan Africa**
Session Objective	Discuss malaria epidemiology in Sub-Saharan Africa.
STEP 1	PRESENT **Slides 1 and 2**. WELCOME participants, REVIEW the objectives for this module, and PROVIDE an overview of all four sessions. Point out the objectives for the first session. PRESENT **Slide 3**. To introduce this module and session, tell participants that we will review the problem of malaria in Sub-Saharan Africa. Participants will learn the causes of malaria along with the biological, environmental, and socio-economic factors affecting transmission. ASK participants the following questions and engage in 5-10 minute discussion while probing participants about their prior knowledge of malaria. This is just a group discussion; the answers will be explored throughout Session 1. 1. What causes malaria? 2. What are some factors that affect malaria transmission?
STEP 2	PRESENT **Slide 4**. EXPLAIN that malaria is a parasitic infection caused *Plasmodium* genus. There are five main species of malaria parasites, but the most common type and most dangerous form of malaria parasite in Sub-Saharan Africa is *Plasmodium falciparum* resulting in the highest rates of complication and mortality. *P. vivax* is a recurring strain of malaria, living in the liver for long periods of time and leading to relapses many years after initial infection. The parasite is transmitted through the bite of an infective female Anopheles mosquito during a blood meal from one person carrying the parasite to another. Malaria is transmitted among humans by female mosquitoes of the genus *Anopheles*. The primary malaria

vectors in Africa are *Anopheles gambiae & Anopheles funestus* which are strongly anthropophilic – meaning they prefer to feed on humans – and are two of the most efficient malaria vectors in the world. Species composition varies by region globally.

Malaria results from the multiplication of Plasmodium parasites within red blood cells when then burst, causing symptoms that typically include fever and headache.

DID YOU KNOW? Malaria comes from the Italian *mala-aria*, meaning "bad air." It was originally thought that there was a link between malaria and the poisonous vapors of swamps.

PRESENT **Slide 5.**

EXPLAIN that there are various biological, environmental and socio-economic factors affecting malaria transmission in Africa. Biological host factors such as age, sex, and genetic factors influence transmission. Children age 6 months to five years are at high risk in highly malaria endemic countries, during the vulnerable period when they have yet to develop partial immunity to malaria.

The other high-risk group is pregnant women whose immunity to malaria is compromised. There are two types of malaria in pregnancy – one impacting the placenta, the other the mother. The first and second pregnancies put the mother at high risk. Having malaria in pregnancy affects birth outcomes, which will be explained in further detail later in the module.

There are genetic advantages for people with the Hemoglobin S, or sickle cell trait, in reducing malaria morbidity. People with the sickle cell anemia trait rarely get malaria. Another genetic mutation, the glucose-6-phosphate dehydrogenase deficiency (G6PD), provides some protection against *P. vivax* infections.

PRESENT **Slide 6**.

EXPLAIN that environmental factors such as temperature, wind, rainfall, and altitude also affect malaria transmission. Temperature has effects on the development the parasite. In temperatures below 16C, parasites are unable to develop within mosquitoes. The ideal condition for parasite development is a mean temperature of 20-30C and a relative humidity of at least 60%. A high relative humidity lengthens the life of the mosquito. Relative humidity >60%

needed for survival of adult Anopheles.

Strong winds may prevent mosquito egg-laying. Also, the wind may extend the flight range of mosquitos; therefore, enabling them to infect more people.

Rainfall is major determinant of mosquito reproduction. Adequate rainfall and distribution create breeding grounds for mosquitos. Excessive rain has the potential to destroy breeding places and sweep away larvae.

Altitude makes some areas too difficult and cold for mosquitoes to breed or live. Typically, there is no malaria in altitudes more than 2,500 meters due to low temperatures and/or low rainfall. For elevation between 2,000 to 2,500 meters, with low temperatures or arid (dry) conditions, there is variation in risk to malaria. In these regions, populations do not have immunity as they are not constantly exposed to malaria parasites, so when conditions are favorable to support a boom in malarial vector populations and infection begins to circulate, epidemics are possible and the malaria morbidity is high. Lower elevations tend to have more constant risk of malaria, although there is often seasonal variation.

WHAT ABOUT CLIMATE CHANGE? Climate change could increase factors favorable for malaria transmission in some areas and reduce it in others. There is a concern in highland regions of Sub-Saharan African that there will be increasing epidemics due to global warming as regions that were previously unsuitable for transmission due to high elevation and low temperatures experience warming. The article linked below basically concludes that the relative importance of climate is declining due to the increase in malaria control efforts.

http://www.nature.com/nature/journal/v465/n7296/abs/nature09098.html

PRESENT **Slide 7**.

EXPLAIN that socio-economic conditions also impact malaria transmission. An underlining determinant of malaria transmission is poverty due to poor housing, malnutrition, and lack of access to interventions and proper treatment. Poor sanitation can create breeding grounds for mosquitoes if pit latrines are left uncovered. Houses/residents with ventilation, holes, and lacking screens, allow mosquitoes to enter households. A person's occupation puts them at risk for malaria transmission if they are working outside at night and/or sleeping outside. Education affects one's ability to understand the process of

transmission and ability to control malaria with the resources available. Wars and large-scale population movements may move people into malaria epidemic areas.

PRESENT **Slide 8**.

EXPLAIN that in Africa, an estimated 74% of the population lives in areas that are highly endemic and 19% lives in epidemic prone areas. In 2015, there were an estimated 214 million cases of malaria worldwide resulting in 438,000 deaths. Approximately 90% of all malaria deaths occur in Africa.

ASK participants to define the difference between endemic and epidemic.

DEFINE **endemic** disease is one that is always present in a population, meaning a high background rate of disease.

DEFINE **epidemic** as the occurrence of more cases of disease than would normally be expected in a specific place or group of people over a given period of time. (CDC.gov)

Areas in light blue (South Africa, Namibia, Addis Ababa, etc.) have no malaria because of altitude, temperature, lack of rainfall, or other environmental conditions that are not favorable to malaria transmission.

PRESENT **Slide 9**.

INTRODUCE Roll Back Malaria (RBM) and its goal to reduce malaria morbidity and mortality by reaching universal coverage and strengthening health systems through the Global Malaria Action Map. The partnership is comprised of more than 500 global partners, including malaria endemic countries, development partners, private sector, non-governmental and community-based organization, foundations, and research and academic institutions. Many of the resources in this Module were provided by RBM.

EXPLAIN that the President's Malaria Initiative (PMI) is a US government funded initiative targeted to reduce malaria-related deaths by one-third from 2015 levels in 19 African countries by 2020 by expanding coverage of insecticide treated nets (ITNs), indoor residual spraying (IRS), intermittent preventive treatment (IPTp), and prompt use of artemisinin-based combination therapies (ACT).

	REFER participants to **Handout 7.1 – Resources for Malaria Information, Prevention, Treatment and Research** for more information on malaria focused organizations.
STEP 3	End this session by ASKING participants if they have any questions about information on malaria and factors influencing transmission in Africa. ENCOURAGE participants to read through the malaria chapters in a DHS or MIS final report in their free time.

Session 2 30 minutes	**The DHS Program Malaria-related Surveys & Methodology**
Session Objective	Describe DHS surveys and how The DHS Program estimates malaria and anemia prevalence.
STEP 1	PRESENT **Slide 10.** INTRODUCE the DHS surveys that look at various malaria indicators: the Malaria Indicator Survey and the Demographic and Health Survey, which includes a malaria module. A third survey, the Service Provision Assessment, collects malaria information at the health facility level. We will review the different types of surveys and biomarker methodology in collecting anemia and parasitemia information.
STEP 2	PRESENT **Slide 11**. EXPLAIN that nationally representative, population-based sample surveys are measurement tools to collect necessary data for all 11 outcomes and 3 impact indicators. The surveys complement routine data collection for monitoring and evaluation by national governmental and national malaria control programs. Three large, population-based surveys collect data on malaria: Demographic and Health Survey (DHS), Malaria Indicator Survey (MIS), and Multiple Indicator Cluster Survey (MICS). The Service Provision Assessment (SPA) surveys formal sector health facilities within a country. SPA surveys measure malaria prevention interventions for antenatal care clients (specifically Intermittent Preventive Treatment) and malaria diagnostic capacity in facilities offering curative care for sick children. REVIEW the DHS with participants if they have not already completed previous MODULES. DHS data collection typically occurs during dry season due to logistics. EXPLAIN that the MIS was developed by RBM partners as a standard survey for assessing key household coverage indicators and morbidity indicators. Designed to be conducted similarly to DHS, the MIS provides nationally representative, population-based data. The MIS is timed to correspond with the malaria transmission season in order to get a better estimate of mosquito net use, childhood fever, and parasitemia, all of which have been found to vary by season. High malaria transmission season is usually just as the rainy season is ending. This complicates

data collection because the roads are in poor conditions.

STATE that the MICS is conducted by UNICEF to monitor maternal and child health. These surveys are conducted every 3 years and are comparable over time and across countries. MICS package includes optional module for malaria but does not include anemia or malaria prevalence.

NOTE much effort goes into harmonizing all three household surveys so that comparable indicators can be calculated.

A fourth survey, the SPA, is a survey of formal sector health facilities within a country and not households. The SPA assesses health facilities provision of quality malaria prevention and treatment services in a country. A SPA survey uses 4 types of questionnaires – facility inventory, health provider, observations of consultations for sick children and antenatal care clients (in addition to family planning and delivery service clients), and the client exit interview.

PRESENT **Slide 12**.

The DHS Program has conducted DHS and MIS surveys throughout Sub-Saharan Africa. DHS surveys with malaria modules have been conducted in 46 countries (37 in Sub-Saharan Africa). Many of these countries have also conducted MIS surveys. Since 2006, 16 countries have conducted or are conducting MIS surveys including: Angola, Burkina Faso, Burundi, Democratic Republic of Congo, Kenya, Liberia, Madagascar, Mali, Malawi, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania and Uganda.

This map is accurate for surveys which have been completed as of August 2016.

PRESENT **Slide 13.**

INTRODUCE the following 3 biomarkers related to malaria: **ANEMIA TESTING, RAPID DIAGNOSTIC TEST, and MICROSCOPY**

Biomarkers are objective physical or biologic measures of health conditions. For years, DHS surveys have gathered data on height and weight to evaluate nutritional status of women and children. Now, using field-friendly technologies, The DHS Program is able to collect biomarker data relating to a wide range of health conditions, including infectious

and sexually transmitted infections (STIs), chronic illnesses (such as diabetes, micronutrient deficiencies), and exposure to environmental toxins in addition to anemia and malaria.

For both anemia and malaria testing, informed consent is obtained from the parent or guardian. The statement explains the purposes of the tests, how the tests will be administered, and advises the parent or guardian that the results would be available as soon as the tests are completed. Finally, permission is requested for the tests to be carried out.

Children age 6-59 months that spent the night before the survey in the household are tested for malaria and anemia in DHS and MIS surveys.

PRESENT **Slide 14**.

EXPLAIN that to identify anemia, levels of hemoglobin in the blood are measured using the HemoCue HB, which reveals the levels of hemoglobin within minutes of when capillary blood is collected. Nurses or other medically trained providers share test results for children with their mothers. Levels of hemoglobin below 8.0 g/dL are indicative of severe anemia. Medical staff counsel mothers and refer children to closest health center for immediate medical assistance. Anemia prevalence results are adjusted for altitude.

In 1995, anemia testing became a standard component of the DHS survey protocol after the Kazakhstan DHS showed that respondents were comfortable with providing blood specimens for testing.

PRESENT **Slide 15**.

EXPLAIN that two types of malaria tests are used: a rapid diagnostic test (RDT) and a test that uses thick blood-smears on slides to be read by microscope. Microscopy has been the standard malaria diagnostic test for many years. Well trained, experienced microscopists have relatively high sensitivity for detecting parasites by reading thick blood smears. However, new RDTs are also very sensitive for detecting infection and are not subject to variability between technicians based on skill and experience. RDTs are easier to use and provide rapid results which are not possible by microscopy.

Since 2007 in Angola, The DHS Program incorporates

parasitemia testing into many surveys.

PRESENT **Slide 16**.

EXPLAIN that RDTs offer a useful alternative to microscopy in situations where reliable microscopic diagnosis is not available, as is often the case in the field.

RDTs sometimes called "dipsticks," detect specific **antigens** – *a toxin or other foreign substance that induces an immune response in the body, especially the production of antibodies* – produced by malaria parasites. These antigens are present in the blood of infected or recently treated people. The RDT, usually, signifies their presence by a color change on an absorbing strip. RDTs identify infection with a single drop of blood with results within 15 minutes. A skilled technician is not required to read the results, making it easy for field surveillance. With quick and easy diagnosis, field staff are able to provide full course of treatment for test positives. However, RDTs detect parasite antigens instead of actual parasites which means that an individual who has been treated and recently cleared of infection may still test positive. Thus measurements resulting from RDTs provide a two-week *period-prevalence*, which will almost always be higher than the malaria parasitemia prevalence measured by microscopy. There is a wide range of RDTs now available, many of which test for multiple species.

For children that test positive for malaria with RDT, a full course of treatment is offered. However, to avoid double dosing of malaria treatment, interviewers collect a two-week treatment history of each child before providing malaria treatment. This is verified by the interviewer asking to see the treatment. Children that recently received first-line malaria treatment but still test positive via RDT are not provided with the treatment. Instead, parents/guardians are informed that their child tested positive for malaria, and that if the child has a fever for 2 days after the last dose of the first-line medication, the child should be taken to the nearest health facility for further examination.

PRESENT **Slide 17**.

EXPLAIN the microscopy involves testing blood samples for malaria parasites. A blood smear is collected on a microscope slide for each child who is tested. A bar code

label is provided for each sample instead of the child's name. The blood smears are dried and packed carefully in the field and returned to a central laboratory for reading. Microscopy detects parasites present in the blood at the time of the survey and therefore provides a *point prevalence* of parasitemia.

SHOW participants that the first photograph shows the thick blood smear collected on slide for laboratory reading. The second photograph shows the thick blood smear collected on slide being read by the microscopist.

PRESENT **Slide 18**.

EXPLAIN that DHS and MIS surveys usually conduct both RDT and microscopy for malaria testing. RDT is easier to conduct in the field, but identifies a larger number of positive cases compared with microscopy readings. RDTs detect antigens and not parasites. Also, RDT allows identification of people with malaria in the field which allows for immediate provision of antimalarial medications.

Reading blood smears is very time consuming. Even experienced microscopists read only 7-11 slides per an hour. Microscopy reading requires trained microscopists who can sometimes be in short supply. Even skilled microscopists have to be trained in our protocol and recording system. Also, most countries don't have a lot of skilled microscopists so monopolizing all that countries have for the survey is an issue.

There are challenges involved in ensuring high quality results in the two testing types, particularly because they yield different results. Accurate measurement of population-level parasite prevalence using RDTs requires some knowledge of the distribution of various *Plasmodium* species. Prevalence of parasitemia should be based on the results of high quality **RDT** when the following conditions apply: P. falciparum account for nearly all infections (≥90%) and thus species determination is not necessary; and low level infections (<200 parasites/µL), are uncommon since sometimes these infections are not detected by RDT if the body is not producing antigens to fight them..

Prevalence should be based on **microscopy** with blood films prepared in the field and read in quality-controlled laboratories by well-trained microscopists in settings where there is evidence of the following: non-falciparum malaria

	or mixed infections account for more than 10% of infections; species determination is necessary (>10% of infections are non-falciparum or mixed); and parasite density is expected to be below 200 parasites/µL. PRESENT **Slide 19**. EXPLAIN that when the results of the RDT and microscopy tests are finalized, these data are merged with the data from the individual interviews. As mentioned earlier, bar codes are used to protect the confidentiality of respondents. When test results are merged with data from the individual interviews, all information that could potentially identify a respondent has been removed, so there is no way for a respondent to be linked with his/her malaria test results. This produces a dataset that links individual characteristics to malaria prevalence. In other words, this makes it possible to link malaria prevalence with household's education, residence, income, and other characteristics.
STEP 3	End this session by ASKING participants if they have any questions. TELL participants that they can read about biomarker collection in the DHS or MIS final reports in their free time.

Session 3 1 hour	**Key Malaria-Related Data Collected by The DHS Program**
Session Objective	Discuss the type of data and indicators The DHS Program collects
STEP 1	PRESENT **Slide 20**. TELL participants that this session will focus on the technical strategies for preventing malaria in children, pregnant women and the general population. Many participants will be familiar with this information, but it is pertinent to review vector control and case management to understand the malaria indicators. TELL participants that we will now look at some of the standard malaria indicators that are included in The DHS Program.
EXERCISE	DISTRIBUTE **Handout 7.2**, *Core Impact & Outcome Indicators of Malaria*. TELL participants to look at the table. REVIEW with participants what is an indicator [Module 3] and how indicators are determined. For most malaria indicators, they are presented as percentages or proportions with numerators and denominators. This handout defines each relevant indicator, describes both the numerator and denominator used to determine the proportion, and the purpose the indicator in malaria control. Indicators are divided into two categories: Core Outcome and Core Impact. TELL participants to use this handout throughout Session 3 as a guide and reference tool. Slide 21 will go through the Handout 7.2.
STEP 2:	PRESENT **Slide 21**. EXPLAIN that there are 11 core outcome indicators for household surveys; 7 indicators are used to measure vector control though ITNs or IRS. There are quite a number of indicators regarding ITNs. This helps assess coverage of special populations and the population as a whole. It makes it easier to assess who is using nets and whether households have enough nets. Prompt access to effective antimalarial treatment is measured by three indicators which reflect diagnosis (finger or heel stick is used as a proxy measure),

treatment seeking from appropriate providers, and the proportion of antimalarials taken which were ACTs (first line drugs).

Prevention and control of malaria in pregnant women is measured by two indicators. The first is the percentage of pregnant women who slept under an ITN the previous night and the second is the percentage of pregnant women who received intermittent preventive treatment (IPTp) during their last pregnancy.

REFER all participants to **Handout 7.2 Core Outcome and Impact Malaria Indicators for Household Surveys**. Explain each indicator as described below.

EXPLAIN that the first indicator, proportion of households with at least one ITN **[Core Outcome Indicator #1 on Handout 7.2],** measures household ITN possession among the population. Households are asked if there is any mosquito net in the house that can be used while sleeping. Surveyor determines the type of mosquito net through observation and a series of questions.

EXPLAIN that the second indicator, proportion of households with at least one ITN for every two people **[Core Outcome Indicator #2 on Handout 7.2],** is used to determine what proportion of households has a sufficient number of ITNs to cover all individuals to achieve universal coverage with the assumption that each net can effectively protect two individuals. Many National Malaria Control Programs now focus on universal coverage and provide one ITN for every two persons within a household.

EXPLAIN to participants that the third indicator, proportion of population with access to an ITN within their household **[Core Outcome Indicator #3 on Handout 7.2],** estimates the proportion of the population that could potentially be covered by existing ITNs, assuming that each ITN in a household can be used by two people within that household, otherwise known as access to an ITN. This indicator is a population-level indicator in contrast to the previous indicator which is measured at the household level.

EXPLAIN that the fourth indicator, proportion of population which slept under an ITN the previous night **[Core Outcome Indicator #4 on Handout 7.2],** helps measure usage of ITNs. TELL participants that this indicator may be biased by the seasonality of survey data collection, which is most often done during the dry season when net use is likely at its lowest, except for MIS surveys which are done towards the end of rainy season.

TELL participants that the fifth indicator, proportion of children under 5 who slept under an ITN the previous

night **[Core Outcome Indicator #5 on Handout 7.2],** measures the level of ITN coverage of children under 5 at the time of the survey. EXPLAIN that this indicator may also be biased by the seasonality of survey data collection, which is most often done during the dry season when net use is likely at its lowest, except for MIS surveys which are done towards the end of rainy season.

TELL participants that the sixth indicator proportion of pregnant women age 15-49 who slept under an ITN the previous night **[Core Outcome Indicator #6 on Handout 7.2],** shows vector control for pregnant women. This indicator is used to measure the level of ITN use by pregnant women at the national level. This indicator may be biased by the seasonality of survey data collection, which is most often done with the dry season when net use is likely to be lowest, except for MIS surveys which are done towards the end of rainy season.

EXPLAIN that the seventh indicator, proportion of households with at least one ITN and/or sprayed by IRS in the last 12 months **[Core Outcome Indicator #7 on Handout 7.2],** uses two main vector control activities to asses overall national coverage. It shows the proportion of households covered by either an ITN or IRS.

TELL participants the eighth indicator, proportion of women age 15-49 who received IPTp during antenatal care visits during last pregnancy **[Core Outcome Indicator #8 on Handout 7.2],** looks at the proportion of women with a live birth in the past two years who received three or more doses of SP/Fansidar during her most recent pregnancy. EXPLAIN that this indicator does not provide information about which stage of pregnancy the IPTp was given. This is also subject to recall bias for a woman may not remember what type of antimalarial was given or how many doses she received.

TELL participants that the ninth indicator, proportion of children under 5 with fever in the last 2 weeks who had a finger or heel stick **[Core Outcome Indicator #9 on Handout 7.2],** looks at case management of malaria in children under 5. The indicator provides a proxy measure for the level of coverage of children under 5 with fever to diagnostic testing for malaria infections. As countries scale up towards universal diagnostic testing, the indicator values reported are expected to increase over time. Diagnostic testing allow a more rational use of antimalarials.

EXPLAIN to participants that the tenth indicator, proportion of children under 5 with fever in last 2 weeks for whom advice or treatment was sought **[Core Outcome Indicator #10 on Handout 7.2],** captures a proxy measure for access to appropriate providers for

effective malaria treatment. Sources of advice or treatment include public and private facilities and health care providers, pharmacies, shops and markets but not traditional healers or other sources.

The DHS Child Health module includes tables with the prevalence and of treatment of fever for children under 5. The tables show among children under 5 with fever, the percentage for whom advice or treatment was sought from a health facility or provider, percentage who took antimalarial drugs, and the percentage who took antibiotic drugs.

EXPLAIN that the final indicator, proportion receiving first-line treatment according to National Policy among children under 5 with fever in the last two weeks who received any antimalarial drugs **[Core Outcome Indicator #11 on Handout 7.2],** measures the extent to which first line treatments are used to treat malaria as a proportion of all antimalarial treatments.

PRESENT **Slide 22**.

EXPLAIN to participants that insecticide-treated nets (ITNs) have been shown to reduce all-cause child mortality and prevent malaria where infection is commonplace. Many National Malaria Control Programs promote the distribution of ITNs to the population as a means of vector control. DEFINE an ITN as meeting one of two conditions: 1) a factory treated net that does not require any treatment; or 2) or a net that has been soaked with insecticide within the past 12 months.

PRESENT **Slide 23**.

DEFINE long-lasting insecticidal nets (LLINs) as a factory treated net that does not require any treatment. It is designed to maintain efficacy against mosquito vectors for a least 3 years. The WHO has recommended since 2007 that all malaria control programs procure only LLINs. Now, surveys define LLINs and conventionally treated nets in the category of ITNs because ITNs are still readily available in many countries. As most ITNs procured by countries for distribution are LLINs estimates of ITN coverage and of LLIN coverage are almost always similar.

PRESENT **Slide 24.**

EXPLAIN to participants that IRS refers to the spraying of the internal walls of the dwelling to interrupt the

transmission of malaria by killing female adult mosquitoes. Only female mosquitoes feed on blood, which is required for egg maturation. Normally, mosquitoes rest on the walls after they feed, and killing them with insecticides prevents their offspring from infecting other people. Experience in many African countries has demonstrated the efficiency of this method. IRS can be expensive, so IRS is usually done in a selective and limited way, targeting those at highest risk of malaria.

To obtain information on the extent of the use of IRS, questions in MIS & DHS ask households if specialized technicians sprayed the dwellings against mosquitoes in the period 12 months preceding the survey.

PRESENT **Slide 25**.

EXPLAIN that malaria infection during pregnancy is a major public health concern in malaria endemic areas. Malaria during pregnancy can result in poor health outcomes for the woman and her newborn such as maternal anemia, low birth weight and premature delivery.

TELL participants that along with ITN usage during pregnancy, pregnant women are recommended to take antimalarial drugs as intermittent preventive treatment (IPTp). The treatment consists of multiple doses of sulfadoxine-pyrimethamine (SP) taken during antenatal care (ANC) visits. WHO recommendations specify that a dose should be given at each ANC visit beginning at quickening, with each dose at least one month apart. This dosage will reduce anemia and placental malaria infections at time of delivery.

EXPLAIN to participants that not all malaria endemic countries have IPTp programs. Some have even discontinued IPTp programs for various reasons including low malaria prevalence and increased evidence of SP drug resistance.

REMIND participants that ANC coverage can be found in DHS surveys in the Maternal Health Chapter or module of the survey.

PRESENT **Slide 26**.

EXPLAIN that since 2010 the WHO recommends that all patients suspected of malaria receive parasitological confirmation from microscopy or rapid diagnostic testing (RDT) before treatment is started. Treatment based on clinical diagnosis or presentation of symptoms (presumptive treatment) should only be considered when malaria testing is not available. We already discussed the differences between microscopy and RDT in Session 2.

TELL participants that fever is a major manifestation of malaria in children under 5. Prior to 2010, WHO recommended that all children under five with fever be treated presumptively with antimalarial medicines based on a clinical diagnosis. MIS and DHS surveys have used this as an indicator for malaria treatment. It is difficult, however, to determine if the fever is malarious or not.

PRESENT **Slide 27**.

INTRODUCE the three core impact indicators, refer to **Handout 7.2**. At a minimum, it is recommended that all countries with high-intensity malaria transmission regularly monitor all-cause under 5 mortality based on data from statistically-sound national-level household surveys, such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS).

Alongside data on mortality, it is recommended that countries also collect data on anemia and parasitemia to assess malaria morbidity among children under the age of five. Parasitemia prevalence is a useful morbidity indicator, as it is malaria-specific and can provide a rough measure of transmission. Additionally, anemia prevalence is a reliable indicator of malaria morbidity that can reflect the impact of malaria interventions in high transmission settings.

You will notice that there is no indicator for malaria-specific mortality.

TELL participants that the first indicator **[Core Impact Indicator #1 on Handout 7.2]** is a mortality indicator looking at all-cause under 5 mortality. EXPLAIN that MIS do not have a large enough sample size to measure mortality reliably. Because of this, estimates of child mortality rates are best obtained through DHS or MICS surveys. Also, the standard MIS survey does not included full birth histories. It is not recommended to estimate under 5 mortality using data from truncated birth histories.

EXPLAIN that the second Indicator **[Core Impact**

Indicator #2 on Handout 7.2] is an indicator of malaria prevalence detected by Rapid Diagnostic Testing (RDT) or microscopy, which will be explained in the next session. The prevalence of parasitemia among children age 6-59 months is a useful indicator of malaria burden. However, rates of malaria prevalence can be difficult to interpret and can fluctuate dramatically throughout the course of a year as mosquitos are influenced by seasonal variations in rainfall and temperature. TELL participants that parasitemia testing is conducted during high transmission season for malaria. The MIS is ideally conducted at end of rainy season and 4-6 weeks after rains end, which is peak transmission timeframe.

EXPLAIN that Indicator 3 **[Core Impact Indicator #3 on Handout 7.2]** describes anemia prevalence and is defined by a hemoglobin (Hb) concentration below established cut-off level of 8g/dL. It is useful to follow trends in anemia prevalence because it is a reliable indicator of malaria morbidity that can reflect the impact of malaria interventions. Anemia is tested with the HemoCue technology and requires a fingerprick for blood. TELL participants that this indicator is also subject to seasonal variation in malaria-related anemia. EXPLAIN that anemia has many other causes apart from malaria so it is not a specific measure of malaria burden.

PRESENT **Slide 28**.

EXPLAIN that the first time the DHS included malarial parasitemia testing was in 2006-07 in Angola. Since that time, the DHS has conducted malarial parasitemia testing in 22 countries, including Angola, Benin, Burkina Faso, Burundi, Cameroon (not pictured), Cote d'Ivoire, DRC, Gambia, Ghana (not pictured because data not yet available), Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Tanzania, Togo, and Uganda.

Cameroon, not pictured on this map, reports malaria prevalence by RDTs because microscopy tests were not done. In Cameroon, 30% of children age 6-59 months tested positive for malaria by RDT.

It is important to note that not all these data were collected during the high malaria transmission season.

DHS has done a second round of malarial parasitemia testing in many countries: Angola, Burkina Faso, Liberia, Madagascar, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania, and Uganda.

Malaria prevalence is lowest and under 10% in The Gambia

(0.8%), Senegal (1.2%), Rwanda (2.2%), Tanzania (4.1%), Kenya (5%), and Madagascar (9.1%). Malaria prevalence is highest in Mali at 51.6% and Burkina Faso at 45.7%.

This map is accurate as of July, 2016 from The DHS Program's STATcompiler.

PRESENT **Slide 29**.

EXPLAIN that anemia testing in children was done in 34 countries including Angola, Benin, Burkina Faso, Burundi, Cameroon, Congo (Brazzaville), Cote d'Ivoire, DRC, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Sierra Leone, Swaziland, Tanzania, Togo, Uganda, and Zimbabwe.

TELL participants that there are other causes of anemia other than malaria that might also be regionally specific such as nutritional deficiencies.

Anemia was lowest and under 5% in the following 10 countries: Kenya (2.2%), Rwanda (2.3%), Sao Tome & Principe (2.6%), Namibia (2.6%), Swaziland (2.9%), Burundi (2.9%), Angola (3.0%), Zimbabwe (3.7%), Madagascar (3.8%), Congo Brazzaville (4.4%), and Uganda (4.7%). Anemia prevalence is highest in Burkina Faso at 25.9% and Mali at 20.6% in children age 6-59 months.

ASK participants if they observe geographical differences in anemia prevalence.

This map is accurate as of July, 2016 from The DHS Program's STATcompiler.

PRESENT **Slide 30**.

EXPLAIN that the SPA survey is a nationally representative sample of health facilities within a country. The SPA is designed to collect information from health facilities on the delivery of health care services and to examine the preparedness of facilities to provide quality health services in child health, family planning, maternal and newborn care, HIV, and malaria, among other topics.

There are several malaria-related service readiness indicators in addition to quality of care indicators. This course highlights a selection of the malaria-related indicators in the SPA.

EXPLAIN that indicators 1 through 3 are collected from the SPA facility inventory questionnaire. The 3 indicators

evaluate malaria prevention and treatment services for ANC facilities. The first indicator, **IPTp guidelines available at facilities offering ANC services on the day of the survey,** is a service readiness indicator to determine if health facilities have IPTp guidelines visibly available on the day of the survey.

The second indicator, **staff member recently trained on intermittent preventive treatment of malaria in pregnancy,** indicates whether health facilities have an ANC provider trained on IPTp during the 24 months before the survey. The training must have involved structured sessions; it does not include individual instruction that a provider might have received during routine supervision.

The third indicator, **SP/Fansidar available at the facilities offering ANC services on the day of the survey**, is a service readiness indicator to determine if health facilities have the medication available to provide IPTp to pregnant women.

TELL participants that the SPA survey interviewers observe provider-client consultations among antenatal care clients. The fourth indicator, **IPTp interventions for antenatal care clients,** assesses the quality of care among antenatal care clients. The consultations should include discussions on use of IPTp during pregnancy. This indicators determines whether providers are giving or prescribing SP/Fansidar to antenatal care clients. For example, the 2013-14 Malawi SPA shows that in more than 60% of observed consultations, the provider gave or prescribed SP/Fansidar to the antenatal care client.

EXPLAIN that the fifth indicator, **Malaria diagnostic capacity in facilities offering curative care for sick children,** is from the SPA facility inventory questionnaire. The SPA assesses the service readiness of facilities capable of diagnosing malaria. Facilities are determined to have the capacity to diagnose malaria by having all of the following: 1) unexpired malaria RDT kits or a functioning microscope with relevant stains and glass slides; 2) staff member recently trained in RDT or microscopy; and 3) malaria RDT protocol available in the facility. For example, only 35% of Malawian health facilities offering curative care for sick children have the capacity to diagnose malaria.

STEP 3

End this session by ASKING participants if they have any questions about malaria indicators, vector control methods, case management activities, and prevalence of anemia and malaria in DHS and MIS surveys.

Session 4 30 minutes	**Malaria Indicators: Results from Six Countries**
Session Objectives	• Discuss the latest DHS malaria indicators in six countries: Angola, Kenya, Malawi, Rwanda, Senegal, and Tanzania
STEP 1	(NOTE to instructor: As you present **Slides 33–44,** which compare results on malaria indicators in six African countries, ASK participants for their thoughts on what each slide shows before you share the notes.) PRESENT **Slide 31**. TELL participants that as we go through these slides on malaria indicators, they should look for common patterns and consider the implications of these patterns for prevention and treatment interventions. PRESENT **Slide 32**. EXPLAIN to participants that interpreting results and trends of malaria surveys has several considerations. FIRST, the timing of the survey implementation relative to the malaria transmission seasons (rainy and early-post-rainy seasons) affects interpretation of the survey findings. MIS surveys are generally conducted during and immediately after the rainy season, and should end no later than four to six weeks after the rains end, as this timeframe is associated with peak transmission. However, the timing of both DHS and MICS surveys are dependent on many factors frequently causing the surveys to not be aligned with peak malaria transmission season. For operational reasons both DHS and MICS surveys are usually conducted during the dry season and therefore outside of the peak malaria transmission period. Thus, malaria indicators from a DHS or a MICS and an MIS may not be strictly comparable. A second consideration is parasitemia results will differ across countries depending upon the type of parasitemia testing conducted. DHS surveys generally conduct both RDT and microscopy to measure malaria parasitemia. However, sometimes countries choose to rely solely on RDTs (Cameroon). As discussed in Session 2, microscopy and RDT tests may produce different estimates of malaria parasitemia prevalence as the metrics are different. Also, the specific RDT type used may change in a country

between surveys and could possibly vary among countries. DHS and MIS surveys typically report only *Plasmodium falciparum* prevalence.

Thirdly, National Malaria Control programs differ across countries. Some well-funded programs have extensive malaria control intervention activities such as ITN/LLIN distribution, IRS, and IPTp. Others may not have malaria control programming due to financial constraints.

PRESENT **Slide 33**.

EXPLAIN that DHS and MIS surveys ask if households own any mosquito nets and, if so, how many and what type. Interviewers are instructed to look at the nets whenever possible.

REFER participants to **Handout 7.2, Indicator 1** to see indicator description, numerator, denominator and purpose.

Net ownership is highest in Rwanda, with 81% of households owning at least 1 ITN. In contrast, net ownership is lowest in Angola with 35% of households owning at least 1 ITN. According to the National Malaria Control Programme in Angola, the promotion of the use of mosquito nets started in 1999 with priority given to the distribution and promotion of the use of ITNs by children under age 5 and pregnant women. In 2010, the strategy was modified to cover the entire population, with distribution of at least 1 ITN per every two citizens. This trend in distribution policy from targeting young children and pregnant women to promoting universal coverage is widespread across many African Malaria Control programs.

ASK participants to explain what factors influence cross-country comparisons of ITN ownership? What socio-economic factors are likely to affect ITN ownership?

PRESENT **Slide 34**.

Let's take another look at ownership of ITNs in Tanzania. The slide shows results from five surveys in Tanzania. ITN ownership dramatically increased four-fold from 23% in 2004-05 to 91% in 2011-12 and then decreased in 2015-6 to 66%.

ASK participants to explain what factors influence these trends in ITN ownership?

There was a universal coverage campaign in 2010-11,

followed by a "keep up"" strategy through school net distribution in the Southern zone and a voucher scheme, along with continuous distribution at ANC on Zanzibar. A second universal coverage campaign was scheduled for mid-2015-April 2016 and may not have been captured in the survey (conducted August 2015-February 2016).

PRESENT **Slide 35**.

DEFINE universal coverage as the percentage of households with at least one net for every two people who stayed in the household the night before the survey. 43% of households in Rwanda had one ITN for every 2 people. Less than 10% of Angolan households had one ITN for every two people within a household.

ASK participants what are some factors to consider when interpreting this graph.

REFER participants to **Handout 7.2, Indicator 2** to see indicator description, numerator, denominator and purpose.

PRESENT **Slide 36**.

EXPLAIN that the access indicator estimates the proportion of the population that could potentially be covered by existing ITNs given the number of ITNs owned by the household. This indicator moves from looking at *household* ownership of ITNs to the *individuals* living in these households who have access to the ITNs. This allows us to compare ownership to utilization using the same denominator. For a comprehensive breakdown of the access indicator, please see the following video: https://www.youtube.com/watch?v=YfTXcc13GOI

REFER participants to **Handout 7.2, Indicator3** to see the description, numerator, denominator and purpose for the ITN access indicator.

Rwanda has the highest access to nets, with 64% of the population having access to an ITN. In Angola, 19% of the household population could potentially be covered by an ITN given the number of ITNs owned by households.

ASK participants to explain back the difference between ITN ownership and access to ITNs.

PRESENT **Slide 37**.

EXPLAIN that net ownership does not always translate into net usage. REFER participants to **Handout 7.2, Indicator 4** to see the description, numerator, denominator and purpose for the household population utilization indicator.

Tanzania has the highest percentage of net usage with 68% of de facto population sleeping under an ITN the night before the survey. Of households that own at least one ITN, 73% of the de facto population in Tanzania slept under an ITN the night before the survey. Comparatively, Angola has the lowest utilization of ITNs. In Angola, 19% of de facto population slept under an ITN the night before the survey and half (52%) of households that own at least one ITN slept under an ITN the night before the survey.

Explain the difference in net usage between those that slept under an ITN last night and those that own at least 1 ITN and slept under an ITN last night? What comparisons can be made across the countries, if any?

PRESENT **Slide 38**.

EXPLAIN that small children are more vulnerable to malaria morbidity and mortality than adults or older children in endemic settings. Strategies to prevent the transmission of malaria in children can produce tangible results in the reduction of morbidity and mortality caused by malaria. Additionally, to prevent complications from malaria during pregnancy, such as anemia, low birth weight, and trans-placental parasitemia, all pregnant women are encouraged to sleep under ITNs. The risk of contracting malaria among pregnant women is two or three times higher than risk for non-pregnant women (Steketee, 2001), depending on parity or whether or not it is the woman's first or second birth. During pregnancy, malaria can change from an asymptomatic infection to a state that puts women at risk of death.

Given the severity that malaria displays during pregnancy, many National Malaria Control Programs have adopted the WHO strategies that aim to prevent malaria during pregnancy. Along with ITN distribution, IPTp, case management and health education programs aim to educate the population on the prevention and treatment of malaria in pregnancy.

REFER participants to **Handout 7.2, Indicators 5 and 6** to see indicator descriptions, numerators, denominators and purpose.

Tanzania has the highest percentage of children and

pregnant women sleeping under an ITN at 72% and 75%, respectively. Angola has the lowest percentages of net usage among children under 5 and pregnant women, both at 26%.

PRESENT **Slide 39**.

EXPLAIN that IRS is not common due to the expense for National Malaria Control Programs. EXPLAIN that when the survey sample design permits, IRS results should be presented separately for the targeted areas.

Indoor spraying was used in 14% of households in Tanzania compared to only 1% of Kenyan households in the 12 months preceding the survey.

ASK participants what are some factors to consider when interpreting this graph.

PRESENT **Slide 40**.

EXPLAIN that intermittent preventive treatment (IPTp) with sulfasoxine-pyrimethamine (SP) can prevent the harmful consequences of malaria for women infected during pregnancy. The WHO recommends that pregnant women in regions with high prevalence of malaria be given IPTp with SP/Fansidar at each ANC visit after quickening (approximately after the first trimester), with at least one month in between each dose to prevent malaria.

TELL participants that the DHS survey asks women who gave birth in the two years preceding the survey if they took any SP during their pregnancies to keep them from getting malaria. They are also asked whether they received the drugs as part of an antenatal care (ANC) visit, from a Community Health Worker (CHW) or from another source. REFER participants to **Handout 7.2, Indicator 8** to see indicator description, numerator, denominator and purpose.

In Malawi, 89% of women received any SP/Fansidar during ANC visits, nearly two-thirds (63%) received the 2 or more doses of SP/Fansidar during an ANC visit, but only 12% received 3 or more during an ANC visit. In Angola, 28% received any SP/Fansidar during ANC, only 18% received 2 or more doses during ANC, and only 8% received 3 or more doses.

ASK participants possible reasons for the dramatic gap in coverage with at least one, at least two and at least three doses of SP/Fansidar during pregnancy? What effect does

National Malaria Control programming and efforts have on IPTp?

PRESENT **Slide 41**.

TELL participants that this graph demonstrates the indicator children under five with fever in the last two weeks for whom advice or treatment was sought. Advice or treatment seeking was highest in Kenya but less than 60% in Angola, Rwanda, and Senegal.

REFER participants to **Handout 7.2, Indicator 10** to see indicator description, numerator, denominator and purpose.

PRESENT **Slide 42**.

OBSERVE the surveys with the indicator of proportion of children under 5 with fever in last 2 weeks who had a finger or heel stick. Thirty-nine percent of children under five in Kenya had a finger or heel stick compared to only 7% of children under 5 in Senegal.

REFER participants to **Handout 7.2, Indicator 9** to see indicator description, numerator, denominator and purpose. This indicator is expected to increase over time with the increase in malaria diagnostics and testing.

PRESENT **Slide 43**.

OBSERVE the denominator of this indicator. It is not the same as the previous two slides regarding the management of sick children with fever. This indicator does NOT measure the percent of all children with fever who received appropriate treatment, but rather the percent of all children that received treatment who received the RECOMMENDED first line treatment (ACT). For example, in Kenya 25% of children with fever took ACT, but 92% of children with fever who took an antimalarial took any ACT.

REFER participants to **Handout 7.2, Indicator 11** to see indicator description, numerator, denominator and purpose.

ASK participants to explain the variation in this indicator among countries.

PRESENT **Slide 44**.

EXPLAIN that this figure shows differences in malaria prevalence by urban-rural residence. DHS has found that malaria prevalence is commonly higher in rural areas than in urban areas. The disparity in residence is highest in Malawi, Angola, and Tanzania.

ASK participants why prevalence is generally higher in rural areas than in urban areas?

PRESENT **Slide 45**.

EXPLAIN that this figure shows that wealth is linked to malaria in all of the countries presented here. As household wealth increases, malaria prevalence generally decreases.

ASK participants to explain this slide. Why is malaria prevalence higher in children in the poorest households compared to children in the wealthiest households?

STEP 2

ASK participants if there was any information that was new to them or that they found surprising. PROMOTE discussion of country comparisons.

Session 5 **(Optional)** 30 Minutes	**Malaria Trivia Game**
Session Objective	Review information learned in Module 7 with team trivia game.
STEP 1	REVIEW **Activity 7.1 Instructions to the Malaria Trivia Game** and **Activity 7.1 Malaria Trivia Game** before you begin this session. It is suggested that the facilitators open the PowerPoint Presentation, look at it, and then read the instructions.)
STEP 2	INTRODUCE the *Malaria Trivia Game.* This is an optional Session 5, but is an interactive and fun way for participants to review the material covered in Module 7. TELL participants that it is now time to review information learned in Module 7 with a team trivia game.

Module 7

Collecting Data on Malaria in National Surveys

Objectives for Module 7

By the end of this module, participants should be able to:

- Discuss malaria epidemiology in Sub-Saharan Africa
- Describe DHS surveys and how The DHS Program estimates malaria and anemia prevalence
- Discuss the type of data and indicators The DHS Program collects
- Discuss the latest DHS malaria indicators in six countries

Module 7
Session 1

Malaria Epidemiology in Sub-Saharan Africa

What causes malaria?

- Malaria is a vector-borne parasitic disease, caused by parasite genus ***Plasmodium* (Plasmodia).**
- 5 main species of malaria parasites that infect humans:
  - *Plasmodium falciparum (Most common in Sub-Saharan Africa)*
  - *Plasmodium malariae*
  - *Plasmodium ovale*
  - *Plasmodium vivax*
  - *Plasmodium knowlesi*
- Parasite is transmitted through the bite of infective *Anopheles* female mosquito during blood meal from one person carrying the parasite to another.
  - *Anopheles gambiae & Anopheles funestus*
- The parasites multiply within human red blood cells which then rupture, causing symptoms such as fever and headache.

Biological Host Factors Affecting Malaria Transmission

- **Age:**
  - Children age 6 months to 5 years in highly malaria endemic countries at high risk
  - All age groups are susceptible to malaria in epidemic prone areas
- **Sex:**
  - Pregnant women have higher degree of susceptibility to malaria
- **Genetic Factor:**
  - Presence of Hemoglobin S (HbS) – the sickle cell trait – reduces severity of *P. falciparum* infections
  - G6PD provides some protection against malaria.

Information provided by Roll Back Malaria

Environmental Factors Affecting Malaria Transmission

- **Temperature:**
  - Effects life cycle of parasite & mosquito development
  - Best conditions: 20-30C and humidity of at least 60%
- **Strong winds:**
  - May prevent egg-laying
  - May extend flight range to infect more people
- **Rainfall:**
  - Adequate rains create breeding places for mosquito
  - Excessive rains destroy breeding places & sweep away larvae
- **Altitude**

Information provided by Roll Back Malaria

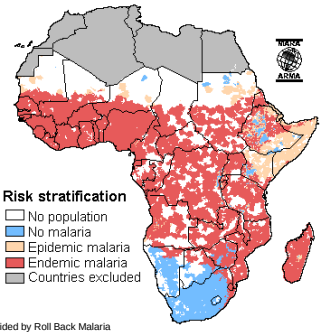
Social & Economic Factors Affecting Malaria Transmission

- **Poverty**
- **Poor Sanitation**
- **Housing Characteristics**
- **Occupation**
- **Education**
- **Wars & Large-scale Population Movements**

Information provided by Roll Back Malaria

Module 7, Slide 7

Malaria Risk in Africa



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Module 7, Slide 8

Stakeholders in International Malaria Programs

- **Roll Back Malaria (RBM)**

  RBM is a global framework to implement coordinated action against malaria. The overall strategy aims to reduce malaria morbidity and mortality by reaching universal coverage and strengthening health systems through the Global Malaria Action Plan (GMAP).
- **President's Malaria Initiative (PMI)**

  Started in 2005 as a US Government funded program, PMI's goal is to reduce malaria-related deaths by one-third from 2015 levels in 19 countries in Africa that have a high burden of malaria by expanding coverage of ITNs, IRS, IPTp, and prompt use of ACT.

Module 7, Slide 9

Module 7
Session 2

DHS Malaria-related Surveys &
The DHS Program Methodology

Measurement Tools

- **Demographic and Health Survey (DHS)**
  nationally representative, population-based surveys every 4-5 years. Includes malaria-related questions.
- **Malaria Indicator Survey (MIS)**
  indicators include mosquito net ownership and use, IPTp, prevalence and treatment of fever in children; can include testing for malaria or anemia; shorter than full DHS to allow for more frequent monitoring.
- **Multiple Indicator Cluster Survey (MICS)**
  nationally representative, population-based surveys by UNICEF every 3 years. Includes optional module for malaria but not all indicators presented.
- **Service Provision Assessment (SPA)**
  survey of formal sector health facilities to assess provision of quality malaria prevention and treatment services in a country. Includes malaria-related questions about service delivery and quality of care.

Module 7, Slide 11

DHS and MIS Surveys

Biomarker Testing in the MIS and DHS

- Malaria-related biomarkers:
  - Anemia Testing
  - Parasitemia Testing: Rapid Diagnostic Test & Microscopy
- Children usually age 6-59 months that spent the night prior to survey in household are tested for malaria and anemia.

Module 7, Slide 13

Anemia Testing

- Children age 6-59 months are eligible for anemia testing.
  - A different cut-off level is used to define severe anemia (<8.0g/dl) in the MIS than the cut-off used for nutritional definition of severe anemia (<7.0g/dl) in the DHS.
- Eligible women and parents/guardians of eligible children complete informed consent process.
- HemoCue analyzer is used to check hemoglobin levels.

Module 7, Slide 14

Parasitemia Testing

- **Rapid diagnostic test** (RDT) kits are used to assess the presence of malaria antigens in respondents' blood. RDT kits are easy to use in remote areas where lab facilities are not available.
- In most countries, **microscopy** (slides) are used in addition to RDT kits. Blood-smears are read by microscope to measure parasitemia levels.

Information provided by Roll Back Malaria

Module 7, Slide 15

Rapid Diagnostic Test (RDT)

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- Requires single drop of blood from finger or heel stick to identify infection
- Tests for malaria infection
- Cost-effective
- Do not require skilled technician to read results
- Results available in 15 minutes
- Results provided to child's parent/guardian
- Those who test positive for malaria using rapid test are offered a full course of medicine
- Detect parasite antigens instead of actual parasites

Module 7, Slide 16

Microscopy

- Blood smear of each tested child
- Bar code label for anonymity
- Dried and packed carefully in field
- Laboratory must read and determine malaria infection status
- Can test for various malaria species
- Results not given to guardian or child

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Module 7, Slide 17

RDT vs. Microscopy

- Prevalence of RDT positivity is often higher than prevalence of microscopy positivity
- Reading and results of slides can delay availability of survey data by several months & requires training of microscopists
- RDTs can detect antigens of parasite in individuals who are not infected anymore up to 2 weeks after parasite clearance
- RDT is recommended to treat individuals in the field

Information provided by Roll Back Malaria

Module 7, Slide 18

Merging Test Results & Demographic Data

After the RDT and microscopy test results are finalized, they are merged with data from interviews. This permits analysis of malaria prevalence by:

- Age
- Sex
- Residence
- Education
- Wealth
- Other background characteristics

Module 7, Slide 19

Module 7
Session 3

Key Malaria-Related Data Collected by The DHS Program

Core Outcome Indicators for Household Surveys

Intervention	Indicator Description
Prevention: Vector Control	1. Proportion of households with at least one ITN
	2. Proportion of households with at least one ITN for every two people
	3. Proportion of population with access to an ITN within their household
	4. Proportion of population which slept under an ITN the previous night
	5. Proportion of children under 5 who slept under an ITN the previous night
	6. Proportion of pregnant women age 15-49 who slept under an ITN the previous night
	7. Proportion of households with at least one ITN and/or sprayed by IRS in the last 12 months
Prevention: IPTp	8. Proportion of women age 15-49 who received IPTp during antenatal care visits during last pregnancy in the past 2 years
Case Management	9. Proportion of children under 5 with fever in the last 2 weeks who had a finger or heel stick
	10. Proportion of children under 5 with fever in last 2 weeks for who advice or treatment was sought
	11. Proportion receiving first-line treatment according to National Policy among children under 5 with fever in the last 2 weeks who received any antimalarial drugs

Module 7, Slide 21

Information provided by Roll Back Malaria

Vector Control: Insecticide-Treated Nets

An **insecticide-treated net (ITN)** is:

1) a factory treated net that does not require any treatment OR
2) a net that has been soaked with insecticide within the past 12 months

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Module 7, Slide 22

Vector Control: Long-Lasting Insecticidal Nets

A **long-lasting insecticidal net (LLIN)** is a factory treated net that does not require any treatment. It is designed to maintain efficacy against mosquito vectors for at least 3 years. Since 2007, WHO has recommended that national malaria control programs procure only LLINs.

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Module 7, Slide 23

Vector Control: Indoor Residual Spraying

© 2011 Filiberto Hernandez (PMI)

Indoor Residual Spraying (IRS) is organized, timely spraying of an insecticide on the inside walls of houses. IRS interrupts malaria transmission by killing adult female mosquitos when they enter houses and rest on the walls after feeding, but before they can transmit infection to another person.

Module 7, Slide 24

Intermittent Preventive Treatment during Pregnancy (IPTp)

Malaria during pregnancy can result in poor outcomes for the woman and her newborn, such as maternal anemia, low birth weight, and premature delivery.

- **IPTp** is a regimen of sulfadoxine-pyrimethamine (SP) given at least 3 or more times during at least one antenatal care (ANC) visit
- IPTp in 3 or more doses during pregnancy reduces prevalence of anemia and placental malaria infections at time of delivery

Module 7, Slide 25

Core Outcome Indicators: Case Management

Diagnosis and Treatment

- Prompt treatment of fever among young children
- Prompt diagnosis and effective treatment of malaria

Module 7, Slide 26

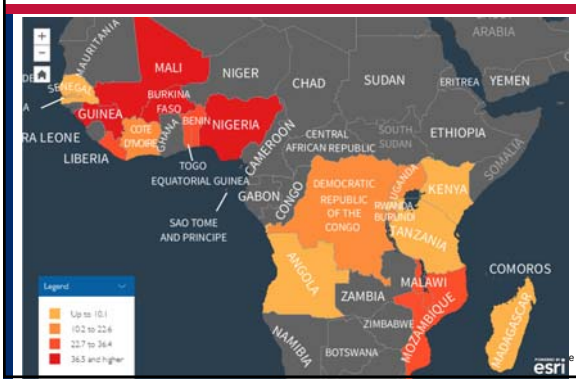
Core Impact Measures

RBM Impact Measures	Indicator Description
Mortality Indicator	1. All-cause under 5 mortality rate (5q0).
Morbidity Indicators	2. Parasitemia Prevalence: proportion of children age 6-59 months with malaria infection.
	3. Anemia Prevalence: proportion of children aged 6-59 months with a hemoglobin measurement of <8 g/dL

Information provided by Roll Back Malaria

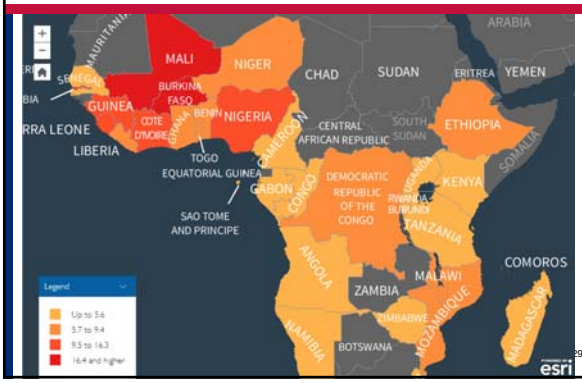
Module 7, Slide 27

Malaria prevalence by microscopy among children age 6-59 months



Module 7, Slide 28

Anemia prevalence among children age 6-59 months (hemoglobin lower than 8g/dL)



Module 7, Slide 29

SPA Malaria-related Indicators

SPA Measures	Indicator Description
Malaria prevention interventions for antenatal care clients	1. IPTp guidelines available at facilities offering antenatal care services on the day of the survey
	2. Staff member recently trained on intermittent preventive treatment of malaria in pregnancy
	3. SP/Fansidar available at facilities offering antenatal care services on the day of the survey
	4. Providers give or prescribe SP/Fansidar to antenatal care clients within observed consultations
Malaria diagnostic capacity in facilities offering curative care for sick children	5. Facilities have the capacity to diagnose malaria by having all of the following: • unexpired malaria RDT kits or a functioning microscope with relevant stains and glass slides • staff member recently trained on either RDT or microscopy • malaria RDT protocol available in the facility

Module 7, Slide 30

Module 7
Session 4

Malaria Indicators:
Results from Six Countries

Angola • Kenya • Malawi
Rwanda • Senegal • Tanzania

Interpreting Trends

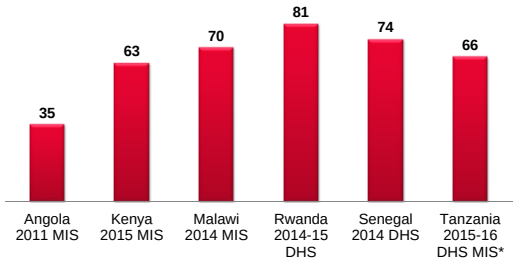
There are several consideration when interpreting trends of malaria indicators within and across countries:

- Seasonality
- Microscopy vs. RDT
- National Malaria Control programs

Module 7, Slide 32

Ownership of Insecticide-treated Nets (ITNs)

Percentage of households that own at least one ITN

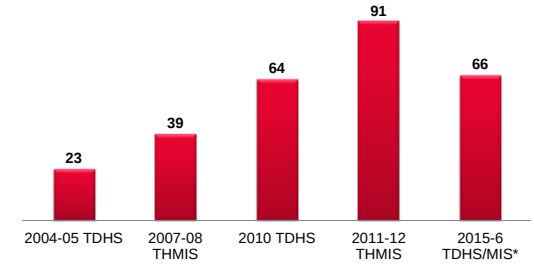


*preliminary data from Key Indicators Report

Module 7, Slide 33

Trends in Ownership of ITNs in Tanzania

Percentage of households that own at least one ITN

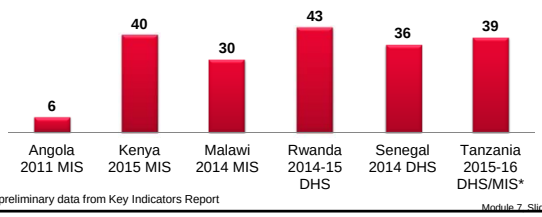


*preliminary data from Key Indicators Report

Module 7, Slide 34

Universal Coverage of ITNs

Percent of households with at least one ITN for every two people who stayed in the household the night before the survey

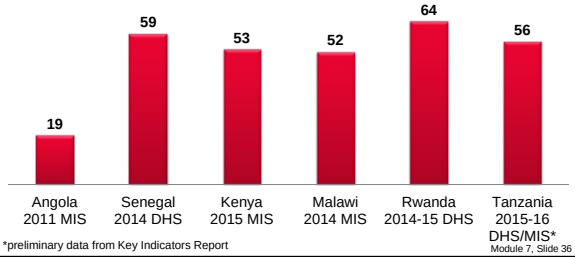


*preliminary data from Key Indicators Report

Module 7, Slide 35

Access to ITNs

Percent of de facto population with access to an ITN

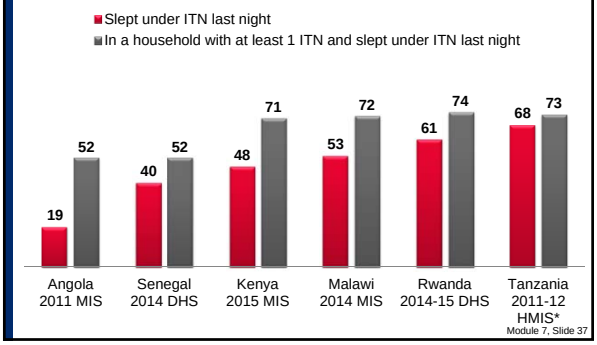


*preliminary data from Key Indicators Report

Module 7, Slide 36

Use of ITNs

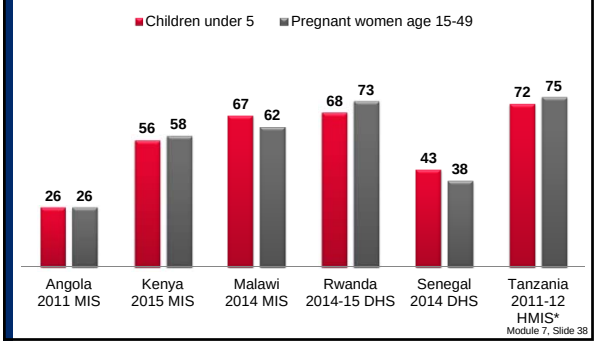
Percent of de facto population



Module 7, Slide 37

Use of ITNs by Children and Pregnant Women

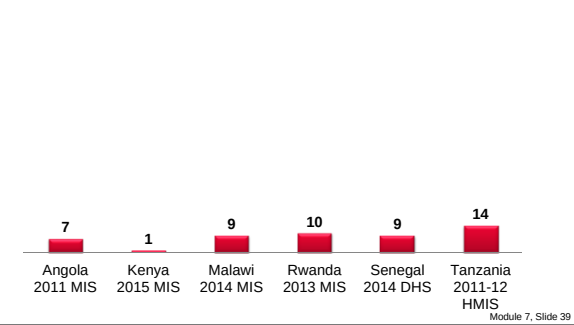
Percent who slept under ITN last night



Module 7, Slide 38

Household Indoor Residual Spraying

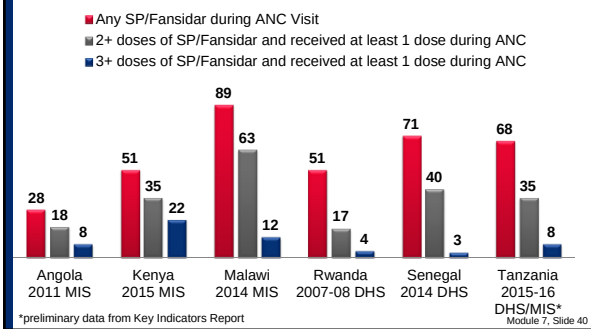
Percent of households with rooms sprayed during last 12 months



Module 7, Slide 39

Use of Antimalarials during Pregnancy (IPTp)

Percent of pregnant women age 15-49 who

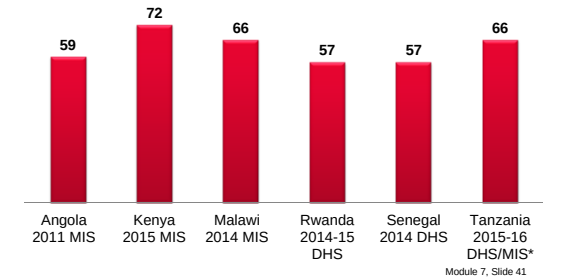


*preliminary data from Key Indicators Report

Module 7, Slide 40

Management of Children with Fever: Care Seeking

Among children under 5 with fever in the two weeks before the survey, percent who sought treatment or advice

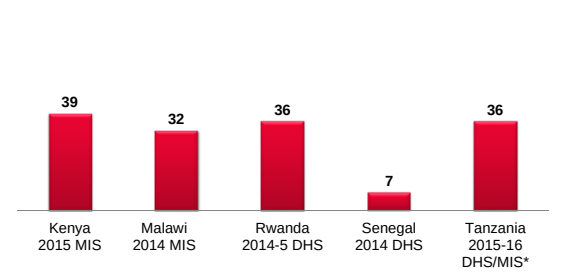


Module 7, Slide 41

*preliminary data from Key Indicators Report

Management of Sick Children with Fever: Diagnostics

Among children under 5 with fever in the two weeks before the survey, percent who had a finger or heel stick

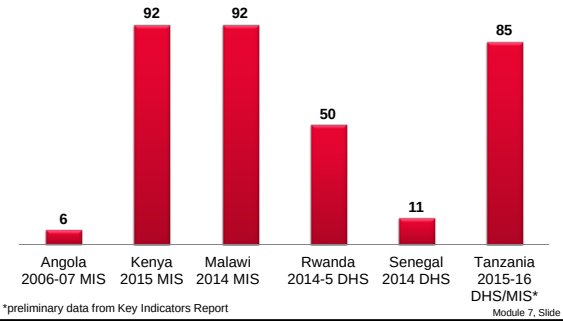


Module 7, Slide 42

*preliminary data from Key Indicators Report

Management of Sick Children with Fever: Treatment

Among children under 5 with fever in the two weeks before the survey who took any antimalarial, percent who took any ACT

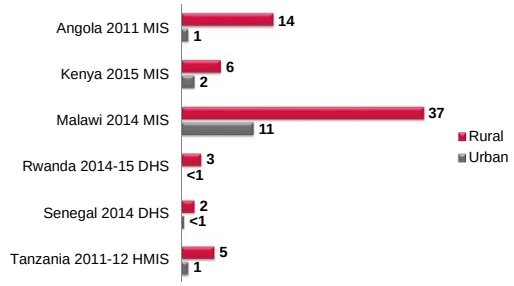


*preliminary data from Key Indicators Report

Module 7, Slide 43

Malaria Prevalence by Urban-Rural Residence

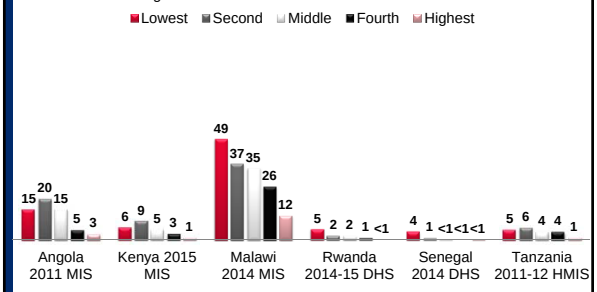
Percent of children age 6-59 months with malaria according to microscopy



Module 7, Slide 44

Malaria Prevalence by Wealth Quintile

Percent of children age 6-59 months



Module 7, Slide 45

Module 7
Session 5

Malaria Trivia Game

Resources for Malaria Information, Prevention, Treatment, and Research

The Bill and Melinda Gates Foundation

The foundation aims to develop groundbreaking approaches to reducing the burden of malaria and accelerating progress toward eradication of the disease.
http://www.gatesfoundation.org/what-we-do/global-health/malaria

Centers for Disease Control and Prevention (CDC)

The CDC provides malaria prevention resources, surveillance, and technical support.
http://www.cdc.gov/malaria/

Malaria Consortium

The consortium is dedicated to improving delivery of prevention and treatment to combat malaria in Africa and Asia.
http://www.malariaconsortium.org

Malaria Indicator Survey Database

The website serves as a home for Malaria Indicator Survey datasets and documentation. The datasets are publicly available for downloading after a simple registration process. The site also includes information about MIS surveys as well as a MIS toolkit to help countries and organization conduct a MIS.
http://malariasurveys.org/

A comprehensive list of malaria indicators, definitions and rationale used in household surveys such as the MIS can be found at the following link.
http://www.malariasurveys.org/documents/Household%20Survey%20Indicators%20for%20Malaria%20Control.pdf

Malaria Journal

Malaria Journal is a journal that exclusively publishes articles on malaria and, as such, it aims to bring together knowledge from the different specialties involved in the very broad discipline, from the bench to the bedside and to the field. *Malaria Journal* offers a fast publication schedule

while maintaining rigorous peer-review; this is achieved by managing the whole of the publication process electronically, from submission to peer-review.
http://www.malariajournal.com/

MEASURE Evaluation

The project develops malaria indicators, data collection tools, and guidance on monitoring and evaluation of malaria control programs.
http://www.cpc.unc.edu/measure/our-work/malaria

PATH's Malaria Control and Elimination Partnership in Africa

PATH's Malaria Control and Evaluation Partnership in Africa (MACEPA) works to eliminate malaria transmission in four countries–Ethiopia, Kenya, Senegal, and Zambia–by 2020.
http://www.path.org/projects/malaria-control.php

President's Malaria Initiative (PMI)

Started in 2005 as a US Government funded program, PMI's goal is to reduce malaria-related deaths by one-third in 19 African countries that have a high burden of malaria by expanding coverage of ITNs, IRS, IPTp, and prompt use of ACT.
http://www.pmi.gov/

PMI resident advisors work with National Malaria Control Programmes in the 19 PMI countries to develop annual Malaria Operational Plans (MOPs), which provide a detailed implementation plan for malaria activities.
https://www.pmi.gov/resource-library/mops

Roll Back Malaria (RBM)

RBM is a global framework to implement coordinated action against malaria. RBM's overall strategy aims to reduce malaria morbidity and mortality by reaching universal coverage and strengthening health systems.
http://www.rollbackmalaria.org/

RBM's strategy is detailed in the document, *Action and Investment to Defeat Malaria, 2016-2030.*
http://www.rollbackmalaria.org/about/about-rbm/aim-2016-2030

STATcompiler

The DHS Program's STATCompiler allows users to interact with survey data, creating tables from over 500 indicators in over 90 countries.
http://statcompiler.com/

The Global Fund to Fight AIDS, Tuberculosis, and Malaria

The Global Fund is a 21st-century organization designed to accelerate the end of AIDS, tuberculosis, and malaria as epidemics.
http://www.theglobalfund.org

UNICEF

UNICEF monitors achievement in the Millennium Development Goals (MDGs), the upcoming Sustainable Development Goals (SDGs), and RBM goals.
http://data.unicef.org/child-health/malaria.html

World Bank

The World Bank treats financing for malaria control as an integral part of financing for essential health services in the context of universal health coverage. The Bank works with countries to ensure that essential health interventions including malaria are adequately planned, coted, and budgeted for in national health sector plans in a sustainable manner.
http://www.worldbank.org/en/topic/health/brief/malaria

World Health Organization

The WHO Global Malaria Program (GMP) is responsible for the coordination of WHO's global efforts to control and eliminate malaria. GMP's policy guidance on prevention, case management, surveillance, monitoring and evaluation, and malaria elimination provides a benchmark for national malaria programs and multilateral funding agencies.
http://www.who.int/malaria/en/

The WHO adopted the 2016-2030 Global Malaria Technical Strategy in 2015, which guides countries in their efforts to accelerate progress towards malaria elimination.
http://www.who.int/malaria/publications/atoz/9789241564991/en/

Handout 7.2

Core Outcome Indicators for Malaria for Household Surveys as of August, 2016

Intervention	Indicator Description	Numerator	Denominator	Purpose
Prevention: **Vector Control**	1. Proportion of households with at least one ITN	Number of households surveyed with at least one ITN	Total number of households surveyed	This indicator measures household ITN possession among the population
	2. Proportion of households with at least one ITN for every two people	Number of households with at least one ITN for every two people	Total number of households surveyed	This indicator is used to determine what proportion of households has a sufficient number of ITNs to cover all individuals **(universal coverage)**
	3. Proportion of population with access to an ITN within their household	Total number of individuals who could sleep under an ITN if each ITN in the household is used by two people.	Total number of individuals who spent the previous night in surveyed households	This indicator estimates the proportion of the population that could potentially be covered by existing ITNs **(access)**
	4. Proportion of population which slept under an ITN the previous night	Number of individuals who slept under an ITN the previous night	Total number of individuals who spent the previous night in surveyed households	This indicator measures the level of ITN use of all age groups at the time of the survey
	5. Proportion of children under 5 who slept under an ITN the previous night	Number of children under 5 who slept under an ITN the previous night	Total number of children under 5 who spent the previous night in surveyed households	This indicator is used to measure the level of ITN coverage of children under 5
	6. Proportion of pregnant women age 15-49 who slept under an ITN the previous night	Number of pregnant women age 15-49 who slept under an ITN the previous night	Total number of pregnant women age 15-49 within surveyed households	This indicator is used to measure the level of ITN use by pregnant women at national level
	7. Proportion of households with at least one ITN and/or sprayed by IRS in the last 12 months	Number of households that have at least one ITN and/or have been sprayed by IRS in the last 12 months	Total number of households surveyed	This indicator measures overall national coverage of the 2 main vector control activities (ITN & IRS)

Handout 7.2

Core Outcome Indicators for Malaria for Household Surveys as of August, 2016

Intervention	Indicator Description	Numerator	Denominator	Purpose
Prevention: Intermittent Preventive Treatment	8. Proportion of women age 15-49 who received IPTp during antenatal care visits during last pregnancy	Number of women age 15-49 who received 3 or more doses of recommended antimalarial drug treatment, at least one of which was received during an ANC visit, to prevent malaria during their last pregnancy that led to a live birth within the last 2 years	Total number of women age 15-49 who delivered a live baby within the last 2 years	This indicator is used to measure the national level use of IPTp to prevent malaria during pregnancy of women
Case Management: Diagnosis	9. Proportion of children under 5 with fever in the last 2 weeks who had a finger or heel stick	Number of children under 5 who had a fever in the previous 2 weeks who had a finger/heel stick	Total number of children under 5 who had a fever in the previous 2 weeks	This indicator captures baseline-level coverage and subsequent scale-up of diagnostic programs
Case Management: Treatment	10. Proportion of children under 5 with fever in last 2 weeks for whom advice or treatment was sought	Number of children under 5 who had a fever in the previous 2 weeks for whom advice or treatment was sought	Total number of children under 5 who had a fever in the previous 2 weeks	This indicator captures national level utilization of appropriate providers for prompt treatment of malaria
	11. Proportion receiving first-line treatment according to National Policy among children under 5 with fever in the last 2 weeks who received any antimalarial drugs	Number of children under 5 who had a fever in the previous 2 weeks who received first line treatment according to national policy	Total number of children under 5 who had a fever in the previous 2 weeks who received any antimalarial drugs	This indicator measures the extent to which first line treatments are used to treat malaria as a proportion of all antimalarial treatments

Handout 7.2

Impact Measure	Indicator Description	Numerator	Denominator	Purpose
Mortality Indicator	1. All-cause under 5 mortality rate (5q0)	Method of measurement: DHS surveys collect data on the birth date and age at death of non-living children to produce probability of dying before age 5 from children exposed to mortality during 5 year period before survey		In areas of stable transmission, all-cause under 5 mortality trends should be assessed to evaluate the impact of interventions
Morbidity Indicator	2. Parasitemia Prevalence: proportion of children age 6-59 months with malaria infection	Number of children age 6-59 months with malaria infection detected by RDT or microscopy	Total number of children age 6-59 months tested for malaria parasites by RDT or microscopy	This indicator measures malaria in a country
	3. Anemia Prevalence: proportion of children age 6-59 months with a hemoglobin measurement of <8 g/dL	Number of children age 6-59 months with a hemoglobin measurement of <8g/dL	Total number of children age 6-59 months who had hemoglobin measurements obtained during household survey	This indicator is useful indicator of malaria morbidity that can reflect the impact of malaria interventions. It is a proxy measure of the prevalence of malaria-related anemia

Service Provision Assessment: Malaria-related indicators as of August, 2016

SPA Measures	Indicator Description
Malaria prevention interventions for antenatal care clients	1. IPTp guidelines available at facilities offering antenatal care services on the day of the survey
	2. Staff member recently trained on intermittent preventive treatment of malaria in pregnancy
	3. SP/Fansidar available at facilities offering antenatal care services on the day of the survey
	4. Providers give or prescribe SP/Fansidar to antenatal care clients within observed consultations
Malaria diagnostic capacity in facilities offering curative care for sick children	5. Facilities have the capacity to diagnose malaria by having all of the following: • unexpired malaria RDT kits or a functioning microscope with relevant stains and glass slides • staff member recently trained on either RDT or microscopy • malaria RDT protocol available in the facility

Instructions to the Malaria Trivia Game

Running the Game

We suggest having two people administer the game: Host and Scorekeeper.

Host: The host is responsible for introducing the game, reading the categories and clues, operating the PowerPoint game board, and judging the answers. The host will have a list of questions and answers for the game.

Scorekeeper: The scorekeeper is responsible for keeping score for all of the teams. If a team provides the correct response to a question, they earn the value of the question. If they answer incorrectly, the value is subtracted from their score.

Teams

Divide the group into 3 or more teams of 2 to 5 people per team. Assign each team a number. Team number one chooses the first question.

To Open the PowerPoint Game

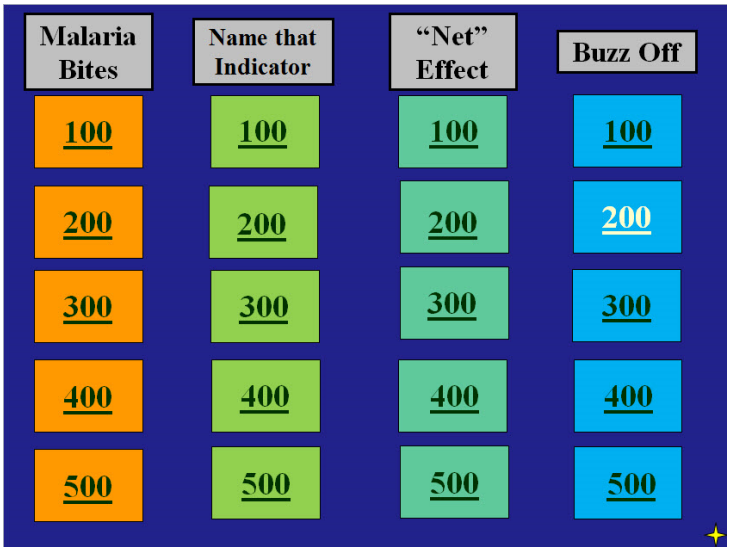
1. Open **Activity 7.1** .ppt file
2. View Slide Show
    a. Select "Slide Show" Tab. Then select "From Beginning"
    b. OR select the Slide Show icon  at the bottom right of the screen.
3. Click on the mouse or use the arrow keys to move through the slides. Many slides have animation with text or images that require you to click the mouse or use the arrows keys to proceed to the next text frame, image or slide.

Open the game and look at it. Then read the instructions.

The Board

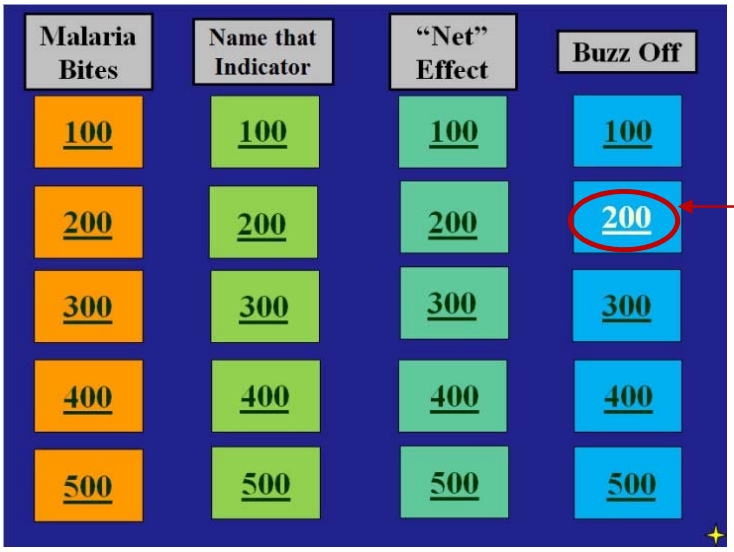
The trivia board is a Microsoft PowerPoint presentation. **Slide #4** is the grid of categories and point values. There are *four categories*: *Malaria Bites*, *Name that Indicator*, "*Net" Effect*, and *Buzz Off*. Each category has

values 100 through 500. Questions with a higher point value are more difficult than questions with a lower point value.

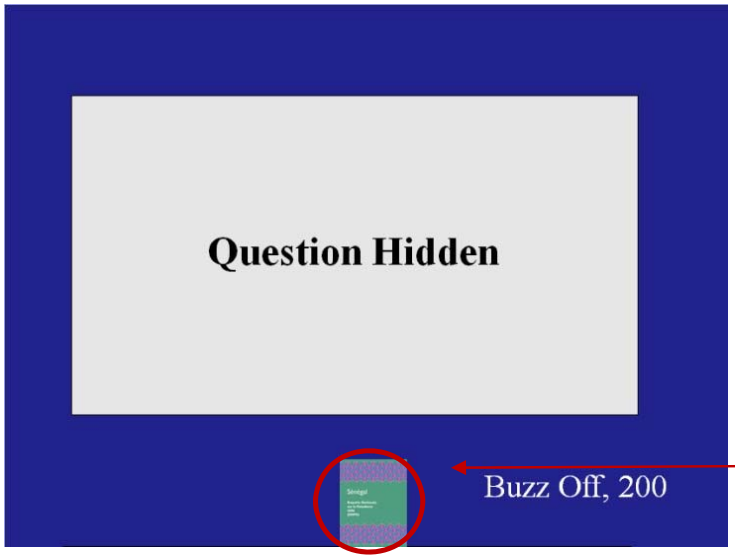


Each question square on slide 4 is linked to a question. For example, if you click on *Buzz Off, 200* you will be taken to a slide which displays the appropriate question. Once you ask the question and the team answers, you can click on the slide to view the correct answer. To return to the question grid on slide #4, click on the DHS report cover icon at the bottom center of the slide.

After you have played a question, the font color of the number on the square changes color on slide #4.



Click on the value underneath the chosen category to move to the question. For example, *Buzz Off for 200.*



Once a team has responded with an answer, click anywhere on the screen to reveal the correct answer. To return to the grid on Slide #4, click on the DHS report cover icon at the bottom center of the slide.

General Play

Divide the group into 4 or more teams of 2 to 5 people per team. Assign each team a number. The team that is chosen to go first begins the game by selecting a category and point value (e.g. *"Net" Effect for 300*). The host then reads the clue, after which the team that selected the question has 1 minute to answer it. Teams are allowed to discuss responses within the minute. The spokesperson must provide the team's answer within 1 minute.

A correct response earns the point value of the question. If the spokesperson gives an incorrect response or fails to answer within 1 minute, the point value is deducted from the team's score. The next team in the order is given an opportunity to respond within one minute. If no correct response is given, the host reads the correct response. The next team in the order chooses the next question and point value.

After all the questions have been asked, the scorekeeper announces the winning team.

MALARIA TRIVIA!

Hosted
by
DHS Curriculum Facilitators

Rules

- This is a question and answer game to test your knowledge of malaria.
- We are going to divide the room into teams. Each team should identify one spokesperson.
- Each team will have a chance to choose a question. The team spokesperson will give the answer to the question after consulting with his/her teammates. Most of our questions are multiple choice.

Rules Continued

- If your team gets the question wrong, the team next in line has a chance to answer.
- Each question is assigned a value of 100-500 points. Your team will get these points only for a correct answer. If you answer incorrectly, the value is deducted from your score.
- Don't use any computers or mobile devices to cheat!
- Most importantly HAVE FUN!

Malaria Bites	Name that Indicator	"Net" Effect	Buzz Off
100	100	100	100
200	200	200	200
300	300	300	300
400	400	400	400
500	500	500	500

Answer: Red Blood Cells

Malaria results from the multiplication of Plasmodium parasites within red blood cells, causing symptoms that typically include fever and headache.

Malaria Bites, 100

Answer: C) Malaria parasites & anemia

Data is collected on anemia and parasitemia to assess malaria morbidity among children under the age of five. Parasitemia prevalence is a useful morbidity indicator, as it is malaria-specific and can provide a rough measure of transmission. Additionally, anemia prevalence is a reliable indicator of malaria morbidity that can reflect the impact of malaria interventions.

Name That Indicator, 100

Answer: E) MaLF is NOT an acronym

- RDT-Rapid Diagnostic Test
- LLIN- Long-Lasting Insecticide Net
- IPTp- Intermittent Preventive Treatment during Pregnancy
- PMI- President's Malaria Initiative
- IRS-Indoor Residual spraying

Net Effect, 100

Answer: **Indoor Residual Spraying**

IRS is organized, timely spraying of an insecticide on the inside walls of houses. IRS interrupts malaria transmission by killing adult female mosquitos when they enter houses and rest on the walls after feeding, but before they can transmit infection to another person.

Buzz Off, 100

Answer: A) Anopheles gambiae

Malaria is transmitted among humans by female mosquitoes of the genus *Anopheles.* The primary malaria vectors in Africa are *An. gambiae* and *An. funestus*, which are strongly anthropophilic (meaning they prefer to feed on humans) and consequently, are two of the most efficient malaria vectors in the world.

Most *Anopheles* mosquitoes are crepuscular (active at dusk or dawn) and prefer to feed indoors (endophagic).

Malaria Bites, 200

Answer: A) Proportion of children under 5 years old who slept under an insecticide-treated net (ITN) the previous night

This indicator is used to measure the level of ITN coverage of children under 5 years old at the national level.

Name That Indicator, 200

Answer: B) DHS-dry season and the MIS-rainy season

If possible, the MIS is timed to correspond with the malaria transmission season in order to get a better estimate of mosquito net use, childhood fever, and parasitemia, all of which have been found to vary by season. High malaria transmission season is usually just as the rainy season is tapering off. This complicates data collection because the roads are in poor condition.

Net Effect, 200

Answer: Intermittent Preventive Treatment during Pregnancy

IPTp is a regimen of sulfadoxine-pyrimethamine (SP) given at least twice during antenatal care (ANC) visits. IPTp in 2 doses during pregnancy reduces prevalence of anemia and placental malaria infections at time of delivery. The lower case 'p' indicates IPT during pregnancy.

Buzz Off, 200

Answer: B) Pregnant women & C) Children age 6 months to 5 years

Children age 6 months to five years are at high risk in highly malaria endemic countries. The other high-risk group is pregnant women whose immunity to malaria is compromised.

Malaria Bites, 300

Answer: ACT

Artemisinin-based combination therapies (ACTs) are a common malaria treatment, not a form of prevention.

Name That Indicator, 300

Answer: C) Angola

Angola: Standard MIS, 2006-07 was the first DHS survey to include parasitemia testing.

The DHS has collected malaria data (either a malaria module, parasitemia testing, or malaria/bednet questions) in over 40 countries!

Net Effect, 300

Answer: B) An organism that carries & transmits a disease

Mosquitoes are the vectors for malaria, carrying the *Plasmodium falciparum* from one host to another. *Vector control* is the method to limit or eradicate mosquitos through IRS, IPTp, ITN & LLIN usage.

Buzz Off, 300

Answer: A) RDT & D) Blood smear with microscopy reading

Rapid diagnostic test (RDT) kits are used to assess the presence of malaria parasites in respondents' blood. Microscopy (slides) are used in addition to RDT kits. Blood-smears are read by microscope to measure parasitemia levels.

Malaria Bites, 400

Answer: B) Proportion of households with at least one ITN for every two people

This indicator is used to determine what proportion of households has a sufficient number of ITNs to cover all individuals to achieve universal coverage. Many National Malaria Control Programs now focus on universal coverage and provide one ITN for every two persons within an household.

Name That Indicator, 400

Possible answers include:

ITNs/LLINs

Indoor Residual Spraying (IRS)

IPTp

Net Effect, 400

Possible answers include:

An insecticide-treated net (ITN) is a factory treated net that does not require any treatment, a pretreated net obtained with past 12 months, OR a net that has been soaked with insecticide within past 12 months.

A long-lasting insecticidal net (LLIN) is a factory treated net that does not require any treatment. It is designed to maintain efficacy against malaria vectors for at least 3 years.

Buzz Off, 400

Answer: E) All of the Above

Environmental factors such as temperature, humidity, wind, rainfall, and altitude all affect malaria transmission. Temperature has effects on the development the parasite. High humidity lengthens the life of the mosquito. Strong winds may prevent mosquito egg-laying. Rainfall is major determinant of mosquito reproduction. Altitude makes some areas too difficult and cold for mosquitoes to breed or live. We will discuss in detail the biological, environmental, and socio-economic factors of malaria transmission.

Malaria Bites, 500

Answer: This indicator is intended to determine how many children are tested to diagnose malaria with RDT.

The replacement of conventional antimalarial drugs with high-cost artemisinin-based alternatives has created an increased need for accurate disease diagnosis. In addition to avoiding unnecessary treatment with expensive drug combinations, diagnostics allow a more rational use of drugs that might effectively reduce drug pressure, thereby delaying the onset of drug resistance. The information will help evaluate scale-up of diagnostic programs by capturing baseline-level coverage.

Name That Indicator, 500

Answer: D) DHS, MIS, MICS, SPA

Four large surveys collect data on malaria: 3 Nationally representative surveys – Demographic and Health Survey (DHS), Malaria Indicator Survey (MIS), and Multiple Indicator Cluster Survey (MICS). Much effort goes into harmonizing all 3 surveys so that comparable indicators can be calculated. The SPA survey collects health facility level data on provision of quality malaria prevention and treatment services.

AIS: AIDS Indicator Survey
KAP: Knowledge, Attitudes, Practices
KIS: Key Indicator Survey

Net Effect, 500

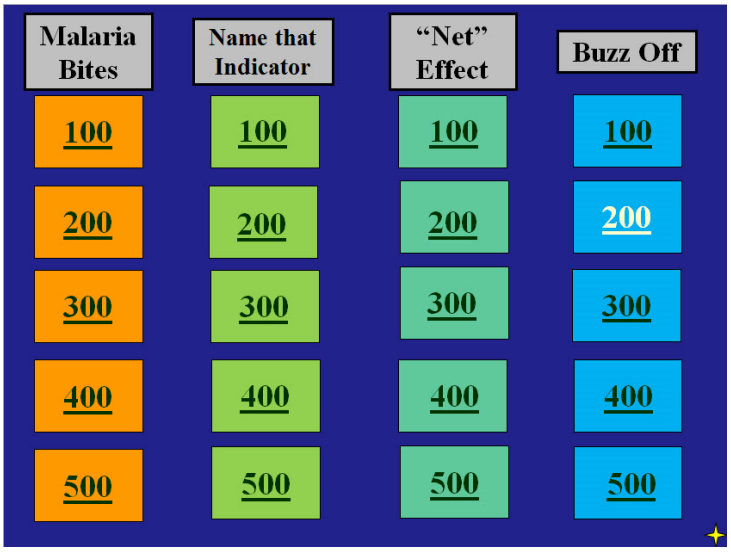
Answer:

An *endemic disease* is always present in a population, leading to a high prevalence of the disease. An *epidemic* is the occurrence of more cases of disease than would normally be expected in a specific place or group of people in a given period of time.

Buzz Off, 500

Question and Answer Key to the Malaria Trivia Game

The trivia board is a Microsoft PowerPoint presentation. **Slide #4** is the grid of categories and point values. There are *four categories*: *Malaria Bites*, *Name that Indicator*, *"Net" Effect*, and *Buzz Off*. Each category has values 100 through 500. Questions with a higher point value are more difficult than questions with a lower point value.



Each question square on Slide #4 is linked to a question. The Categories, Values, Questions and Answers are provided below. This page is intended only for Module 7 facilitators.

Activity 7.1

Category	Value	Question	Answer
Malaria Bites	100	On which part of the body do malaria *parasites* feed?	Red Blood Cells
	200	Name the species of *mosquito* that spreads malaria.	A) Anopheles gambiae
	300	Which groups are considered high risk for malaria? Choose all that apply	B) Pregnant women & C) children age 6 months to 5 years
	400	What are 2 methods of testing for malaria parasites? (2 answers)	A) RDT & D) Blood smear with microscopy reading
	500	What are some environmental factors affecting malaria transmission?	E) All of the above
Name that Indicator	100	Malaria surveys collect biomarkers to determine prevalence of which 2 conditions?	C) Malaria parasites & anemia
	200	Which is the correct wording for the indicator that measures ITN coverage of children under 5 years old?	A) Proportion of children under 5 years old who slept under an ITN the previous night
	300	Which of the following is NOT a malaria prevention method?	ACT
	400	Which indicator measures “universal coverage” to ITNs?	B) Proportion of households with at least one ITN for every 2 people
	500	Why do DHS surveys collect data on the number of children under 5 years old with a fever in the previous 2 weeks who had a finger/heel stick?	This indicator is intended to determine how many children are tested to diagnose malaria with RDT.

Activity 7.1

Category	Value	Question	Answer
"Net" Effect	100	Which is not an acronym used in association with malaria?	E) MaLF
	200	During which season does data collection typically occur for the DHS and MIS?	B) DHS-dry season & the MIS-rainy season
	300	What country's DHS report was the first to include parasitemia testing?	C) Angola
	400	Name at least 2 cost-effective and proven prevention measures against malaria.	2 of the 3: ITNs/LLINs, IRS, or IPTp
	500	What are the 4 survey types that are measurement tools for malaria?	D) DHS, MIS, MICS, SPA
Buzz Off	100	What does the acronym IRS stand for?	Indoor Residual Spraying (IRS)
	200	What does the acronym "IPTp" stand for?	Intermittent Preventive Treatment during Pregnancy (IPTp)
	300	Define VECTOR.	B) An organism that carries & transmits a disease
	400	What is the difference between an ITN and LLIN?	An ITN is a factory treated net that does not require any treatment, a pretreated net obtained with past 12 months, OR a net that has been soaked with insecticide within past 12 months. A LLIN is a factory treated net that does not require any treatment. It is designed to maintain efficacy against malaria vectors for at least 3 years.
	500	What is the difference between endemic and epidemic?	An *endemic disease* is always present in a population, leading to a high prevalence of the disease. An *epidemic* is the occurrence of more cases of disease than would normally be expected in a specific place or group of people in a given period of time.

Module 7: Pre-Test

1. **What is the most common malaria parasite in Sub-Saharan Africa?**
   - ***a.*** *Plasmodium vivax*
   - ***b.*** *Plasmodium ovale*
   - ***c.*** *Plasmodium falciparum*
   - ***d.*** *Plasmodium knowlesi*

2. **Which malaria-related tests are carried out in malaria surveys?**
   - **a.** Anemia testing
   - **b.** Rapid diagnostic test
   - **c.** Microscopy
   - **d.** All of the above

3. **Who is usually tested for anemia and malaria parasitemia in the Malaria Indicator Survey?**
   - **a.** Children age 6-59 months
   - **b.** Women age 15-49
   - **c.** Men age 15-49
   - **d.** Women and men age 60+

4. **All of the following are true about the Malaria Indicator Survey (MIS) EXCEPT**
   - **a.** Developed by Roll Back Malaria
   - **b.** Conducted during the dry season
   - **c.** Indicators include mosquito net ownership and use, IPTp, anemia & malaria prevalence
   - **d.** Harmonized with Demographic & Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) so indicators can be comparable

(Turn over for final question)

5. **Match the following terms to their use in malaria control**

_____ ITN	A. Vector Control (3 possible answers)
_____ IPTp	B. Diagnosis
_____ IRS	C. Treatment
_____ Finger or heel stick	D. Preventive Treatment
_____ ACT	
_____ LLIN	

Module 7: Post-Test

1. **What is the most common malaria parasite in Sub-Saharan Africa?**
   - ***a.*** *Plasmodium vivax*
   - ***b.*** *Plasmodium ovale*
   - ***c.*** *Plasmodium falciparum*
   - ***d.*** *Plasmodium knowlesi*

2. **Which malaria-related tests are carried out in malaria surveys?**
   - **a.** Anemia testing
   - **b.** Rapid diagnostic test
   - **c.** Microscopy
   - **d.** All of the above

3. **Who is usually tested for anemia and malaria parasitemia in the Malaria Indicator Survey?**
   - **a.** Children age 6-59 months
   - **b.** Women age 15-49
   - **c.** Men age 15-49
   - **d.** Women and men age 60+

4. **All of the following are true about the Malaria Indicator Survey (MIS) EXCEPT**
   - **a.** Developed by Roll Back Malaria
   - **b.** Conducted during the dry season
   - **c.** Indicators include mosquito net ownership and use, IPTp, anemia & malaria prevalence
   - **d.** Harmonized with Demographic & Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) so indicators can be comparable

(Turn over for final question)

5. **Match the following terms to their use in malaria control**

_____ ITN	A. Vector Control (3 possible answers)
_____ IPTp	B. Diagnosis
_____ IRS	C. Treatment
_____ Finger or heel stick	D. Preventive Treatment
_____ ACT	
_____ LLIN	

Module 7: ANSWER KEY

1. **What is the most common malaria parasite in Sub-Saharan Africa?**
   - ***a.*** *Plasmodium vivax*
   - ***b.*** *Plasmodium ovale*
   - ***c. Plasmodium falciparum***
   - ***d.*** *Plasmodium knowlesi*

2. **Which malaria-related tests are carried out in malaria surveys?**
   - **a.** Anemia testing
   - **b.** Rapid diagnostic test
   - **c.** Microscopy
   - ***d. All of the above***

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(Turn over for final question)

5. **Match the following terms to their use in malaria control**

__***A***___ ITN	A. Vector Control (3 possible answers)
__***D***___ IPTp	B. Diagnosis
__***A***___ IRS	C. Treatment
__**B**___ Finger or heel stick	D. Preventive Treatment
__***C***___ ACT	
__***A***___ LLIN	