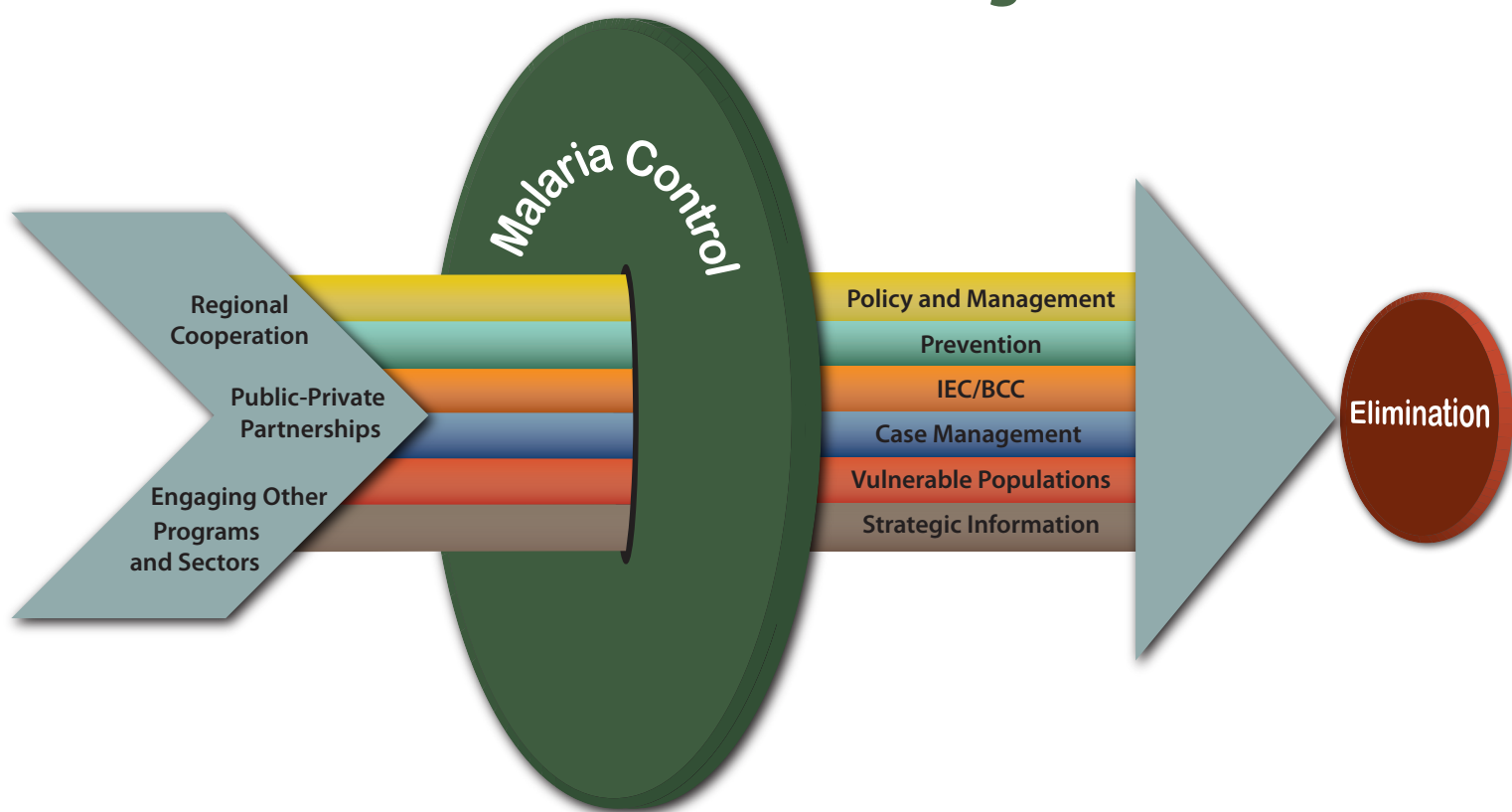


Bi-Regional Malaria Indicator Framework

DRAFT*

On Track to the Target



Monitoring and Evaluation of Malaria Control and Elimination in the Greater Mekong Subregion

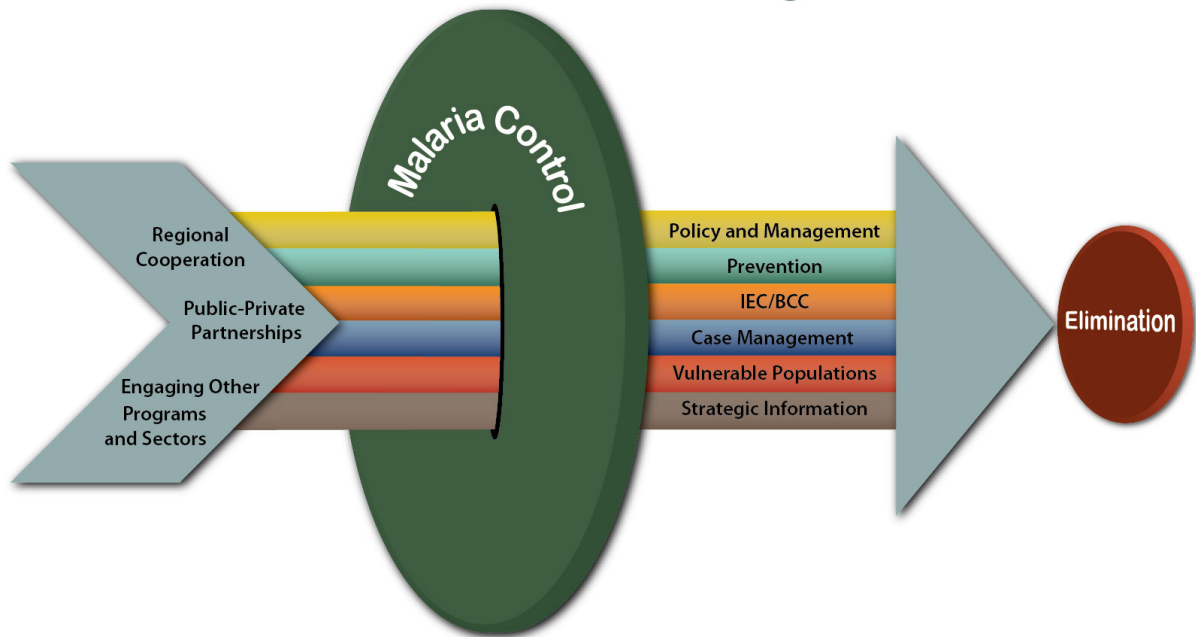
January 2011

WHO/Centers for Disease Control and Prevention/
Malaria Consortium/USAID/MEASURE Evaluation

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* The branding process is pending.

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List of Acronyms

ACT	Artemisinin-Based Combination Therapy
ANC	Antenatal Care
API	Annual Parasite Incidence
BCC	Behavior Change Communication
BMIF	Bi-Regional Malaria Indicator Framework
CDC	Centers for Disease Control and Prevention
DHS	Demographic and Health Surveys
GMP	[WHO] Global Malaria Programme
GMI	Global Malaria Indicators
GMS	Greater Mekong Subregion
HMIS	Health Management Information System
IEC	Information, Education and Communication
IPT	Intermittent Preventive Therapy
IPTp	Intermittent Preventive Therapy in pregnancy
IRS	Indoor Residual Spraying
ITN	Insecticide-Treated Net
LLIHN	Long-Lasting Insecticidal Hammock Net
LLIN	Long-Lasting Insecticidal Net
M&E	Monitoring and Evaluation
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Surveys
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MRA	Medicine Regulatory Authority
NMCP	National Malaria Control Programs
NGO	Nongovernmental Organization
PMI	U.S. President's Malaria Initiative
QA	Quality Assurance
RDM/A	Regional Development Mission/Asia (USAID)
RDT	Rapid Diagnostic Test
SPR	Slide Positivity Rate
SRI	Supplemental Regional Indicators
SSA	Sub-Saharan Africa

TB	Tuberculosis
TBD	To Be Determined
TES	Therapeutic Efficacy Study
TPR	Test Positivity Rate
UN	United Nations
USAID	United States Agency for International Development
WHO	World Health Organization
WPRO	World Health Organization Western Pacific Regional Office

Executive Summary

In order to increase capacity for an effective response to malaria in the Greater Mekong Subregion (GMS), national malaria control programs (NMCPs) from Myanmar (Burma), Cambodia, China, the Lao PDR, Thailand, and Viet Nam partnered with the World Health Organization (WHO), the U.S. Agency for International Development (USAID), MEASURE Evaluation, Malaria Consortium, and the Centers for Disease Control and Prevention (CDC) to develop the Bi-Regional Malaria Indicator Framework (BMIF) for Monitoring and Evaluation (M&E) of Malaria Control and Elimination in GMS. The BMIF is a regional commitment for the control and progress towards the elimination of malaria through a uniform method of monitoring and evaluation within the Mekong subregion. This document outlines the goals and challenges of malaria control efforts in the subregion, and provides both a conceptual framework and specific indicators for use in monitoring and evaluating national malaria control programs (NMCPs). Progress towards this goal requires measuring the successes and failures of malaria control efforts; so specific, measurable indicators have been developed according to the conceptual framework. The framework is designed to address the unique needs of the GMS while synchronizing indicators as much as possible with existing Global Malaria Indicators (GMI).

The indicators presented in this document are organized into eight categories corresponding to two goals and six key programmatic approaches identified by NMCPs. The two goals are (1) malaria control and (2) elimination. The six tactics were selected to illustrate the GMS malaria control programming priorities and organize indicators into groups measuring related outcomes. These six approaches are: (1) policy and management; (2) prevention; (3) information, education and communication/behavior change communication (IEC/BCC); (4) case management; (5) engaging vulnerable populations; and (6) strategic information. Using a common set of indicators across the subregion will facilitate the collection of uniform data on malaria for country programs, donors, and international organizations.

Two types of indicators populate the framework: (1) core indicators that were created by the WHO Global Malaria Programme (GMP), and (2) Supplemental Regional Indicators (SRI), which were created specifically for the GMS. The core GMP indicators are bolded in the indicator list on the following page.

In addition, the indicators reflect many of the objectives agreed to in the World Health Organization Western Pacific Regional Office (WPRO) Regional Action Plan to Control and Eliminate Malaria, as endorsed by the Regional Committee Meeting in 2009. As a result, the BMIF will also be used to guide M&E in malaria-endemic countries of WPRO outside of the GMS.

The BMIF is designed for use by NMCPs and other government or nongovernmental organizations (NGOs) working on malaria control and prevention. The framework and indicators should be used to gather data that are useful for malaria control program management.

National program officers can use this document to guide the development or updating of national malaria M&E plans, by referring to the framework and its indicators to determine if important program components are addressed by the M&E plan. In addition, the indicator reference sheets can guide the development of data collection tools to ensure NMCP data collection is standardized and uniform.

The framework is also designed to be useful during data collection and reporting. When national and subnational health officers are ready to report BMIF data, they should refer to the indicator reference sheets to ensure collected data are reported appropriately and consistently.

Finally, these indicators should allow countries to report regularly to recognized authorities at various organizational levels, (e.g., the Ministry of Health, the Regional Committee—through the WHO Regional Director, and the World Health Assembly—through the WHO World Malaria Report).

Bi-Regional Malaria Indicator Framework

Note: Core GMI indicators are in bold.

TBD: To Be Determined. Guidance for these indicators will be inserted when they are complete.

Malaria Control

- A. **Deaths due to malaria (number and rate)**
- B. **Confirmed malaria cases (number and rate)**
- C. Confirmed cases by malaria species (percentage)
- D. **Admitted malaria cases (number and rate)**
- E. **Malaria test positivity rate**
- F. Interruption of malaria transmission in targeted administrative units

Policy and Management

- 1.1 National malaria policies and plans are updated and independently or jointly reviewed at least once every 5 years
- 1.2 Annual domestic and external funding for national malaria program
- 1.3 Percentage of administrative units sharing an international border that develop and implement a joint plan of action over the last 12 months

Prevention

- 2.1 **Percentage of population at risk covered by long-lasting insecticidal net/insecticide-treated net (LLIN/ITN) distribution**
- 2.2 Percentage of population at risk covered by retreated mosquito nets
- 2.3 **Percentage of population covered by indoor residual spraying (IRS)**
- 2.4 **Percentage of targeted households covered by indoor residual spraying**

- 2.5 Percentage of households at risk of malaria with at least one long-lasting insecticidal net/insecticide-treated net and/or sprayed by IRS in the last 12 months

Information, Education and Communication/Behavior Change Communication

- 3.1 (TBD General IEC/BCC program indicator)
- 3.2 Percentage of individuals in areas at risk of malaria who slept under long-lasting insecticidal net/insecticide-treated net the previous night
- 3.3 (TBD Treatment IEC/BCC indicator)

Case Management

- 4.1 **Percentage of suspected malaria cases with parasite-based diagnosis**
- 4.2 Country has a functional Quality Assurance (QA) system for microscopy and rapid diagnostic tests (RDTs)
- 4.3 **Percentage of uncomplicated malaria cases with (a) confirmed *P. falciparum* malaria that received artemisinin-based combination therapy, and (b) confirmed *P. vivax* that receive appropriate antimalarial treatment including radical treatment, according to national guidelines**
- 4.4 Country has functional QA systems for antimalarial medicines
- 4.5 **Percentage of health facilities without stock-outs of first-line antimalarial medicines, mosquito nets, and diagnostics, during the last 12 months (by month)**

Engaging Vulnerable Populations

- 5.1 Comprehensive interventions for vulnerable populations at high risk of malaria are implemented according to policy
- 5.2 **Percentage of pregnant women attending antenatal care (ANC) receiving at least two doses of intermittent preventive therapy (IPTp)**—Note: Only for high transmission areas in Pacific countries

Strategic Information

- 6.1 **Completeness of monthly health facility reports on surveillance and logistics**
- 6.2 Country has functional system for outbreak detection, preparedness, and timely response
- 6.3 National malaria risk stratification is developed and updated at least once every 5 years, based on the surveillance data (confirmed cases)
- 6.4 Systematic monitoring of antimalarial drug efficacy is carried out at least once every 2 years, according to WHO protocol

- 6.5 Systematic monitoring of insecticide efficacy is carried out at least once every 2 years following WHO guidelines

Elimination

- 7.1 Country has reoriented the NMCP towards an elimination program in targeted areas based on listed criteria
- 7.2 Percentage of administrative units in a country with an SPR $\geq 5\%$, SPR $< 5\%$, API $< 1/1,000$, interruption of local transmission, and elimination of malaria
- 7.3 Percentage of confirmed malaria cases investigated and responded to in the population targeted for elimination
- 7.4 **(Reference Sheet TBD—Number of active foci reported per year)**
- 7.5 **(Reference Sheet TBD—Annual Blood Examination Rate)**
- 7.6 **(Reference Sheet TBD—Number of cases by classification)**
- 7.7 **(Reference Sheet TBD—Proportion of private facilities reporting to national malaria surveillance system)**

I. Background

The Bi-Regional Malaria Indicator Framework for Monitoring and Evaluation of Malaria Control and Elimination (BMIF) in the Greater Mekong Subregion has been created through the joint efforts of the National Malaria Control Programs of the six Greater Mekong Subregion (GMS) countries— Myanmar (Burma), Cambodia, China, Lao PDR, Thailand, and Viet Nam—and of WHO, USAID, MEASURE Evaluation, Centers for Disease Control and Prevention (CDC), and Malaria Consortium.

The framework is named “bi-regional” because the GMS straddles the WHO South-East Asia and Western Pacific regions. In addition, during the process of creating the BMIF, the framework was harmonized with the WPRO Regional Action Plan to Control and Eliminate Malaria as endorsed by the Regional Committee Meeting in 2009, and as a result, will be used to guide M&E in malaria-endemic countries of WPRO outside of the GMS.

The first effort to create a regionally relevant guide for malaria M&E in the Western Pacific Region occurred in 1999 with creation of the Kunming malaria indicator framework. The Kunming indicators proved difficult to capture and accurately report because of various reasons; therefore the need for a new and more effective framework for strengthening national capacity to collect, manage, and analyze standardized data was recognized.

This document discusses the basic epidemiologic challenges of malaria control and elimination in the GMS countries; it also provides guidance on the M&E of programmatic responses to these challenges by outlining a conceptual framework, and identifying relevant indicators useful for improving program management.

A. Epidemiologic Challenges

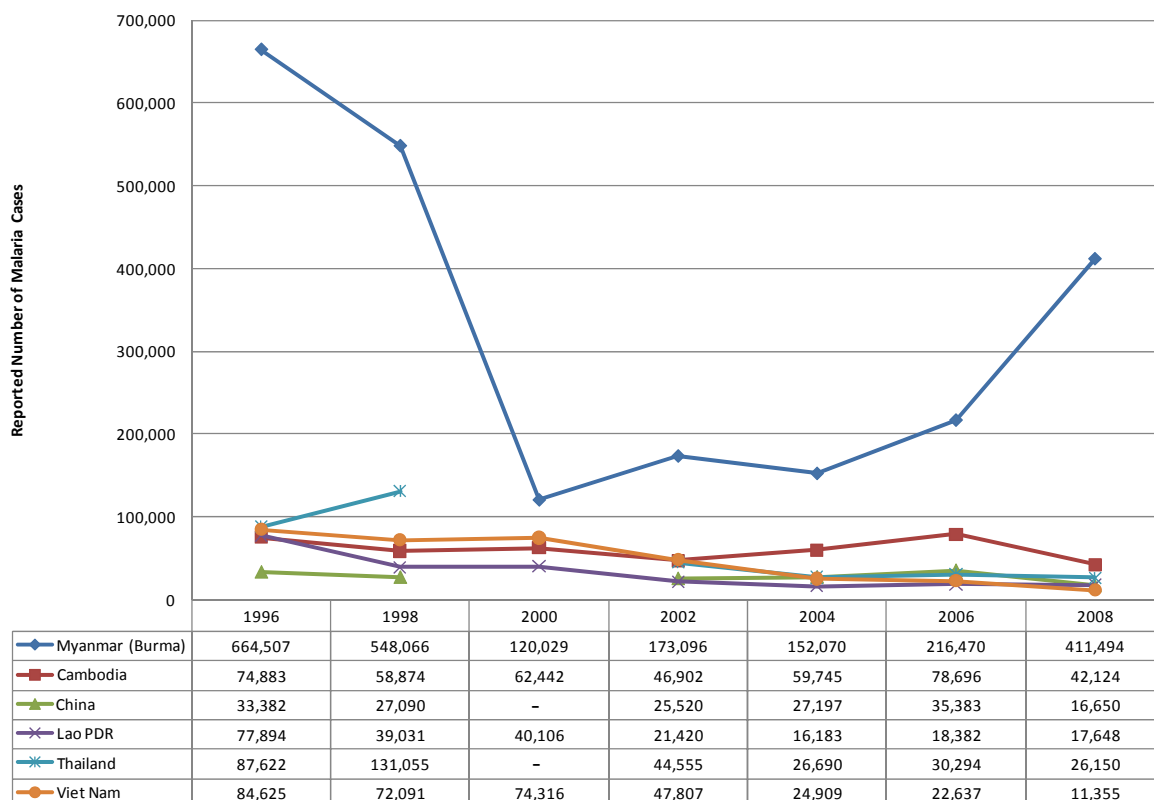
Of the six countries in the GMS, Myanmar (Burma) and Cambodia experience the heaviest burden of malaria, with more than half of malaria deaths in the GMS occurring in Myanmar (Burma). In these countries, where *P. falciparum* is abundant, malaria transmission is usually concentrated in the forested regions. However, the relative importance of *P. vivax* in malaria transmission is increasing and cases are thought to be under-reported. In these countries, malaria disproportionately affects vulnerable populations such as migrants, forest workers, border rangers, miners, ethnic minorities, etc. These groups experience high risk of infection due to occupationally related exposure to mosquitoes, lack of access to effective prevention such as ITNs, and physical or financial barriers to treatment. Currently, detailed programmatic information on these vulnerable populations such as epidemiological characterization and health care-seeking practices is limited.

In contrast, malaria control efforts in China, Lao PDR, Thailand, and Viet Nam have been largely successful, and malaria no longer rates as a priority public health concern for the general population. Malaria transmission in Thailand is now mostly limited to foci along the borders with Myanmar and Cambodia, including forested areas and the southern border of the country, where civil unrest rendered implementation of effective malaria control difficult. Because of these conditions, the high-risk groups in Thailand are the ethnic minorities inhabiting these regions and migrants from neighboring countries. It is estimated that more than half of all malaria cases in Thailand occur among the non-Thai. Viet Nam has also experienced significant progress in malaria control. As evident in Table 1, malaria morbidity and mortality have declined significantly in Viet Nam over the last 15 years. Despite these positive clinical statistics, transmission is still frequent; about a third of the Vietnamese population lives in endemic zones and vulnerable populations, such as illegal migrants, often

reside in high-risk regions without access to prevention or treatment. In China, malaria transmission has decreased significantly, and the entire country is being targeted for elimination of malaria by 2020. Currently, most cases are due to *P. vivax* and Yunnan and Hainan are the only provinces with endemic transmission of *P. falciparum*.

Recent trends in reported malaria cases for the six GMS countries from 1996–2008, are shown in Figure 1.

Figure 1. Reported Malaria Cases in the Greater Mekong Subregion, 1996–2008



Despite these regional successes in malaria control, the presence of high-transmission foci and disproportionately affected subgroups within the subregion are reason for concern. Additionally, recent evidence of prolonged parasite clearance times to artemisinin derivatives on the Cambodia-Thailand border has incited a global effort to contain artemisinin-resistant *P. falciparum* parasites and prevent the spread of naturally occurring artemisinin-resistant parasite strains.¹ This coordinated regional approach for malaria prevention and control is necessary and globally supported.

¹ <http://www.who.int/malaria/publications/atoz/9789241500470/en/index.html>

B. Why Indicator Framework Is Necessary

As the epidemiologic profile describes, the foci of malaria control in the GMS are quite different than those of sub-Saharan Africa (SSA). Since much of the global malaria community's efforts have concentrated on highly endemic regions such as SSA, many of the existing indicators that have been developed for malaria M&E are not always relevant for the GMS. The unique epidemiological, social, and political environment in the GMS necessitates approaches to malaria control that are tailored to its specific regional situations. These include low endemicity, focal transmission, disproportionately affected subgroups, rapidly developing drug resistance, and high *P. vivax* to *P. falciparum* infection ratios.

C. Process of Creating Indicator Framework and the Organizations Involved

This indicator framework was created with funding from USAID's Regional Development Mission/Asia (RDM/A). NMCPs from each country developed the framework under the guidance of WHO and MEASURE Evaluation, and with assistance from Malaria Consortium and CDC. The process originally began in 2006 when WPRO decided to revise the regional Kunming indicators. This effort continued when WHO and MEASURE convened the Informal Consultation to Review the Greater Mekong Sub-Region Malaria Monitoring and Evaluation Framework in Bangkok, Thailand on 9-10 October 2008. At this meeting, country programs highlighted their progress and specific challenges faced in the implementation of the original Kunming malaria indicators. Gaps in the original Kunming indicators set and difficulties with implementing and capturing indicators were highlighted.

In order to create an improved GMS malaria M&E system, the NMCPs proceeded to identify the essential elements that need to be measured to achieve malaria control in the subregion, which became the components of the BMIF. Over the following year and a half, country visits and regional meetings were organized to finalize the framework; collect feedback from NMCPs and international partners; select indicators and harmonize the BMIF with other working frameworks such as the GMP and the WPRO Regional Action Plan; and to create indicator definitions and reference sheets.

D. Intended Audience

The BMIF is designed for use by National Malaria Control Programs, and other government or NGOs working on malaria control and prevention. The framework and indicators should be used to gather data that are useful for malaria control program management.

National program officers can use this document to guide the development or updating of national malaria M&E plans by referring to the framework and its indicators to determine if important program components are addressed by the M&E plan. In addition, the indicator reference sheets can guide the development of data collection tools to ensure NMCP data collection is standardized and uniform.

The framework is also designed to be useful during data collection and reporting. When national and subnational health officers are ready to report BMIF data, they should refer to the indicator reference sheets to ensure collected data are reported appropriately and consistently.

Finally, these indicators should allow countries to report regularly to recognized authorities at various organizational levels—e.g., the Ministry of Health, the Regional Committee through the WHO Regional Director, and the World Health Assembly through the WHO *World Malaria Report*. It will also allow donors and international organizations to collect uniform data on malaria from the subregion that better reflect the epidemiologic situation.

E. Key Terms Used in the Indicator Framework

Given that this indicator framework is intended for use across the GMS region, it is important to start with a common understanding on the topic of malaria control and elimination. The following terms are used frequently in the framework, and for this reason, they are defined below. Definitions for other terms can be found in the indicator reference sheets, or in the glossary.

Elimination refers to the reduction to zero of the incidence of infection caused by a specified agent in a defined geographical area as a result of deliberate efforts. Continued measures to prevent re-establishment of transmission are required. The World Health Organization certification requires that there is a total of 3 consecutive years without local malaria transmission in a country to be classified as achieving elimination.

Vulnerable Populations refer to all of the following populations: pregnant women, children under 5 years old, adults over 65 years old, ethnic minority groups, mobile/migrant populations, forest-goers, HIV-positive persons, and others as determined by national policy.

Insecticide-Treated Nets are bed nets that have been treated with insecticides to provide protection by repelling mosquitoes and killing those that land on it. The net is hung over the sleeping area in order to prevent biting by mosquitoes. ITNs require retreatment with insecticides periodically in order to maintain their effectiveness (www.who.int/whopes/en).

Long-Lasting Insecticidal Net are bed nets that have been treated with insecticides to provide protection by repelling mosquitoes and killing those that land on it. The net is hung over the sleeping area in order to prevent biting by mosquitoes. LLINs are different from ITNs in that they have insecticide bound to the netting material during production, enabling them to extend their protection to approximately 3 years before requiring retreatment (www.who.int/whopes/en).

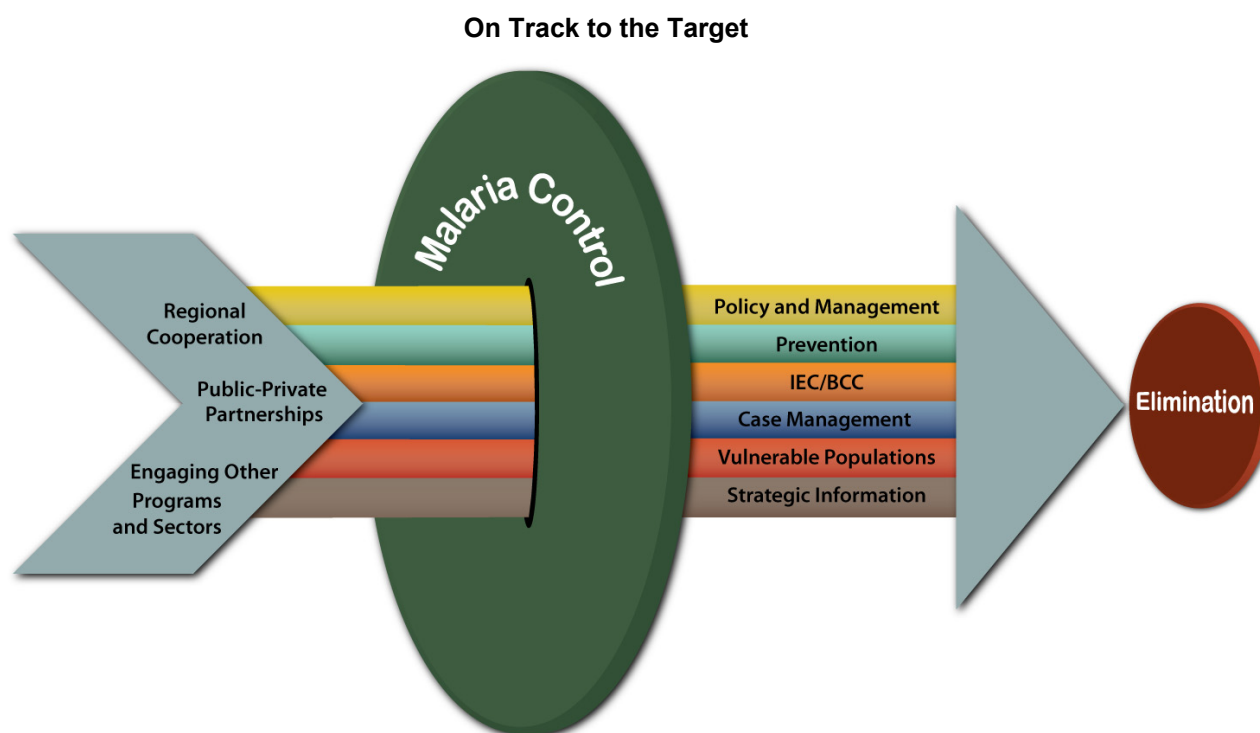
Information, Education and Communication/Behavior Change Communication (IEC/BCC)—IEC aims to impart knowledge and skills to the general public to enable informed decisions and encourage active involvement in malaria prevention, treatment, and control activities. It is also important for raising the profile and visibility of malaria control programs through continuous advocacy activities. BCC refers to any communication activity with a goal of empowering individuals or communities to practice positive health behaviors. Malaria-related examples include use of ITNs, prompt care-seeking for children with fever, and use of IPT by pregnant women.

Rural/Urban disaggregation is recommended for some indicators. No standard criteria for differentiating between rural and urban areas exist, so countries will need to determine appropriate criteria.

Midyear Resident Population at Risk of Malaria is the population residing in areas at risk of malaria halfway through the surveillance or observation period. This can be estimated by calculating the average from population measurements from the same time in 2 consecutive years. Ideally, countries should use the same calendar they use to collect surveillance data.

Routine Information consists of data that are generated and collected in a standardized manner and on a regular basis (frequently monthly) from health facilities and, where available, from communities. This can be collected as part of the Health Management Information System (HMIS), or through vertical disease specific information systems.

F. Purpose of Bi-Regional Malaria Indicator Framework



This indicator framework addresses the goals of malaria control and elimination in the GMS. As these goals represent two separate endpoints on a continuum of malaria reduction, they are depicted as such in the framework schema. Measuring progress towards these goals requires quantification of reductions in disease burden, and the successful geographical containment of disease. The malaria control indicators are labeled with letters rather than numbers to differentiate them from the other indicators as measures of general program impact.

The BMIF outlines six major components for achieving malaria control and elimination. These include policy and management, prevention, IEC/BCC, case management, engaging vulnerable populations and strategic information. In addition, several cross-cutting themes are specified for effective implementation of these components: regional cooperation, strong public-private partnerships, and engagement of other programs and sectors. These cross-cutting elements do not have a specific set of indicators; instead various indicators throughout the framework touch upon these important issues.

There are two types of indicators that populate this framework: (1) the core Global Malaria Indicators (GMI), (2) and the Supplemental Regional Indicators (SRI). The GMI are indicators developed by WHO's Global Malaria Program (GMP), while the SRI were chosen from other sources, or were developed through consultations with GMS NMCPs and various international authorities. The reference sheets for the two types of indicators are slightly different to help differentiate them; this is explained in the next section.

Data Use

The indicators presented in this framework can be used to monitor and report on progress in implementation of the various NMCP components; this includes guiding program management and improvement; assessing implementation of malaria control strategy priorities, and measuring the effectiveness of the overall malaria control strategy.

Further, indicators can also be used by both national and international agencies to compare malaria control performance across different countries. Such comparison will assist in identifying relative strengths and weaknesses in institutional capacity to implement various malaria control interventions, and help to show the relative progress in achieving control and elimination targets. Cross-national comparisons can also assist national policymakers in learning about innovative approaches that may be applicable in their own countries. Lastly, the indicators can provide evidence-based data to health policymakers for use in negotiations on malaria policy and for advocating on behalf of vulnerable populations.

II. How to Use the Indicator Framework

This indicator framework is intended to be a living, functional guide for those implementing malaria control programs. A national program manager should be able to use the framework to identify malaria control goals, to create strategies for accomplishing those goals, and to align national standards and reporting with those of other countries in the region. M&E officers and local health staff can use the indicator reference sheets to ensure collected data are reported appropriately and consistently.

A. NMCP Program Management

Construction of the BMIF was centered around input from NMCPs in the GMS. As such, the framework and indicators reflect the malaria control and elimination priorities in the region, and can be used as a reference when program managers formulate their national strategies and M&E plans. Specifically, program managers can refer to the framework to determine if the program components identified are relevant to the NMCP's strategy. If a component is important, then it should be included in the national strategy.

After a national strategy is determined, a national malaria M&E plan should be created and it should be based on and reflect the national strategy. The NMCP will need to select indicators to use in the national strategy; the BMIF provides well-defined and standardized indicators for this purpose.

Program managers can review the BMIF indicators and select those that are useful to their program. An indicator should be chosen if it reflects program priorities and if it is useful for program management, not if the data are easy to collect, or if the NMCP already performs well on the selected indicator. In fact, indicators that the NMCP may not perform well on will be more useful for program management, as they can be tracked to assess improvement, and can help identify program gaps.

After the national malaria M&E plan is created, it needs to be implemented. Indicator data will need to be collected in a uniform manner. The indicator reference sheets will help accomplish this by furnishing standardized indicator definitions. The NMCP can use these definitions to construct data collection tools so that data are collected and managed appropriately and consistently.

After the M&E plan is implemented and data are collected, the NMCP should evaluate BMIF indicators to ensure program components are improving. Compiled data should be analyzed regularly to identify patterns and gaps. In this manner, the NMCP can use collected data as evidence in support of policy changes, adaptation of interventions, and resource allocation.

While using the BMIF, NMCPs should document any issues that are encountered. As previously mentioned, this is a living document; feedback and recommendations based on experience implementing the BMIF will help assess and improve the framework. A specific plan for revising the BMIF is outlined in Section IV of this document.

B. Indicator Data Collection

When collecting data, an M&E officer or local health staff should refer to the reference sheets, as they provide basic guidance about the indicator. The sheets describe indicator characteristics such as data sources, frequency of data collection, justification, strengths and limitations, and other sources of information. For illustrative purposes, an example indicator reference sheet is included below, and it is followed by an explanation of each element.

1.2 Annual domestic and external funding for national malaria program
<p>Definition</p> <p>Funding for national malaria control program disaggregated by funding sources in U.S. dollars. This includes funds from the government/Ministry of Health, multinational organizations such as WHO, the Global Fund, and the World Bank, bilateral organizations and other organizations such as NGOs, universities, and foundations.</p> <p>This indicator contains the same data items as the budget section of the World Malaria Report data sheet.</p>
<p>Data Source: Government and NMCP records and reports</p>
<p>Data Items</p> <p>Contribution to malaria budget in U.S. dollars from:</p> <ul style="list-style-type: none"> • Government/Ministry of Health. • Global Fund. • World Bank. • United Nations (UN) Agencies. • European Union. • U.S. Government. • Other bilateral. • Other NGOs, foundations, etc.
<p>Data Type: Number (U.S. dollars).</p>
<p>Disaggregation: By funding source.</p>
<p>Frequency: Annual.</p>
<p>Applicability: All countries.</p>

Purpose/Rationale: Adequate funding is necessary to effectively control malaria. Knowing the amount of funds spent on malaria activities and where the funding originated from increases transparency, helps with program planning and allocation of resources, and aids in tracking any significant changes in funding from year to year; it can also help reveal shortfalls in funding and aid international organizations and national governments in assuring sustainability of funding. This indicator measures the amount of malaria funding and the source so both aspects can be tracked.

Method of Measurement: This indicator utilizes data from government and NMCP records and reports. The dollar amount from an NMCP budget, which includes all money from all funding sources, should be utilized to report this indicator. If this budget does not exist, the budgets from separate organizations—such as the Global Fund PR, the NMCP, and the MOH—should be utilized to report the total amount of funds used to control malaria. In the latter case, care should be taken to make sure funding is not counted more than once.

Strengths:

- The data for this indicator should be readily available within government and NMCP records and reports.

Limitations:

- Although indicator is clearly defined, the national government’s contribution to the malaria program may not be easily identified, as some administrative levels and aspects of the malaria program may be integrated with programs for other diseases.

Reference

Date of Last Revision: 27 April 2010

At the top of each indicator reference sheet is a “Quick Reference” box. This box is intended to allow M&E officers and health staff to quickly review the important information necessary to properly collect indicator data. The core GMI have “Quick Reference” boxes—which are all white below the indicator name, while the SRI have “Quick Reference” boxes—which are blue and white below the indicator name, as in the example.

The first row of the indicator reference sheet and the “Quick Reference” box is the indicator *Name*. Below this is a box with the detailed *Definition* of the indicator; this includes specific information on the numerator and denominator for quantitative measures. In the above example there are no numerator and denominator; rather there is some guidance on specific aspects of funding and how they should be reported.

The next section outlines possible *Data Sources*. In this case, data should be gathered from “Government and NMCP records and reports.”

The specific data required are listed in the *Data Items* box. For this indicator, the following data items will be necessary: the contribution to the malaria budget in U.S. dollars from Government/Ministry of Health, the Global Fund, the World Bank, UN agencies, European Union, the U.S. Government, Other bilaterals, Other NGOs, foundations, etc.

The *Data Type* section specifies the form in which these data will need to be reported by data collectors. In addition, if the data are to be stored in a database, the data type will help inform programmers what format the data will be in. This example asks that the data be reported as a number in U.S. dollars.

The *Disaggregation* section specifies specific subpopulations or manners in which data should be stratified. For this example, it is by funding source.

The *Frequency* of data collection desired is also specified on the indicator sheets. In this case, annual reporting is requested.

Finally, *Applicability* provides guidance for specific countries or regions in which the indicator is of *interest*.

Other useful information follows the indicator reference sheet “Quick Reference” box. This includes *Purpose/Rationale* for collecting data on the indicator. This section explains why the indicator has been selected, and what its intended purpose is.

The *Method of Measurement* section provides further guidance on how data should be collected.

Limitations and *Strengths* of the indicator are also described. In this example, a strength is the availability of necessary data, while a limitation is the difficulty determining the exact amount contributed by the national government.

The next component of the reference sheet is the *References* section. It refers the reader to other documents where the current indicator was originally described.

The last section is the *Date of Last Revision*, which indicates when the reference sheet was last revised.

III. Indicator Reference Sheets

A. Malaria Control

A. Deaths due to malaria (number and rate)
<p>Definition</p> <p>Numerator: Deaths with a primary diagnosis of malaria at death.</p> <p>Denominator for rate: Midyear resident population at risk of malaria.</p> <hr style="border-top: 1px dashed #000;"/> <p>Clarification</p> <p>† Deaths can be from health facilities (hospitals) or other deaths recorded in HMIS. Malaria should be recorded as the primary cause of death. A multiplier of 100,000 persons might be used in low-incidence areas.</p> <p>† Populations at risk of malaria—a population living in area where imported malaria cases exist, or where a locally transmitted malaria case was detected over the last 12 months.</p>
<p>Data Source: Routine information</p> <p>Inpatient discharge records—both hospitals and non-hospital health facilities with inpatient beds. Reported deaths from any health facility, even those with outpatient services only, should be included in reported routine data.</p>
<p>Data Items</p> <ul style="list-style-type: none"> • Deaths with a primary diagnosis of malaria at death. • Midyear resident population at risk of malaria.
<p>Data Type: Number and rate.</p>
<p>Disaggregation: Age <5, ≥5 years and place (district, health facility catchment area).</p>
<p>Frequency: Monthly.</p>
<p>Applicability: All countries.</p>

Purpose/Rationale

- *Monitors Impact of Program on Severe Disease and Death.* May show differential impact of treatment that specifically attenuates clinical progression from uncomplicated to severe disease and death.
- *Monitoring New RBM Target of Near-Zero Preventable Malaria Deaths and the Related MDG Target (By 2015).* Surveillance of inpatient malaria deaths is an excellent tool to monitor this new target. The operational target would be elimination of inpatient malaria deaths. If inpatient cases and deaths have reached zero, then population malaria deaths have likely been reduced to very low levels.
- In contrast to inpatient cases (in which a substantial fraction are “moderate” cases and do not fit WHO’s definition of severe malaria), deaths represent very severe illness.

Method of Measurement (Interpretation/Use)

Some health information systems record deaths in any health facility (even those with only outpatient services). These malaria deaths should be added to those reported from inpatient facilities.

Low transmission considerations: Line-listed inpatient malaria cases/deaths allow more detailed analysis by age, village, and intervention risk factors. When inpatient deaths decline to low levels and national goal is elimination of malaria deaths, each malaria death should have complete (field) investigation.

Much of the interpretation guidance for deaths is similar or identical to that of inpatient cases (see Indicator D, Inpatient Malaria Cases). We have only highlighted the differences between cases and deaths in this section.

Most Sensitive Indicator of Impact on Severe Disease. Deaths may be the most sensitive indicator for monitoring impact, especially on severe disease. Deaths are likely to be the most sensitive indicator to detect rising resistance to antimalarial medicines or insecticides (IRS or on LLIN).

However, the number of reported deaths can be small and result in instability of the baseline and post-intervention periods for comparing trends. Therefore, analyzing trends in deaths and cases together on a double-axis graph is useful.

High Transmission Settings. As malaria control improves, deaths should decline continuously as transmission declines from high to moderate levels.

Monitoring New RBM Target of Near-Zero Preventable Malaria Deaths and the Related MDG Target (by 2015). Inpatient malaria deaths will be the most important operational way to monitor this new indicator for countries without clinician-diagnosed vital event registration.

Comparison of Inpatient Cases and Deaths. Cases and deaths should be analyzed and displayed together on a double-axis graph. Trend in deaths (<5 years) may be a more sensitive indicator (and decline first and faster) than aggregate number of cases <5 years, especially at high levels of transmission.

Relationship with Resistance to Antimalarial Medicines and Insecticides. Deaths appear to increase (at least double) when high-grade drug resistance appears to the national first-line antimalarial medicine. Changing first-line antimalarial medicine to more efficacious medicine may result in decline of inpatient deaths by 25–50% or more. A rise in inpatient cases may indicate drug resistance (or the use of fake antimalarial medicines). Deaths may be a sensitive indicator of rising resistance to insecticides (IRS or LLIN).

Comparison of Inpatient Trends to Population Trends. Preliminary data indicate similarity of inpatient, outpatient, and population trends (Kilifi studies, Zambia data), although patterns in individual facilities and districts may vary. This similarity may be related to minimal health-facility-related bias in LLIN and IRS coverage. More data are needed on this issue.

Strengths

Limitations

- Trends in deaths have the same limitations as inpatient cases (see “Limitations” sector for Indicator D, Inpatient Malaria Cases).

- Because some persons leave (or are taken from) inpatient facilities prior to death, opportunity for health-facility-related bias may be larger for deaths than for inpatient cases.

References

WHO, World Malaria Report 2005, p. 75–84, Table 13, and p 291.

WHO Expert Committee on Malaria, Twentieth Report, 2000, p 46–47.

Date of Last Revision: May 2010

B. Confirmed malaria cases (number and rate)
<p>Definition</p> <p>Numerator: Number of confirmed malaria cases (by microscopy or RDT) reported by health facilities (passive detection), active case detection, or by community workers per year.</p> <ul style="list-style-type: none"> • Confirmed case: Person with suspected malaria who is confirmed using either microscopy or RDT. <p>Denominator for rate: Midyear resident population by age (<5 years, all ages) per 1,000 persons for persons resident in areas at risk of malaria.</p> <p>† Areas at risk of malaria—this should be determined according to the risk stratification system described in Indicator 6.3.</p>
<p>Data Source: Routine information.</p> <p>Data reported by health facilities and community health workers.</p> <p>Data from community and active case detection forms should be added to total numbers but should be identified as a separate subset. Community level data should be included only once quality is assured and procedures are in place to reduce double-counting.</p>
<p>Data Items</p> <ul style="list-style-type: none"> • For microscopy— <ul style="list-style-type: none"> ▪ Number of confirmed malaria cases from passive case detection. ▪ Number of confirmed malaria cases from active case detection. ▪ Number of confirmed malaria cases detected by community workers. • For RDT— <ul style="list-style-type: none"> ▪ Number of confirmed malaria cases from passive case detection. ▪ Number of confirmed malaria cases from active case detection. ▪ Number of confirmed malaria cases detected by community workers.
<p>Data Type: Number and rate</p>
<p>Disaggregation: Stratify by age group (<5, ≥5 years), species, and place (village, district, health facility catchment area).</p> <ul style="list-style-type: none"> • Data stratification by sex is relevant in areas where occupational malaria is significantly higher in either of the sexes.
<p>Frequency: Monthly.</p>
<p>Applicability: All countries.</p>

Purpose/Rationale

Measures trend of malaria morbidity and highlights location and quantity of ongoing malaria transmission. This indicator is the most important measure of progress and management in low-incidence areas.

Method of Measurement (Use/Interpretation)

- Data on confirmed cases should be separately recorded by parasite species, primarily *P. falciparum* and *P. vivax*. Separate rates by parasite species can be calculated.
- Persons resident in areas at risk of malaria = people living in areas where malaria transmission occurs during any time of the year.
- Completeness of health facility and district reporting should be known to correctly interpret the rate of this indicator.
- Traditionally, Annual Parasite Index (API) is terminology used by malaria community to indicate annual rate of confirmed malaria cases per 1,000 persons population (not only examined).
- Low transmission considerations—
 - Most low-incidence countries combine malaria confirmed cases from in- and outpatient settings.
 - In countries in the malaria elimination phase and in some low-transmission countries in the control phase, any person with positive result from a parasite-based test (microscopy or RDT) would be considered a malaria (confirmed) case.
 - Additionally, stratify by age, village, foci, and intervention risk factor.
 - Stratify by type of case detection—passive or active.
 - Stratify by case classification—local transmission (the result is an autochthonous case, which may be further classified as introduced, relapsing, or locally transmitted) or imported.
 - As the number of confirmed cases become less clustered, rates become less important.
 - Confirmed cases provide very good source of epidemiological information: place, time, and “person.” This information comes from a line list of confirmed cases.
- Trends in cases and rates of outpatient confirmed malaria cases should only be interpreted along with another indicator—percentage of suspected malaria cases receiving parasite-based testing for malaria. Overall, >90% of suspected malaria cases should be consistently tested for malaria (for example, no or few stock-outs of RDT or problems with microscopy at health facility level).
- Randomized controlled trials of ITN indicate 50% reduction in uncomplicated malaria cases when ITNs targeted all sleeping spaces (and not just targeted high-risk populations such as children <5 years old and pregnant women) even in high-transmission areas. Therefore, if ITN use in all persons is consistently >80%, then declines in outpatient confirmed cases should reach 50% from LLIN alone.

- Declines >50% are expected if multiple malaria control interventions (LLIN, IRS, treatment) have reached high levels (>80%).
- In high-transmission areas, treatment alone (without increases in LLIN or IRS) may not result in much decline in number or rate of outpatient uncomplicated malaria cases. However, recent evidence indicates that ACT can decrease transmission.
- Trends in outpatient confirmed malaria cases should be compared with trends in inpatient malaria cases and deaths. Current evidence indicates that percentage declines of outpatient confirmed malaria cases have paralleled declines in inpatient malaria cases and deaths in countries with aggressive malaria control. However, in areas with strong access to health services and strong treatment programs (prevent uncomplicated cases from becoming severe cases), declines in inpatient malaria cases and deaths may exceed those of outpatient confirmed cases.
- Malaria (confirmed) case rate of 1 per 1,000 persons or lower is indicative of excellent level of malaria control and indicates readiness to transition from control to pre-elimination phase.
- Private-sector involvement, active surveillance, and reporting from community agents improve the likelihood that the rate of reported cases is similar to the population rate.
- *Rates.* Calculation of rates over time (e.g., percentage of decline in a particular year compared with baseline) for district, region and other levels should be done using respective midyear population figures adjusting for population growth from national census projections and the UN Statistics Division.
- Reliable trends depend on a consistent set of data reported from public-sector health facilities or other sectors. Sets of data received increasingly or suddenly from military health facilities, or private non-profit or for profit health facilities, should be added up to national figures, but they should remain a separate subset for allowing comparison with the previous time series based only on public health facilities.
- Data from different channels (e.g., public-sector, private-sector, active detection, community RDT testing) should be analyzed separately.

Strengths

Limitations

- Trend may not be reliable if percentage of suspected cases that were tested or completeness of reporting has been highly variable, or if there were changes in policy of diagnosis of malaria.

- The number of reported malaria cases may vary due to multiple factors:
 - Access to health services (e.g., user fees, distance, cultural barriers, quality of care)
 - Health facility reporting completeness (e.g., often private health facilities report less)
 - Under-notification of people due to malaria self-treatment

References

WHO, Guidelines for the Treatment of Malaria, 2006, p. 5–8.

WHO, Guidelines for the Treatment of Malaria, 2006, p. 41.

WHO, World Malaria Report 2005: p. 75-84, Table 13, p. 291.

WHO-RBM, Framework for Monitoring Progress and Evaluating Outcomes and Impact, p. 10–13, 2000.

WHO Expert Committee on Malaria, Twentieth Report, 2000, p. 46–47.

Date of Last Revision: May 2010

C. Confirmed cases by malaria species (percentage)

Definition

Calculate following percentages for Active Case Detection and Passive Case Detection, and for microscopy and RDTs separately:

Percentage of confirmed malaria cases due to *P. falciparum*—

- **Numerator:** Number of laboratory-confirmed cases caused by *P. falciparum* mono-infection and mixed infections.
- **Denominator:** Total number of confirmed cases due to *P. falciparum*, *P. vivax*, mixed infections *and* other species.

Percentage of confirmed malaria cases due to *P. vivax*—

- **Numerator:** Number of laboratory-confirmed cases caused by *P. vivax* monoinfection and mixed infections (for RDT calculation assume all non-falciparum cases are due to *P. vivax*).
- **Denominator:** Total number of confirmed cases due to *P. falciparum*, *P. vivax*, mixed infections *and* other species.

† Mixed infection—infections due to two or more species of malaria parasite (for calculation purposes, it is assumed that most of these cases are due to *P. falciparum* and *P. vivax*).

Data Source: Routine information

Data Items

For both Passive Case Detection and Active Case Detection collect data:

- For microscopy—
 - # of *P. falciparum* cases.
 - # of *P. vivax* cases.
 - # of mixed infection cases.
 - # of cases caused by other species.
- For RDTs—
 - # of *P. falciparum* cases.
 - # of cases caused by species other than *P. falciparum*.
 - # of mixed infection cases (*P. falciparum* + other species).

Data Type: Percentage.

Disaggregation: By Passive Case Detection and Active Case Detection; by species: *P. falciparum*, *P. vivax*.

Frequency: Monthly.

Applicability: All countries.

Purpose/Rationale

This indicator will be used to compare the proportion of cases caused by *P. falciparum*, *P. vivax*, and other species. The number of cases caused by different species is important to track, as different treatments and strategies are necessary for effective control; a breakdown of cases by species will also allow efficacious program management. In addition,

P. falciparum responds to control efforts more quickly than *P. vivax*; as countries move toward elimination, *P. vivax* will account proportionally for more cases than *P. falciparum*. Monitoring this trend will allow countries to gauge their progress towards elimination and to reformulate their programs in order to address the specific disease profile present in their country. Specific control and elimination interventions should be determined by the malaria species being targeted.

Method of Measurement

This indicator requires data collected from patient and laboratory records, which should be available within routine data collecting systems. All cases for which the presence of *Plasmodium* species was confirmed should be included in the calculation of the indicator. In countries where there is limited or no confirmation of species in malaria-endemic areas, data from surveillance sites can be substituted for data from routine information sources.

The following percentages should be produced for passive and active case detection and for microscopy and RDTs separately:

1. Percentage of laboratory-confirmed cases due to *P. falciparum*
2. Percentage of laboratory-confirmed cases due to *P. vivax*.

The percentages calculated using the *microscopy data* should be used to make program management decisions. The *RDT data* are collected to measure the extent of RDT utilization and should be tracked until RDT use matches microscopy use. At this later point in time, the RDT data could also be used as a basis for programmatic decisions.

If countries collect data on *individuals tested by both microscopy and RDT*, these individuals should be counted as a microscopy result only. If countries are not collecting these data, proportions should be calculated as described above, since “double-counting” of individuals tested by both methodologies in the numerator and denominator should not greatly affect the proportional breakdown by species.

Strengths

- The denominator is clearly defined and can be calculated exactly from existing records.

Limitations

- In areas where a large proportion of cases are not confirmed, or where individuals self-treat, this indicator may not reflect the true breakdown of cases by species.
- The accuracy of laboratory tests, especially PAN RDTs, to confirm malaria infection and species will vary with time and place due to the different standards of practice of malaria microscopy, the different types of RDT used, and the extent to which village workers and volunteers use these tests.

References

Date of Last Revision: 27 April 2010

D. Admitted malaria cases (number and rate)
<p>Definition</p> <p>Numerator: Cases with a primary diagnosis of malaria at discharge (and not admission). It is assumed that all cases would have had a parasite-based test for malaria (microscopy and/or RDT) and discharge diagnosis was based on test results.</p> <ul style="list-style-type: none"> Inpatient cases can be from hospitals or non-hospital facilities with inpatient beds. <p>Denominator for rate: Midyear resident population by age (<5, all ages) per 1,000 persons for persons resident in areas at risk of malaria (per 100 000 persons might be used in low-incidence areas).</p> <p>† Areas at risk of malaria—this should be determined according to the risk stratification system described in Indicator 6.3.</p>
<p>Data Source</p> <p>Inpatient discharge records, both hospitals and non-hospital health facilities with inpatient beds.</p>
<p>Data Items</p> <ul style="list-style-type: none"> Cases with primary diagnosis of malaria at discharge (microscopy and/or RDT). Midyear resident population by age per 1,000 persons for persons.
<p>Data Type: Number and rate.</p>
<p>Disaggregation: Stratify by age group (<5, ≥5 years) and place (district, health facility catchment area).</p>
<p>Frequency: Monthly.</p>
<p>Applicability: All countries.</p>

Purpose/Rationale

As marker of severe disease and death, monitors impact of program on severe disease. This indicator may show differential impact of treatment since treatment specifically attenuates clinical progression from uncomplicated to severe disease.

Monitoring new RBM target of near-zero preventable malaria deaths (by 2015). Surveillance of inpatient malaria cases and deaths is an excellent tool to monitor this new target. The operational target would be elimination of inpatient malaria cases and deaths. If inpatient cases and deaths have reached zero, then population malaria deaths have likely been reduced to very low levels.

Method of Measurement (Use/Interpretation)

- Low transmission
 - Line-listed inpatient malaria cases allow more detailed analysis by age, village, and intervention risk factors.

- In some countries, inpatient cases may include uncomplicated *P. falciparum* cases (according to national guideline) to ensure full treatment, recovery, and parasite clearance.
- This indicator may be more important in areas with high transmission that have more severe morbidity due to malaria.
- Inpatient cases are markers of severe disease and death. Generally, the number of inpatient cases is higher than the number of deaths; therefore, trends of cases may be more stable.
- As a marker of severe malarial disease, this indicator has gained more importance since 2008 Global Malaria Action Plan added “near zero preventable deaths” as a new indicator for 2015.
- *Sensitivity to Detect Change in Morbidity and Mortality due to Recent Malaria Interventions.* Data from Zambia and other countries indicate inpatient surveillance data can detect declines in inpatient malaria cases and deaths of approximately 20–30% (temporally related to start of malaria control interventions) if there is reasonable access to inpatient facilities and information system is good.
 - Small changes (e.g., <20%) may not be reliably detected by inpatient surveillance data over the short term (1–3 years).
- *Effect of Treatment Compared with Prevention/Transmission Reduction.* Treatment is likely to result in declines in severe malaria (inpatient cases) and deaths, out of proportion to declines in transmission.
- *Monitoring New RBM Target of Near-Zero Preventable Malaria Deaths (by 2015).* Once number of inpatient cases has been reduced, countries should shift to case-based (line listing, individual record) data to more effectively track why moderate and severe cases of malaria continue to occur.
- *Aggregate number of cases <5 years may not decline sharply during transition from high to moderate transmission until an approximate threshold of <20% population parasite prevalence is reached.* During the reduction of transmission from high to moderate levels, cases in children <1 year may decline, but cases in 1–4 years may rise, resulting in stable number of total cases in those <5 years. Trends in cases <1 year are likely to be more sensitive than those of aggregate number of cases <5 years, however, trends in cases <1 year usually are not measurable because most high-transmission countries have not started line-listing of individual inpatient cases and deaths to derive trends by year of age.
- *Comparison of Inpatient Cases and Deaths.* Inpatient cases and deaths should be analyzed and displayed together on a double-axis graph. Trend in deaths (<5 years) may be more sensitive indicator (and decline first and faster) than aggregate number of cases <5 years, especially at high levels of transmission.
- *Relationship with Resistance to Antimalarial Medicines and Insecticides.* Cases and deaths may increase (at least double) when high-grade resistance appears to the

national first-line antimalarial medicine. Changing first-line antimalarial medicine to more efficacious medicine may result in decline of inpatient deaths by 25–50% or more. A rise in inpatient cases may indicate antimalarial medicine resistance, the use of fake antimalarial medicines, or resistance to insecticides for IRS or on ITN.

- *Comparison with Outpatient Laboratory-Confirmed Case Data.* Recent evidence shows that trends of inpatient malaria cases and deaths closely followed trends in outpatient laboratory-confirmed malaria cases.
- *Comparison of Inpatient Trends to Population Trends.* Data indicate similarity of inpatient, outpatient, and population trends (Kilifi studies, Zambia data), although patterns in individual facilities and districts may vary widely. This similarity may be related to minimal health-facility-related bias in LLIN and IRS coverage. More data are needed on this issue.

Strengths

- Inpatient malaria cases and deaths are markers of severe malaria and death, and, therefore, are powerful indicators for monitoring impact.
- Inpatient cases with moderate and severe malaria are markers of failure of the public health system to either prevent or effectively treat.
- The predictive value of inpatient malaria cases and deaths in most areas is relatively high and sensitive to changes induced by malaria control activities.

Limitations

- Potential bias of health facility trends compared with population trends. Trends in inpatient data may be different than population trends because of reduced access to inpatient facilities according to distance and other factors. Inpatient facility attendance may be affected by treatment-seeking behavior, malaria treatment practices at health facility level and by the people accessing to health care.
- There are several published accounts of biased inpatient trends in individual facilities; so interpreting data for individual health facilities and districts should be done with caution, especially for gradual changes over long time periods.
- Theoretically, health facility bias should point to a single direction—that is, health facility trends should decline faster than population trends. Therefore, programmatically, if expected decline in inpatient cases and deaths is not evident, then impact is likely to be lacking at the population level as well.

References

WHO-RBM, Framework for Monitoring Progress and Evaluating Outcomes and Impact, p. 10–13, 2000.

Date of Last Revision: May 2010

E. Malaria test positivity rate
<p>Definition</p> <p>Numerator: Number of outpatient laboratory confirmed malaria cases.</p> <p>Denominator: Total number of outpatient suspected malaria cases tested × 100.</p> <p><i>Caution should be made not to include testing of non-febrile cases or inpatient cases.</i></p>
<p>Data Source: Same as other surveillance data (Outpatient registers, laboratory registers, or HMIS forms).</p>
<p>Data Items</p> <ul style="list-style-type: none"> • Number of outpatient laboratory confirmed cases by microscopy. • Number of outpatient laboratory confirmed cases by RDT. • Total number of outpatient suspected malaria cases tested × 100.
<p>Data Type: Rate</p>
<p>Disaggregation</p> <p>Stratify by age group (<5, ≥5 years) and place (district, health facility catchment area) and by type of case detection (passive or active).</p> <p>If data collected, stratify by type of diagnostic test (microscopy or RDT).</p>
<p>Frequency: Monthly.</p>
<p>Applicability: All countries.</p>

Purpose/Rationale

Malaria test positivity rate (TPR) monitors impact of program on malaria transmission. This indicator partially “corrects” for RDT stock-outs and interruption of microscopy services because denominator does not include suspected cases that are not tested.

Method of Measurement (Use/Interpretation)

- Where substantial amounts of both outpatient microscopy and RDT are used, national programs should separately record testing and results (confirmed) by microscopy and RDT.
- In places where *P. falciparum* and *P. vivax* exist, malaria test positivity rate of the respective species should be calculated separately. The proportion and rates of two species over time is useful in understanding the dynamics of the epidemiology of malaria and guiding treatment.
- *Number of Suspected Malaria Cases Tested.* Those outpatient febrile cases suspected of malaria tested with either microscopy or RDT.
- *Countries Starting to Test Most Outpatient Malaria Cases with RDT.* Malaria TPR is the best outpatient indicator while RDT systems are being established and RDT stock-outs are still occurring.

- TPR should be calculated separately from health facilities (passive detection), active detection, and community workers as the profile of the suspected cases or quality of laboratory testing may vary. TPR from inpatient cases suspected of severe malaria is likely to be much different than that of the outpatient suspected malaria cases. Therefore, data for this indicator should only come from outpatient facilities.
- *Stratify by type of case detection—passive or active.* As majority of fever cases are non-malaria in low transmission settings, the number of suspected cases that undergo lab testing may depend on the local knowledge of endemicity (e.g., all fever cases may not be tested). Therefore, there should be clear national guidance on who should be tested.
- Usefulness of TPR as an indicator increases as percentage of suspected cases tested is >90%.
- *Differentiate between annual TPR and monthly/peak season TPR.* It is important to differentiate between annual TPR and TPR during peak malaria season. TPR in peak malaria season may be much higher than annual TPR, especially in countries with highly seasonal malaria.
- Countries with effective scale-up of interventions consistently show lower annual TPR over time following the introduction of the interventions. Recent evidence indicates that TPR declines in parallel with outpatient confirmed malaria cases and inpatient malaria cases and deaths.
- Based on recent evidence, declines in outpatient malaria cases and inpatient malaria cases and deaths of >50% corresponds to decline of TPR from 55–30% to approximately 15% or lower, and declines of >80% correspond to TPR <10%. Absolute percentage TPR is not an accurate estimate of population prevalence—outpatient TPR is often higher than population prevalence, especially in peak season.
- *Countries with long history of testing nearly all outpatient malaria cases with microscopy.* Assuming consistent percentage of suspected cases tested are >90%, trend in confirmed malaria cases, rate of confirmed cases (API), and test positivity rate are a trio of excellent indicators.
- Peak-season malaria TPR or SPR of $\leq 5\%$ is a common benchmark for excellent control of malaria and indicator of readiness to shift from control to elimination phase.
- Examining both annual outpatient TPR and monthly pattern of TPR by age group is useful for monitoring impact. As malaria control improves, the ratio between TPR in children and adults may change, with more equivalence between the two age groups.
- *Case definition for suspected malaria cases used by clinicians.* If clinicians are using a more restrictive case definition as a trigger for diagnostic testing, then TPR will be higher. However, TPR trend will still decline with increasing malaria control.
- TPR of active case detection, during which febrile individuals are tested in a community, is likely to be less than that of passive case detection.

Strengths

Limitations

- Changes in clinician diagnostic practices can alter TPR.
- Changes in laboratory test characteristics, such as batch-to-batch variability in test characteristics of RDT, can alter TPR.
- Inter- and intra-annual TPR changes can occur due to environmental and other changes.

References

WHO, Guidelines for the Treatment of Malaria, 2006. Geneva, Switzerland

Malaria, Principles and Practice of Malariology, by W H Wernersdorfer, I McGregor, Volume II, pp. 1045–1054, Churchill Livingstone, 1998.

Disease surveillance guidelines. WHO SME/GMP. Draft 2009.

Date of Last Revision: May 2010

F. Interruption of malaria transmission in targeted administrative units
<p>Definition</p> <p>Country will use an endemicity map of malaria transmission in administrative units to report the following:</p> <ul style="list-style-type: none"> • Numerator: Number of administrative units with interruption of local transmission. • Denominator: Number of administrative units within a country. <p><i>Note: Includes both P. falciparum and P. vivax.</i></p>
<p>Clarification</p> <p>† Administrative unit—the smallest useful geographic/government organizational unit such as a province, district, county, sous-prefecture, etc. for which an NMCP can get data required by the indicator.</p> <p>† Interruption of malaria transmission—no locally transmitted malaria case is detected over the last year (a malaria case for which local transmission cannot be disproved. This includes delayed first attacks of <i>P. vivax</i> due to locally acquired parasites with a long incubation period).</p>
<p>Data Source: Routine information, and NMCP policy documents.</p>
<p>Data Items</p> <ul style="list-style-type: none"> • Total number of administrative units in a country. • Number of administrative units with interruption of local transmission during the last year.
<p>Data Type: Percentage.</p>
<p>Disaggregation: None.</p>
<p>Frequency: Annual.</p>
<p>Applicability: All countries.</p>

Purpose/Rationale

Interruption of local transmission is an intermediate and necessary step towards achieving elimination. By mapping and calculating the percentage of the country that falls into these malaria strata, programs will be able to track progress towards controlling malaria.

Method of Measurement

This indicator utilizes data from program records. The denominator should come from NMCP policy documents and maps that identify the name of the appropriate administrative unit and the number of that type of administrative unit in existence within the country. The numerator will be calculated from malaria routine information systems that report the number of malaria cases in an administrative unit. These data will be used to construct an endemicity map of malaria transmission with administrative units that have achieved interruption of local malaria transmission during the prior year. The total number of these administrative units will determine the numerator that will be utilized to calculate the percentage required by the indicator definition.

Strengths

- The denominator is clearly defined and can be calculated exactly from existing records.

Limitations

- Countries may not choose comparable administrative units, and these may change periodically with governmental reorganization. In addition, indicator has greater utility as administrative unit size decreases.

References

Date of Last Revision: 27 April 2010

B. Policy and Management

1.1 National malaria policies and plans are updated and independently or jointly reviewed at least once every 5 years

Definition

For each component of the checklist, the NMCP will need to examine existing policy to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is completely satisfied if the NMCP responds “Yes” to all checklist items. The program will report the proportion of “Yes” responses out of the number of checklist items (18). A checklist item is satisfied if policies and plans exist, are up-to-date (created within last 5 years), and independently or jointly approved by WHO, or an approved organization. This indicator should be reviewed annually to track progress.

A. Case Management

1. Case management guidelines covering diagnosis and treatment of both outpatient and inpatient malaria cases were updated/externally reviewed (Y/N).
2. Existence of drug registration mechanism at national level that identifies all legal antimalarial medications (Y/N).
3. Medication registration mechanism mentioned above prohibits the registration of artemisinin monotherapies (Y/N).

B. Vector Control

4. Integrated Vector Management policy last updated/externally reviewed (Y/N).
5. Existence of national regulatory mechanisms for appropriate use of public health insecticides (Y/N).

C. Vulnerable populations

6. Vulnerable populations are identified in national strategic plan. (Y/N).
7. Vulnerable populations policy last updated/externally reviewed (Y/N).
8. Strategies are in place targeting identified vulnerable populations (Y/N).
9. Pregnant women policy last updated/externally reviewed (Y/N).
10. Country conducts studies of vulnerable populations to identify barriers to accessing appropriate health care (Y/N).

D. Program Management

11. Existence of human resource and professional development plan (Y/N).
12. Existence of financial management plan (Y/N).
13. Existence of public-private policy in malaria work (Y/N/NA).
14. Malaria priority research agenda is developed by national malaria programme, in cooperation with stakeholders, and used as a reference when approving new proposals (Y/N).
15. Existence of M&E and surveillance plan (Y/N).
16. Existence of standard malaria programme operating procedures manual (Y/N).
17. Existence of annual performance review of malaria program by Ministry of Health (Y/N).
18. Collaboration on policies and strategies to control malaria exists between government sectors that the NMCP has identified as appropriate (for example, different government sectors include but are not limited to ministries of agriculture, women affairs, justice, defense, education, bureau of statistics, etc.) (Y/N).

Indicator 1.1 (continued)

Clarification

[†] Integrated Vector Management—according to WHO (<http://apps.who.int/malaria/integratedvectormanagement.html>) includes—

- Selection of methods based on knowledge of local vector biology, disease transmission and morbidity.
- Utilization of a range of interventions, often in combination and synergistically (including chemical, biological, or environmental interventions).
- Collaboration within the health sector and with other public and private sectors that impact on vector breeding.
- Engagement with local communities and other stakeholders.
- A public health regulatory and legislative framework.
- Rational use of insecticides.
- Good management practices.

[†] Human resource plan—based on the WHO endorsed health workforce framework from Human Resources for Health document: Addressing the health workforce crisis: towards a common approach, a human resource plan should address (<http://www.human-resources-health.com/content/pdf/1478-4491-4-21.pdf>)—

1. Policy: Rules, regulations, and legislation for conditions of employment, work standards and development of the health workforce.
2. Health workforce management: Integrated use of data, policy and practice to plan for necessary staff, recruit, hire, deploy and develop health workers.
3. Finance: Obtaining, allocating and dispersing adequate funding for human resources.
4. Education: Production and continuous development of an appropriately skilled workforce.
5. Partnerships: Formal and informal linkages aligning key stakeholders (e.g., service providers, sectors, donors, to maximize use of human resources).
6. Leadership: Capacity to provide direction, to align people, to mobilize resources and to reach goals.

[†] Financial management plan—based on Workshop on Health Sector Financial Management: Training Modules, Seoul, Republic of Korea, March 17–19, 2008 (<http://www.wpro.who.int/sites/hcf/documents/Workshop+on+Health+Sector+Financial+Management.htm>) and MAKER Managers taking Action based on Knowledge and Effective use of resources to achieve Results (<http://www.who.int/management/resources/finances/en/index.html>), a financial management plan must address: policy and strategic planning, budgeting, allocation of resources, accounting and auditing, economic evaluation, and financial projections.

[†] Public-private sector policy—must address following 7 components based on WHO document: Engaging All Health Care Providers in TB Control: Guidance on Implementing Public-Private Mix Approaches (http://whqlibdoc.who.int/hq/2006/WHO_HTM_TB_2006.360_eng.pdf):

1. Formulating objectives—program goals should be clearly defined in terms of national and international guidelines.
2. Defining the task mix for different providers—this includes mapping all providers and determining the specific clinical and public health tasks they should provide.

Indicator 1.1 (continued)

3. Developing practical tools to help implementation—three types of forms are necessary: contracts with providers to facilitate cooperation; appropriate clinical forms for tracking referral, case notification, lab request, etc.; supervisory forms such as quarterly reports, supervisory checklists, laboratory and treatment registries, etc.
4. Training—appropriate training materials and programs available for private providers.
5. Certification—process exists to identify private providers that meet necessary criteria.
6. Incentives and enablers—monetary or non-monetary mechanisms exist to reward participating providers.
7. Monitoring and evaluation—indicators, reporting, and feedback/supervision system exists to monitor private providers.

† M&E and surveillance plan—appropriate components of plan are described within the Monitoring and Evaluation System Strengthening Tool (http://rbm.who.int/toolbox/tool_MESST.html).

Data Source: NMCP policy documents.

Data Type: Checklist—the proportion of “Yes” answers out of 18.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

National malaria policies and plans must be updated regularly in order to address the changing disease profile in the country. This indicator specifies a minimal set of policies and plans that are necessary to address malaria control in countries. Policies are strengthened by independent or joint review, which provides objective technical expertise. This indicator measures the degree to which NMCP policies and plans exist, are up-to-date, and are critically reviewed.

Method of Measurement

This indicator utilizes data from NMCP policy documents. For each component of the checklist, the NMCP will need to examine existing policy to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is satisfied if the NMCP responds “Yes” to all checklist items, and a “18/18” is reported.

Strengths

- The data for this indicator should be readily available within NMCP records and reports.

Limitations

- This indicator is lengthy and covers many different policy areas and the overall score may not reflect strength or weakness in specific areas.

- This indicator gives equal weight to different components of malaria policy and planning; however, some of these components may be more important than others.

References

Date of Last Revision: 27 April 2010

1.2 Annual domestic and external funding for national malaria program

Definition

Funding for national malaria control program disaggregated by funding sources in U.S. dollars. This includes funds from the government/Ministry of Health, multinational organizations such as WHO, the Global Fund, and the World Bank, bilateral organizations and other organizations such as NGOs, universities, and foundations.

This indicator contains the same data items as the budget section of the World Malaria Report data sheet.

Data Source: Government and NMCP records and reports.

Data Items

Contribution to malaria budget in U.S. dollars from:

- Government/Ministry of Health.
- Global Fund.
- World Bank.
- United Nations (UN) Agencies.
- European Union.
- U.S. Government.
- Other bilateral.
- Other NGOs, foundations, etc.

Data Type: Number (U.S. dollars).

Disaggregation: By funding source.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Adequate funding is necessary to effectively control malaria. Knowing the amount of funds spent on malaria activities and where the funding originated from increases transparency, helps with program planning and allocation of resources, and aids in tracking any significant changes in funding from year to year; it can also help reveal shortfalls in funding and aid international organizations and national governments in assuring sustainability of funding. This indicator measures the amount of malaria funding and the source so both aspects can be tracked.

Method of Measurement

This indicator utilizes data from government and NMCP records and reports. The dollar amount from an NMCP budget, which includes all money from all funding sources, should be utilized to report this indicator. If this budget does not exist, the budgets from separate organizations—such as the Global Fund PR, the NMCP, and the MOH—should be utilized to

report the total amount of funds used to control malaria. In the latter case, care should be taken to make sure funding is not counted more than once.

Strengths

- The data for this indicator should be readily available within government and NMCP records and reports.

Limitations

- Although indicator is clearly defined, the national government's contribution to the malaria program may not be easily identified, as some administrative levels and aspects of the malaria program may be integrated with programs for other diseases.

References

Date of Last Revision: 27 April 2010

1.3 Percentage of administrative units sharing an international border that develop and implement a joint plan of action over the last 12 months

Definition

Calculate the following 2 percentages: the percentage of administrative units sharing an international border that developed a joint cross-border action plan for the last 12 months, and also the percentage of administrative units with an international border that implemented greater than 75% of the joint cross-border action plan over the last 12 months:

Develop joint action plan—

- **Numerator:** Number of administrative units with populations at risk of malaria sharing an international border that develop a joint cross-border plan of action.
- **Denominator:** Number of administrative units with populations at risk of malaria sharing an international border.

Implement joint action plan—

- **Numerator:** Number of administrative units with populations at risk of malaria sharing an international border that implement greater than 75% of a joint cross-border plan of action over the last 12 months.
- **Denominator:** Number of administrative units with populations at risk of malaria sharing an international border.

Implementation of greater than 75% of action plan should be determined by the health staff in the administrative unit according to the action items within the plan of action. Because of the varying amount of effort associated with different action items, measurement of 75% completion of the joint action plan will be subjective.

Clarification

† Administrative unit—the smallest useful geographic/government organizational unit such as a province, district, county, sous-prefecture, etc. for which an NMCP can get data required by the indicator.

† Populations at risk of malaria—a population living in area where imported malaria cases exist, or where a locally transmitted malaria case was detected over the last 12 months.

† Joint plan of action—a plan to share information and coordinate activities to control malaria transmission across an international border on a regular basis. The plan should be made jointly by appropriate authorities on either side of the border. If a province has borders with more than one country, a plan should exist for each bordering country.

Data Source: National and provincial MOH and NMCP records.

Data Items

- Number of administrative units with populations at risk of malaria sharing an international border.
- Number of administrative units with populations at risk of malaria sharing an international border that develop a joint plan of action.
- Number of administrative units with populations at risk of malaria sharing an international border that implement greater than 75% of a joint cross-border plan of action over the last 12 months.

Data Type: Percentage.

Indicator 1.3 (continued)

Disaggregation: By the international border (for example Cambodia would want to disaggregate by the percentage of provinces with action plans for each border: Viet Nam, Lao PDR, and Thailand).

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Malaria transmission is not limited to within international borders, so coordination and sharing of information across borders is necessary to limit the spread of malaria. This is especially true if individuals regularly travel across the border between countries. In addition, joint plans of action and cross border collaboration will become increasingly important as country level elimination efforts move forward prior to a regional approach. This indicator measures the extent to which NMCPs are coordinating malaria control activities across borders by measuring the development and implementation of joint cross-border action plans.

Method of Measurement

This indicator utilizes data from provincial NMCP records and reports. If records of cross border collaboration do not exist, the program should start keeping these records. Ideally provinces would create formal joint action plans, and these could be used to determine the numerator.

To measure implementation of greater than 75% of action plan, local health staff in the administrative unit will need to count the total number of action items enumerated within the plan of action, along with those action items that are completed. Because of the varying amount of effort associated with different action items, the health staff will need to subjectively assess whether the action items completed constitute 75% of the work proposed by the joint action plan. For example, a province may complete only 4 out of 6 action items within a plan of action, but officials may determine that these 4 items were a significant portion of the actual work that needed to be done, and that 75% of the proposed work in the action plan was completed.

If an administrative unit completes 75% of its joint cross-border plan of action, public health officials in that administrative unit and the cross-border administrative unit should meet to decide if a new joint cross-border plan of action should be formulated to address other cross-border concerns.

The denominator is calculated by counting the number of provinces with an international border that report locally transmitted or imported cases of malaria over the last 12 months. These data should be available in routine reports to the NMCP, or in an annual NMCP report.

Strengths

Limitations

- Although joint action plans may exist, they may vary in the extent, frequency, and quality of cross-border collaboration.
- Measurement of implementation of greater than 75% of the action plan will be subjective, and the quality of completed components may vary.
- Those action items that are implemented may not be the action items within the plan that are the most important for malaria control.

Reference

Date of Last Revision: 27 April 2010

C. Prevention

2.1 Percentage of population at risk covered by long-lasting insecticidal net/insecticide-treated net (LLIN/ITN) distribution

Definition:

Numerator: Number of persons with ITN calculated by assuming that each distributed ITN covers 2 persons (or less as determined by countries[‡]) and that LLIN lasts 3 years and traditionally treated nets last 1 year.

$$[(\text{Number of LLINs distributed in the last 3 years} + \text{number of conventional ITNs distributed}) * 2 \text{ persons per mosquito net}^{\ddagger}]$$

Denominator: Population at risk of malaria

[‡] 2 persons per mosquito net is the suggested upper limit for assessing appropriate coverage, countries may choose to decrease the goal persons per mosquito net coverage to a number less than 2 based on data or evidence the NMCP has analyzed.

Clarification

[†] Populations at risk of malaria—a population living in area where imported malaria cases exist, or where a locally transmitted malaria case was detected over the last 12 months.

Data Source: Routine information from all organizations distributing ITN and LLIN.

Data Items

- Number of new ITNs distributed in last year.
- Number of LLIN distributed in last 3 years.
- Population at risk of malaria.

Data Type: Percentage.

Disaggregation: Stratify by rural/urban status or other population segments important to malaria transmission or control.

Frequency: Monthly, quarterly, or annual basis.

Applicability: All countries.

Purpose/Rationale

Indicator of universal coverage with ITN. Universal coverage means covering all sleeping spaces and all persons with ITN.

Method of Measurement

- Numerator is calculated by adding cumulative LLINs delivered for the last three consecutive years (including the latest year).
- *Target Population.* In areas of high transmission, target population for ITN will be total population. WHO recommends a ratio of one net per two persons as a planning figure to reach universal coverage. Therefore the number of LLIN required is half of the target population.
- *Delivery Channels.* Mass distribution, ANC distribution, EPI distribution, etc.

- ITN coverage should be maintained high to sustain the achievements of the intervention efforts.

Strengths

- Provides an estimate of sufficient distribution of ITN or LLIN in the last 3 years to sufficiently cover all sleeping spaces and all persons.

Limitations

- As duration of LLIN in the field change with improved LLIN materials and manufacturing processes, the assumptions (LLIN lasts 3 years) may need to be altered.
- Does not measure ITN hanging or use.
- Unknown how many LLINs distributed end up in households.
- There are many outlets for distribution of ITNs; figures may underestimate number of mosquito nets in the communities.
- Replacements for wear and tear, leakages, new needs (e.g., newborns, immigrating population, etc.) need efficient management by the program.

References

WHO-RBM, Framework for Monitoring Progress and Evaluating Outcomes and Impact, p. 10–13, 2000.

World Health Organization, Global Malaria Program. Long-Lasting Insecticidal Nets for Malaria Prevention: A Manual for Malaria Program Managers. Geneva, Switzerland. 2007.

<http://www.who.int/malaria/whomalariapublications.htm#2007>

Date of Last Revision: May 2010

2.2 Percentage of population at risk covered by retreated mosquito nets

Definition

This indicator assumes that each retreated mosquito net covers 2 persons (or less as determined by countries[‡]) and that a retreated mosquito net lasts 1 year.

- **Numerator:** Number of mosquito nets retreated in the last year * 2 persons per mosquito net.[‡]
- **Denominator:** Number of people living in areas at risk of malaria.

[‡] 2 persons per mosquito net is the suggested upper limit for assessing appropriate coverage, countries may choose to decrease the goal persons per mosquito net coverage to a number less than 2 based on data or evidence the NMCP has analyzed.

Clarification

[†] Mosquito nets retreated—this is determined by counting the number of mosquito nets “dipped” during a retreatment campaign.

[†] Areas at risk of malaria—this should be determined according to the risk stratification system described in Indicator 6.3.

Data Source: Routine information from all organizations retreating ITNs.

Data Items

- Number of mosquito nets retreated in the last year.
- Number of people living in areas at risk of malaria.

Data Type: Percentage.

Disaggregation: Stratify by rural/urban status or other population segments important to malaria transmission or control.

Frequency: Monthly, quarterly, or annual basis.

Applicability: Countries with mosquito net retreatment programs.

Purpose/Rationale

Traditional nets must be soaked with insecticide at least once every 12 months to maintain effectiveness. Some countries have net retreatment programs to extend the life of nets which were distributed in the past, and are retreating these while they scale up distribution of LLINs. This indicator measures the degree to which populations are covered by this retreatment program.

For further guidance and information on LLINs/ITNs refer to Indicator 2.1

Method of Measurement

This indicator requires data collected by mosquito net retreatment programs.

In the calculation of this indicator, it is assumed that each mosquito net will cover two individuals or less. Two persons per mosquito net is the suggested upper limit for assessing appropriate coverage, countries may choose to decrease the goal persons per mosquito net

coverage to a number less than 2 based on data or evidence the NMCP has analyzed. Therefore, the number of mosquito nets retreated is multiplied by two (or a factor determined by the NMCP) in order to approximate the number of people protected.

The target population is calculated based on the area at risk for malaria, which is determined according to the risk stratification system (Indicator 6.3).

This indicator when combined with Indicator 2.1 and 2.3, which measure LLIN/ITN and IRS coverage, should approximate the coverage of the population at risk with vector control interventions (but not exactly, as the overlap between interventions—i.e., households with both a LLIN/ITN and IRS remains unknown).

Strengths

- The data for this indicator should be readily available within mosquito net retreatment records and reports.

Limitations

- If retreatment programs distribute retreatment packets rather than dipping mosquito nets directly, the indicator may underestimate the number of individuals protected by retreated mosquito nets.
- Calculation of the target population is dependent on good population data. These data are difficult to determine for mobile or undocumented populations, so the target population may be underestimated.

References

Date of Last Revision: May 2010

2.3 Percentage of population covered by indoor residual spraying (IRS)

Definition

Numerator: Number of people living in households sprayed with IRS in the last 12 months.

Denominator: Number of people living in areas at risk of malaria.

All calculations should be done per spraying cycle.

Data Source

Malaria programme IRS reporting system.

Tools: Mapping of household units and populations, house card and tally sheet, and reporting forms.

Data Items

- Number of people living in households sprayed with IRS in the last 12 months.
- Number of people living in areas at risk of malaria.

Data Type: Percentage.

Disaggregation: None.

Frequency: End of spray cycle.

Applicability: All countries.

Purpose/Rationale

- The indicator provides information how much IRS will contribute to overall program effort to control malaria. It provides information on how widely IRS is used or applied in a country. Currently, most countries do not cover 100% of the country with IRS. Instead, IRS is used in selected districts or provinces for epidemiological, financial, or logistic reasons. In low transmission settings, IRS is more targeted to the foci.
- The next indicator (2.4) provides information on actual coverage of just those households *targeted* for IRS.

Method of Measurement

- It is important to distinguish this indicator (percentage of entire at-risk population protected with IRS) from the next indicator—percentage households targeted for IRS that were actually sprayed.
- Some at-risk areas may not be targeted with IRS for epidemiological factors such as outdoor biting vectors, and financial, or operational capacity reasons. The size of targeted population or areas may or may not vary by spraying cycle.
- The population protected by IRS is calculated by multiplying the average number of people per household with the number of households sprayed (if the number of persons protected is not collected on the forms of the spray teams).

- There is no “target” for this indicator, since the percentage of population at risk covered by IRS depends on epidemiological, operational, and cost considerations.
- Since many areas may have two rounds of spraying in the same area within one year, ensure that double-counting of the same population is avoided.

Strengths

Limitations

References

WHO, Malaria Vector Control and Personal Protection, Report of Study Group, TRS 936, 2006, p. 9–10.

Date of Last Revision: May 2010

2.4 Percentage of targeted households covered by indoor residual spraying

Definition

Numerator: Number of households sprayed with at least one spray round according to national guidelines.

Denominator: Number of households targeted for spraying (at least one round).

Also analyze data by spray cycle.

Data Source

Malaria programme IRS reporting system.

Tools: Mapping of household units and populations, house card and tally sheet Reporting forms.

Data Items

When the data are available on houses or structures—

- Number of houses or structures sprayed.
- Number of houses or structures targeted.

When population data are available—

- Number of people residing in protected houses or structures.
- Number of people residing in targeted houses or structures.

Data Type: Percentage.

Disaggregation: Indicator by district: percentage of districts or localities with at least 80% IRS coverage per spray cycle. This allows evaluation of geographic distribution of adequate performance.

Frequency: End of spray cycle.

Applicability: All countries.

Purpose/Rationale

Measures the performance of the national malaria program in covering households that were targeted for spraying.

Method of Measurement

- Much of the information in previous indicator (2.3—Percentage of population at risk target by indoor-residual spraying) is applicable to this indicator and will not be repeated here.
- Data from IRS spray teams should be always cross-checked with the figures of the population residing in the same areas and districts provided by the last national census.
- The annual report on the percentage of coverage should be submitted from districts, provinces, and to NMCP at end of each spraying cycle. This indicator should be accompanied by figures such as—

- Number of persons living in house/structures targeted and sprayed
 - Insecticide used and its formulations
 - The month and number of spraying days
 - Number of spraying rounds.
- The analysis and interpretation should focus on district-by-district coverage of population living in malaria risk areas protected for IRS compared with the expected target. If possible, an analysis focusing on village-by-village coverage is preferred.
 - Coverage of at least 80% of households targeted must be reached to achieve reduction or interruption of transmission.
 - Epidemiologically, low (<80%) IRS coverage does not provide protection to individuals, even to those living in the sprayed house, as people sleeping in a sprayed house can be bitten by mosquitoes resting in other unsprayed houses.

Strengths

Limitations

- If more than one round is needed, then indicator may overestimate coverage, since coverage of a second round may not equal coverage of the first round. During national adaptation of this indicator, the percentage with at least two rounds may also be calculated.
- Supervision is important to ensure that data quality is high.
- Number of households sprayed must be accurately recorded.

References

WHO, Malaria Vector Control and Personal Protection, Report of Study Group, TRS 936, 2006, p. 9–10, 45–46.

Date of Last Revision: May 2010

2.5 Percentage of households at risk of malaria with at least one long-lasting insecticidal net/insecticide-treated net and/or sprayed by IRS in the last 12 months

Definition

Numerator: Number of households with at least 1 LLIN/ITN or sprayed by IRS in the last 12 months.

Denominator: Total number of households surveyed in areas at risk of malaria.

Clarification

[†] Areas at risk of malaria—this should be determined according to the risk stratification system described in Indicator 6.3.

Data Source: Periodic household surveys.

Data Items

Number of households with at least 1 LLIN/ITN or sprayed by IRS in the last 12 months.

Number of households surveyed.

Data Type: Percentage.

Disaggregation: None.

Frequency: Every 2–5 years.

Applicability: All countries.

Purpose/Rationale

This indicator measures the percentage of households with at least one LLIN/ITN or IRS, which is a measure of minimal spatial vector control coverage, but it is really the complement of this percentage, the households without either a LLIN/ITN or IRS that is of interest, as this informs the NMCP what percentage of households have not been reached by vector control or personal protection interventions.

This indicator allows overall national coverage of the two main vector control activities to be assessed. It will be used to measure the proportion of households covered by either an LLIN, ITN, or by IRS. In places where IRS is limited to small target areas, this indicator provides a more appropriate assessment of the vector control activities being conducted throughout the country than an indicator measuring national coverage of IRS activity alone.

Method of Measurement

This indicator requires data collected from representative household sample surveys in areas at risk of malaria. The data for the numerator are obtained from information on which households possess an LLIN/ITN, in combination with information on whether the household has been protected by IRS in the last 12 months. The denominator is simply the total number of households in the survey.

In those countries which have already begun to gather IRS information through MIS, DHS, or MICS, this indicator can be calculated with currently existing survey questions and can be tabulated retroactively using past survey data.

An IRS campaign may be conducted either as part of the national strategy for malaria control (operations conducted by governmental spray teams) or undertaken by an NGO or private company in line with national guidelines. It is important to capture only those spraying activities that have occurred as part of an organized IRS campaign, and to exclude spraying that was conducted by a member of the household.

Strengths

- The IRS data for this indicator is already collected during MIS, DHS, and MICS surveys, and the limited number of questions required to ascertain these data can be easily added to other surveys.
- Presence of a LLIN/ITN is typically verified at time of interview.
- This indicator has been developed to address concerns regarding the small areas or ‘target zones’ that are sprayed with IRS in many countries, and the potential misinterpretations of a national-level IRS indicator that may result. By including ITN and IRS interventions in a single indicator, one can assess overall vector control coverage within the country.

Limitations

- Recall bias is likely to affect this indicator, as the issue of asking respondents to recall when the household was sprayed can result in considerable bias and ‘heaping’ of dates.
- Additionally, the actual respondent may not have been present at the time of spraying and may therefore be reporting what was heard from others.
- Estimate may be biased upwards if the respondent confuses spraying with residual insecticide with household products; however, such confusion can be reduced by thorough training of interviewers.
- An appropriate sampling frame reflecting the population living in areas at risk of malaria must be available to ensure data truly reflects coverage of populations at risk—this may be difficult to obtain if malaria transmission is focal and residents are migrant and/or undocumented.

References

Roll Back Malaria, Guidelines for Core Population-Based Indicators. MEASURE Evaluation: January 2009.

Date of Last Revision: 27 April 2010

**D. Information, Education and
Communication/Behavior Change
Communication**

3.2 Percentage of individuals in areas at risk of malaria who slept under long-lasting insecticidal net/insecticide-treated net the previous night

Definition

- **Numerator:** Number of individuals of all ages in areas at risk of malaria who slept under a LLIN/ITN the previous night.
- **Denominator:** Number of individuals of all ages in areas at risk of malaria who spent the previous night in surveyed households (or for special vulnerable population methodologies: number of other vulnerable population individuals in areas at risk of malaria who were surveyed).

* As a secondary analysis, calculate the percentage above for these groups of individuals: Children under 5 years old, women of childbearing age (15–49), pregnant women, and other vulnerable populations.

Clarification

† Other vulnerable populations—ethnic minority groups; mobile/migrant populations; HIV Positive persons and others as determined by national policy (Indicator 1.1).

† Areas at risk of malaria—this should be determined according to the risk stratification system described in Indicator 6.3.

Data Source: Periodic household surveys and special methodologies to count vulnerable populations.

Data Items

- Number of individuals of all ages in areas at risk for malaria who slept under an LLIN/ITN the previous night.
- Number of individuals of all ages in areas at risk of malaria who spent the previous night in surveyed households.
- Number of other vulnerable population individuals in areas at risk of malaria who were surveyed (from special methodologies).

Data Type: Percentage.

Disaggregation: All ages, children under five, women of childbearing age, pregnant women, other vulnerable populations, residence (urban/rural), region, education level of head of household, wealth quintile, sex.

Frequency: Every 2–5 years.

Applicability: All countries.

Purpose/Rationale

This indicator will be used to measure the level of ITN coverage and use of different demographic groups in areas at risk of malaria.

Method of Measurement

This indicator requires data collected from representative household sample surveys or special methodologies to count vulnerable populations in areas at risk of malaria.

For surveys, the MIS guidelines should be consulted for guidance on constructing a sampling frame and conducting data analyses for countries with varying levels of malaria endemicity. It is important that the survey contain a household listing that captures all individuals within each surveyed household. Additionally, surveys should be conducted with sufficient design and sample size to allow comparisons among regions and urban/rural strata if this is desired.

The data for the denominator are obtained from the household questionnaire that lists every individual who slept in the house the previous night. The data for the numerator are then obtained from a listing of the same individuals in the house who slept under a LLIN/ITN the previous night, in combination with information on whether it is a factory treated net that does not require any treatment, or a net that has been soaked with insecticide within the last 12 months.

Strengths

- The limited number of questions required to ascertain data for this indicator can be easily added to any representative sample survey of households.
- Presence of a LLIN/ITN is typically verified at time of interview.
- Comparable across countries given that appropriate and consistent sampling procedures are followed and confounding factors are accounted for.

Limitations

- Because of issues of date recall of last impregnation, this indicator may not provide reliable estimates of ITN retreatment status.
- May be difficult to interpret at the national level unless stratified by urban and rural strata as malaria transmission is most often localized.
- May be biased by the seasonality of survey data collection, which is most often done during the dry season when LLIN/ITN use is likely at its lowest.
- Typically, no information is collected on whether the insecticide used to treat the ITN is an “approved” insecticide.
- No information is collected on whether the LLIN/ITN was washed after treatment, which can reduce its effectiveness.
- An appropriate sampling frame reflecting the population living in areas at risk of malaria must be available to ensure data truly reflects coverage of populations at risk—this may be difficult to obtain if malaria transmission is focal and residents are migratory and/or undocumented.
- Some identifiers for requested disaggregation of the data are available at the household level and may not be applicable to the individual surveyed.

References

Roll Back Malaria, Guidelines for Core Population-Based Indicators. MEASURE Evaluation: January 2009.

Date of Last Revision: 27 April 2010

E. Case Management

4.1 Percentage of suspected malaria cases with parasite-based diagnosis

Numerator: Number of suspected malaria cases that received parasite based examination for malaria (microscopy or RDT).

Denominator: Number of suspected malaria cases x 100.

Use data from passive detection only; exclude data from active case detection.

Data Source: Same as other surveillance data (laboratory registers, or HMIS forms)

Data Items

- Number of suspected malaria cases receiving laboratory examination by microscopy.
- Number of suspected malaria cases receiving laboratory examination by RDT.
- Number of suspected malaria cases.

Data Type: Percentage

Disaggregation: Stratify by age group (<5, ≥5 years) and place (district, health facility catchment area).

If data are collected, stratify by type of diagnostic test (microscopy or RDT).

Frequency: Monthly.

Applicability: All countries.

Purpose/Rationale

An indicator of quality of surveillance—percentage of suspected malaria cases that should have received laboratory testing for malaria. Target should be 100% of suspected cases receiving laboratory testing. This indicator shows capacity of malaria programme to expand rational treatment of malaria based on definitive diagnosis. Both programme implementation and health system capacity influence these achievements.

Method of Measurement (Use/Interpretation)

- Data from active case and community detection should be reported and analyzed separately.
- Separate recording and reporting of number of laboratory tests done and results stratified by microscopy or RDT should be considered in countries where sizable outpatient testing of both methods is used.
- Age stratification (<5 and ≥5 years old) of analysis is suggested as national policy may allow treatment of children under 5 years old without diagnostic testing.
- In principle, percentage of lab testing in the health facilities in such settings is expected to be very high as the programme matures. It is also easier to handle the lower number of suspected malaria cases (based on the local stratification).
- WHO recommends laboratory diagnosis for all suspected malaria cases regardless of age, so any percentage <90% indicates a potential issue.

- Percentage of suspected cases that were tested <90% indicates potential stock-outs of RDT at national or health facility level or issues with clinician adherence—supervision may be needed to diagnose problem and suggest solutions.

Strengths

Limitations

Reference

WHO-RBM, Framework for Monitoring Progress and Evaluating Outcomes and Impact, p. 10–13, 2000.

Date of Last Revision: May 2010

4.2 Country has a functional Quality Assurance (QA) system for microscopy and rapid diagnostic tests (RDTs)

Definition

For each component of the checklist, the NMCP will need to examine existing records to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is completely satisfied if the NMCP responds “Yes” to all microscopy checklist items, and all RDT checklist items. The program will report the proportion of “Yes” responses out of the number of checklist items (5 each) both microscopy and RDTs.

Country has microscopy QA system that implements all 5 of the following during the last year:

1. Routine testing of microscopists through use of reference slide sets or slide bank (Y/N).
2. Refresher training of microscopists who do not pass routine testing (Y/N).
3. Accreditation of microscopists (Y/N).
4. Sample of slides submitted to reference laboratory for cross-checking (Y/N).
5. Procurement and provision of quality microscopy supplies (Y/N).

Country has RDT QA system consisting of all 5 of the following:

1. Procurement of quality RDTs according to WHO product testing results available at www.wpro.who.int/sites/rdt/who_rdt_evaluation/ (Y/N).
2. Conducting lot-testing of incoming RDT shipments before distribution (Y/N).
3. Occasional random sampling for comparison of RDT results with expert microscopy (Y/N).
4. Periodic random sampling of RDTs in the field for quality either by comparing RDT results to positive control wells, or by sending RDTs to a reference lab for evaluation (Y/N).
5. Training and occasional retraining of health workers in use of RDTs (Y/N).

Clarification

- † Routine testing of microscopists through use of reference slide sets or a slide bank—testing microscopists using a slide bank consisting of reference slides of all malaria species currently found in country plus slides confirmed as malaria-negative.
- † Refresher training of microscopists who do not pass routine testing—mandatory attendance at a refresher course lasting at least one week and that includes more stringent focus on species identification and a reassessment of microscopists by examination.
- † Accreditation of microscopists—includes recognition of microscopist skill level, links training with accreditation system for individuals working at each level of the QA laboratory network, monitors microscopist competency to maintain accreditation, and provides a career path for accredited microscopists.
- † Sample of slides submitted to reference laboratory for cross-checking—cross-checking involves external validation of a fixed sample of slides submitted by microscopists at lower/peripheral laboratories to reference laboratories and should occur at least once every 6 months, have a standard methodology for selecting a minimal sample that includes weakly positive slides, and utilize valid statistical analysis of results and provide prompt feedback to microscopists.
- † Procurement and provision of quality microscopy supplies—this includes reliable and well-maintained microscopes, high quality microscope slides, appropriate stains, and effective supply chain to replenish slides and stains.

Thorough microscopy guidelines are available in WHO document, Malaria Microscopy Quality Assurance Manual (http://www.searo.who.int/LinkFiles/Malaria_MalariaMicroscopyManual.pdf)

Indicator 4.2 (continued)

- † Conducting lot-testing of incoming RDT shipments before distribution according to WHO protocol—a ‘lot’ is normally defined as a production run of 40 to 80 thousand tests using a particular batch of monoclonal antibodies and nitrocellulose, testing is performed on a sample of about 125 *P. falciparum*-only RDTs or 175 combined *P. falciparum* and pan-specific RDTs, for each production lot in the order, testing can be done in country if adequate capacity exists, or by sending sample of RDTs to be tested to one of three lot testing centres located in Cambodia, Ethiopia, and the Philippines, further information is available at http://www.wpro.who.int/sites/rdt/who_rdt_evaluation/lot_testing.htm.
- † Occasional random sampling for comparison of RDT results with expert microscopy—every month, 40 RDTs (20 positive and 20 negative) should be crosschecked against the corresponding 40 slides obtained from the same patients and examined by expert microscopists, and discordant rate greater than 15% will require more detailed evaluation or the return of remaining RDTs for lot-testing.
- † Periodic random sampling of RDTs in the field for quality either by comparing RDT results to positive control wells, or by sending RDTs to a reference lab for evaluation—positive control wells should be reliable in the field, low cost, easy to use, be of similar viscosity to blood after reconstitution, and contain the main three target *P. falciparum* antigens in a concentration similar to blood from malaria positive patients (http://www.wpro.who.int/sites/rdt/who_rdt_evaluation/control_wells.htm).
- † Training and occasional retraining of health workers in use of RDTs which includes—training on RDT preparation, interpretation, and good blood safety practices, job-aids and training manuals are available at <http://www.wpro.who.int/NR/exeres/0936D168-0759-4772-ADE5-D480C13ADBF6.frameless.htm?NRMODE=Published>.

RDT QA guidelines are available in WHO document, Rapid Diagnostic Tests in malaria case management: Planning, Procuring and Implementing (<http://www.wpro.who.int/NR/rdonlyres/9F42AF75-AC81-48E5-AAA20FB9B630425C/0/RBMGFATMRDTPApr17Fin2.pdf>) and at the website: <http://www.wpro.who.int/sites/rdt/home.htm>.

Data Source: NMCP records.

Data Type: Checklist: the proportion of “Yes” answers out of 5 for microscopy section, and the proportion of “Yes” answers out of 5 for the RDT section.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Effective and efficient treatment of malaria depends on accurate diagnostic capabilities, so it is important that NMCPs assure the quality of microscopists and RDTs. This is accomplished through a QA system for microscopy and RDTs. This indicator measures the degree to which an NMCP has adequate QA systems in place.

Method of Measurement

This indicator utilizes data from NMCP records. For each component of the checklist, the NMCP will need to examine existing records and reports to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is

satisfied if the NMCP responds “Yes” to each of the five microscopy and RDT criteria and reports a “5/5” for both sections.

Strengths

Limitations

- If countries do not maintain records of microscopy and RDT QA activities, these systems will need to be developed.
- This indicator gives equal weight to all components of functional QA systems, however, some of these components may be more important to quality assurance than others.
- This indicator does not measure actual coverage of areas at risk of malaria by quality microscopists.

References

Date of Last Revision: 27 April 2010

4.3 Percentage of uncomplicated malaria cases with (a) confirmed *P. falciparum* malaria that received artemisinin-based combination therapy, and (b) confirmed *P. vivax* that receive appropriate antimalarial treatment including radical treatment, according to national guidelines

Definition

- **Numerator:** Number of malaria cases receiving appropriate antimalarial treatment at health facility.
- **Denominator:** Number of confirmed outpatient malaria cases expected to be treated at health facility with appropriate antimalarial medicine x 100. This number comes from surveillance data and is based on national treatment policy.

Data Source

Numerator (number of patients treated) comes from logistic information and denominator (number expected to be treated) comes from surveillance data.

Surrogate indicator/denominator. Number of antimalarial medicines dispensed would come from district, provincial and national medicine storerooms and their information systems.

Data Items

- Number of malaria cases receiving appropriate antimalarial treatment at health facility.
- Number of confirmed malaria cases.

Data Type: Percentage

Disaggregation: Analyses may be stratified by different treatments for *P. falciparum* and *P. vivax*. In countries where *P. falciparum* is predominant, stratified analysis should be done by percentage of cases treated with ACT and other antimalarial medicine.

If the information system does not collect number of patients treated, then number of ACTs received or dispensed can be taken as a surrogate numerator.

Frequency: Monthly.

Applicability: All countries.

Purpose/Rationale

- Measures the capacity of health system and programme to ensure access to appropriate antimalarial treatment for those coming to health facilities.
- Provides useful information about difference between actual treatment of patients and amount of antimalarial medicines distributed at various levels.

Method of Measurement (Use/Interpretation)

- *Surrogate indicator with different denominator at some levels.* A surrogate indicator can be calculated by using “dispensed” antimalarial medicines, for example, at district and national level, as the numerator instead of number of patients treated at the health facility level.

- Appropriate antimalarial treatment policy varies from country to country. Some countries also have different treatment policies for the two species, e.g., ACT for *P. falciparum* and Chloroquine alone or Chloroquine and Primaquine for *P. vivax*. This indicator is easiest to implement where a single medicine is used for malaria (for example, ACT alone).
- Ideally, the numerator would come from data tallied and summarized at the health facility level on the number of persons treated at the health facility with an appropriate antimalarial medicine.
- At the national level, countries can use a surrogate of this indicator by using number of first-line treatment courses dispensed divided by the number of malaria cases expected to be treated.
- *Denominator, number of cases expected to be treated.* WHO recommends that all suspected malaria cases receive a laboratory test for malaria and treatment is given to only those that are positive and any cases that are not tested (e.g., stock-out of RDT). Therefore, denominator would be those confirmed plus those not tested.
- This indicator becomes less important as the number of outpatient malaria cases (particularly *P. falciparum*) declines to low levels. As the number of persons needing treatment decline, delivery of medicines and commodities is expected to be less problematic.

Strengths

- If the completeness of reporting is reasonable, this indicator is useful to monitor access to effective treatment for those coming to health facilities.
- This indicator helps programmes avoid over-estimation or over-stocking of medicines.
- Interpretation should be adjusted if suspected malaria cases with negative malaria test results are treated and recorded.

Limitations

- Does not provide population-based estimate of access to treatment—only those coming to health facilities.
- Recording and reporting issue. Paper form may not include new variable—number of patients treated with recommended antimalarial medicine (ACT).
- Using “number of antimalarial medicine treatment courses dispensed” as the numerator is less satisfactory than using counts of patients treated at the health facility level. If “number of antimalarial medicine treatment courses dispensed” is used as a numerator, an information gap remains about percentage of treatment courses dispensed that were actually given to patients.

- The timing of the reporting for both reported malaria cases and distribution of dispensed medicines may not coincide.
- Low reporting completeness of malaria cases and dispensed medicines make the indicator less reliable. This may affect the evaluation of performance and planning.

References

WHO, Guidelines for the Treatment of Malaria, 2006. Geneva, Switzerland

Malaria Control Today, Current WHO Recommendations, Working Document, March 2005, Geneva.

Malaria, Principles and Practice of Malariology, by W. H. Wernersdorfer, I. McGregor, Volume II, pp. 1045–1054, Churchill Livingstone, 1998.

Date of Last Revision: May 2010

4.4 Country has functional QA systems for antimalarial medicines

Definition

For each component of the checklist, the NMCP will need to examine existing records and reports to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is completely satisfied if the NMCP responds “Yes” to all 5 out of 5 checklist items. The program will report the proportion of “Yes” responses out of the number of checklist items.

If the NMCP does not assure the quality of antimalarial medicines, then it should report this indicator for the country Medicine Regulatory Authority (MRA) QA activities—

1. Procurement of quality antimalarial medicines from WHO approved pre-qualified manufacturer list (Y/N).
2. Existence of system for routine quality monitoring of antimalarial medicine during procurement, reception, distribution, storage, and at service delivery points by drug distributor (Y/N).
3. Access to quality control (QC) lab for routine testing of antimalarials (Y/N).
4. Regulatory inspection of antimalarial medicine supply at procurement, reception, distribution, storage, and at service delivery points by MRA (this can be done in combination with item 2) (Y/N).
5. Corrective action for detected substandard, expired and counterfeit drugs taken (Y/N).

Data Source: NMCP and or MRA records and reports.

Data Type: Checklist: the proportion of “Yes” answers out of 5.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Quality antimalarial medicine is necessary to treat malaria effectively, and to reduce the possibility of drug resistance developing. For this reason, quality assurance of antimalarial medicines plays a vital role in ensuring that malaria patients are receiving effective treatment. This indicator measures whether a country has adequate and functional QA systems for antimalarial medicines in place.

Method of Measurement

This indicator utilizes data from NMCP records and reports. For each component of the checklist, the NMCP will need to examine existing records and reports to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is satisfied if the NMCP responds “Yes” to all checklist items.

Strengths

- The data for this indicator should be readily available within NMCP records and reports.

Limitations

- The extent and appropriateness of QA methodologies in different countries may vary.
- This indicator gives equal weight to different NMCP QA activities; however, some of these activities may be more important than others.
- As fewer malaria cases are detected and treated, the market for counterfeit drugs might wane; however, issue of expired drugs might become more prevalent.

References

Date of Last Revision: 27 April 2010

4.5 Percentage of health facilities without stock-outs of first-line antimalarial medicines, mosquito nets, and diagnostics, during the last 12 months (by month)

Definition

- **Numerator:** Number of health facilities, in areas at risk of malaria, without stock-outs of first-line antimalarial medicine (according to national policy), ITN, and RDT continuously in a month.
- **Denominator:** Number of reporting health facilities in the same areas at risk of malaria × 100.

Definition of stock-out to be determined by countries (one day, at least one week in a month, etc.) would be determined for each country. A shorter period for the definition is better, particularly for countries with *P. falciparum*.

† Areas at risk of malaria—this should be determined according to the risk stratification system described in Indicator 6.3.

Data Source: Routine monthly health facility logistics data.

Data Items

Separate calculations for first-line antimalarials (e.g., ACT), RDT and ITN stock-outs

- Number of facilities with stock out of first-line medicine divided by number of facilities in endemic areas reporting during the same period.
- Number of facilities with stock out of RDT divided by number of facilities in endemic areas expected to have RDT during the same period.
- Number of facilities with stock out of ITN divided by number of facilities expected to have ITN during the same period.

Data Type: Percentage.

Disaggregation: None.

Frequency: Monthly.

Applicability: All countries.

Purpose/Rationale

Health facilities should have a continuous (every day) supply of essential commodities (first-line antimalarial medicine [ACT], ITN, and RDT, for example). This indicator monitors supply chain at the peripheral level (health facility) and helps programmes take immediate action following the detection of stock-outs.

Method of Measurement (Use/Interpretation)

- First-line antimalarial medicines would be the antimalarial medicine recommended by the national treatment guidelines.
- *Definition of the time of stock-out.* Definition of stock-out to be determined by countries (one day, at least one week in a month, etc.) would be determined for each country. A shorter period for the definition is better, particularly for countries with *P. falciparum*.

- Definition of stock-out of first-line treatments should be made explicit. Options include: (1) stock-out of any ACT PrePak, (2) stock-out of all ACT PrePaks, etc.
- Supervision reports may also be used to assess the stock outs, but supervisory data would be analyzed separately.
- Supervisory visits should be targeted to areas with excessive stock-outs to help resolve stock-out issues.
- RDT: Consistent information on use of diagnosis of malaria using RDT at health facility level is very useful in interpreting surveillance data and TPR. Therefore, stock-outs of RDT should be routinely monitored.
- A high percentage of health facilities with “no stock-outs” of first-line antimalarial medicine, ITN, or RDT throughout the year indicate a very good supply-chain management system in the country.
- Data on stock-outs are linked with other logistics variables, therefore, data should be triangulated. For example, if there are no stock-outs of RDT, then Indicator 4.1 (percentage of suspected malaria cases tested for malaria) should be 100%. If not, then clinician practices may be an issue that needs investigation. Likewise, if stock-outs are infrequent, then ACT and ITN indicators should also reach high levels. Gaps between stock-out data and ACT, ITN, and RDT indicators should be investigated.

Strengths

Limitations

- Definition of “stock-out” needs to be made clear to health workers—stock-out of any PrePak, stock of all PrePaks, etc.

References

WHO-RBM, Framework for Monitoring Progress and Evaluating Outcomes and Impact, p. 10–13, 2000.

Date of Last Revision: May 2010

F. Engaging Vulnerable Populations

5.1 Comprehensive interventions for vulnerable populations at high risk of malaria are implemented according to policy

Definition

For each component of the checklist, the NMCP will need to examine existing reports and policy documents to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is completely satisfied if the NMCP responds “Yes” to all checklist items. The program will report the proportion of “Yes” responses out of the number of checklist items (19).

The specific policy from Indicator 1.1 that is relevant to each checklist item below is identified in a bracket either before the checklist section, or before the specific checklist item.

1. [C.10] Operational research (Y/N).
2. [C.8] Other innovative evidence-based interventions NMCP identifies as appropriate (for example, other interventions include but are not limited to: community-run spraying programs, altering the environment to remove mosquito breeding sites, forming community malaria councils to increase local ownership of interventions, locally recruited village malaria workers, occupational programs focusing on occupations at risk, border screening, MSAT/MDA, etc.) (Y/N/NA).

[C.8] Comprehensive interventions are implemented based on policies and strategies targeting vulnerable populations.

3. [C.8] IEC/BCC activities (Y/N).
4. [C.8] LLIN distribution (Y/N).
5. [C.8] Long-lasting Insecticidal Hammock nets (LLIHNS) distribution if appropriate (Y/N/NA).
6. [C.8] ITN retreatment if appropriate (Y/N/NA).
7. [C.8] IRS services if appropriate (Y/N/NA).
8. [C.8] Parasitological diagnosis by microscopy and/or RDT (Y/N).
9. [C.8] Treatment with first-line antimalarials (Y/N).

[C.8] Data on vulnerable populations are being routinely collected, disaggregated, and reported.

10. Indicator A (Deaths due to malaria) disaggregated and reported (Y/N).
11. Indicator B (Confirmed malaria cases) disaggregated and reported (Y/N).
12. Indicator 2.1 (LLIN/ITN distribution coverage) disaggregated and reported (Y/N).
13. Indicator 2.4 (IRS targeted population coverage) disaggregated and reported (Y/N).
14. Indicator 3.2 (LLIN/ITN use) disaggregated and reported (Y/N).
15. Indicator 4.1 (malaria parasite-based diagnosis) disaggregated and reported (Y/N).
16. Indicator 4.3 (appropriate treatment) disaggregated and reported (Y/N).

[C.7] Collaboration

17. Collaboration on policies and strategies targeting vulnerable populations exists between different health programmes that the NMCP has identified as appropriate (for example, different health programmes include but is not limited to HIV, TB, EPI, ANC, Dengue, etc.) (Y/N).
18. Collaboration on policies and strategies targeting vulnerable populations exists between government sectors that the NMCP has identified as appropriate (for example, different government sectors include but are not limited to ministries of agriculture, women affairs, justice, defense, education, bureau of statistics, etc.) (Y/N).

Indicator 5.1 (continued)
[C.7] Funding
19. Malaria funding is available to fulfill 100% of projected budget to implement nationwide policies and strategies targeting vulnerable populations, and the amount can be clearly identified (Y/N).
<p>Clarification</p> <p>† Vulnerable populations—include pregnant women; children under 5; ethnic minority groups; mobile/migrant populations; HIV Positive persons and others as applicable.</p> <p>† Operational research—studies or processes to identify and resolve programmatic bottlenecks for effective implementation and/or to build the evidence base for improving interventions and strategies.</p>
Data Source: NMCP program reports or policy documents.
Data Type: Checklist: the proportion of “Yes” answers out of 19.
Disaggregation: None.
Frequency: Annual.
Applicability: All countries.

Purpose/Rationale

Certain populations are at higher risk of malaria, and these populations often differ by country. It is important for countries to study these vulnerable populations and implement comprehensive interventions for these groups in order to effectively control malaria. In addition as transmission decreases, new vulnerable groups may emerge, so it is important for programs to evaluate their programs and periodically identify new vulnerable groups.

Method of Measurement

This indicator utilizes data from NMCP reports or policy documents. For each component of the checklist, the NMCP will need to examine existing policy and reports to determine if the checklist item is satisfied, if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is satisfied if the NMCP responds “Yes” to all checklist items, and a “19/19” is reported.

Strengths

- The data for this indicator should be readily available within NMCP program reports or policy documents

Limitations

- This indicator gives equal weight to different NMCP activities targeting vulnerable populations; however, some of these activities may be more important than others.

References

Date of Last Revision: 17 August 2010

5.2 Percentage of pregnant women attending antenatal care (ANC) receiving at least two doses of intermittent preventive therapy (IPTp)—Note: Only for high transmission areas in Pacific countries

Definition

- **Numerator:** Number of pregnant women receiving second dose of IPT.
- **Denominator:** Number of pregnant women with at least one ANC visit.

Data Source

At ANC clinics. Part of routine monthly reporting of logistic information from health facility to district.

Data items

- Number of pregnant women receiving second dose of IPT.
- Number of pregnant women with at least one ANC visit.

Data Type: Percentage.

Disaggregation: None.

Frequency: Monthly.

Applicability: Only for high transmission areas in Pacific countries.

Purpose/Rationale

- Monitoring coverage of adequate IPT in pregnant women. At least 80% of pregnant women attending ANC should receive at least two doses of IPT. This indicator is used mostly in high-transmission countries.
- Adequate IPT in pregnant women improves birth weight of babies born to women and fetal outcomes in high-transmission malarious areas.
- Low-incidence countries often do not use IPTp.

Method of Measurement (Use/Interpretation)

- This indicator (and this denominator) provides an estimate of only pregnant women making at least one visit to ANC. Fortunately, this percentage is >80% in many countries. An additional indicator can be calculated by using estimated number of pregnant women as a denominator to estimate the percentage of all pregnant women in the area that received at least two doses of IPT.
- Number of women receiving at least two doses should almost reach number of women making first visit to ANC since current medicine used (sulfadoxine-pyramethamine) is inexpensive and widely available.

Strengths

Limitations

- Percentage calculated may be low if women do not return to ANC for their second visit.
- If estimated percentage of pregnant women attending ANC is <90%, then estimate will not reflect population estimate. A similar indicator can be calculated using estimated number of pregnant women as denominator.

References

WHO-RBM, Framework for Monitoring Progress and Evaluating Outcomes and Impact, p. 10–13, 2000.

A Strategic Framework for Malaria Prevention and Control during Pregnancy in the African Region. AFRO/MAL/04/01. 2004. WHO Regional Officer for Africa. Brazzaville. Page 19.

Date of Last Revision: May 2010

G. Strategic Information

6.1 Completeness of monthly health facility reports on surveillance and logistics

Definition

- **Numerator:** Number of health-facility monthly reports received on surveillance and logistics. Number of health facility reports—number of health facilities that provide data for a particular data category (inpatient surveillance, outpatient surveillance, or logistics) by month.
- **Denominator:** Number of health facility reports expected each month.

Both the numerator and the denominator are expressed as number of report-months (number of reports multiplied by number of months).

Reporting completeness of outpatient surveillance, inpatient surveillance, and logistics data should be calculated separately if they are separately reported on different paper forms or through different channels. This is particularly important for inpatient data in high-transmission countries.

Data Source

If data reported from district to provincial/regional or national levels are summarized by district (do not contain data by health facility), district summary form should contain two key variables: (1) number of health facilities expected to report, and (2) number of health facilities that reported.

If district reports electronic records by health facility each month, health facility completeness of reporting can be calculated directly.

Data Items

Outpatient

- Number of outpatient facilities with malaria-related data that reported divided by number of outpatient facilities expected to report during the same period.

Inpatient

- Number of inpatient facilities with malaria-related data that reported divided by number of inpatient facilities expected to report during the same period.

Logistics

- Number of outpatient facilities with malaria-related logistics data that reported divided by number of outpatient facilities expected to report during the same period.

Data Type: Percentage.

Disaggregation: None.

Frequency: Monthly.

Applicability: All countries.

Purpose/Rationale

- Improve completeness of reporting until all health facilities are consistently reporting every month.
- Calculate percentage completeness of reporting, which allows adjustments to be made to other surveillance and logistics indicators.

Method of Measurement (Use/Interpretation)

- If community workers report malaria information to health facilities every month, completeness of reporting by community workers is an additional indicator to calculate. The health-facility reporting form should contain two additional key data elements: (1) the number of community workers expected to report and (2) the number of community workers who reported during the month.
- Completeness of district reporting should also be calculated and 100% completeness should be easily achieved. A list of missing district reports compiled by using an electronic tool should be sent by national level to all districts each month. Provincial supervisors should ensure the 100% completeness of district reporting.
- Reporting completeness of health facilities can be increased and enhanced through (1) regular analysis and interpretation of monthly data, (2) regular production of bulletins on key national indicators; and (3) regular supportive supervision of health facilities and district teams.
- Enables programs to support administrative levels with low reporting completeness to investigate the reasons for it and take corrective measures on missing records.
- High reporting completeness (close to 100%) over longer period indicates a functional information system.
- Low and fluctuating reporting completeness over time implies non-functionality of the information system and inadequacy of the surveillance and logistic data for program monitoring and use.
- Trend analysis based on data with low or fluctuating completeness can lead to biased interpretation.

Strengths

Limitations

- Routine reporting generally does not involve private sector.

References: N/A

Date of Last Revision: May 2010

6.2 Country has functional system for outbreak detection, preparedness, and timely response

Definition

For each component of the checklist, the NMCP will need to examine existing reports and policy documents to determine if the checklist item is satisfied; if it is satisfied, the NMCP will report a “Y” or “Yes” response to this item. This indicator is completely satisfied if the NMCP responds “Yes” to all checklist items. The program will report the proportion of “Yes” responses out of the number of checklist items (4).

1. Surveillance data are routinely reviewed from both public and private sectors (by designated staff at the district, provincial, and national levels) for detection of outbreak at least monthly (ideally weekly) (Y/N).
2. Country has defined the threshold for detection of malaria outbreak for different epidemiological settings (Y/N).
3. Existence of an adequately resourced national outbreak plan for all levels of the system for timely detection and response (Y/N).
4. The country reports on malaria outbreaks of international concern to WHO (in line with the International Health Regulations, [IHR]) (Y/N).

Clarification

[†] Adequately resourced national outbreak plan—(based on the MEASURE Evaluation document, *A Guide for Monitoring and Evaluating Avian Influenza Programs in Southeast Asia* available at <http://www.cpc.unc.edu/measure/publications>) is a plan that addresses preparing for an emergency, surveillance, case investigation and treatment; preventing the spread of the disease in the community; establishing emergency communication protocols; maintaining essential services; collaborating and communicating with other health programs and non-health sectors; research and evaluation; an annual budget for response; and the existence of SOPs, a formal command and control structure for outbreak response, as well as emergency insecticide and antimalarial stockpiles.

[†] Outbreaks of international concern—This is determined according to criteria published in the WHO document: *International Health Regulations (2005)*, available at <http://www.who.int/ihr/9789241596664/en/index.html>.

Data Source: NMCP program reports or policy documents.

Data Type: Checklist—the proportion of “Yes” answers out of 4.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Countries must have a functional system for malaria outbreak detection, preparedness, and timely response, to avoid major setbacks in malaria control and to reduce mortality and morbidity from the outbreak; this will become more important as transmission decreases. Even with no local malaria transmission, vulnerable areas should maintain vigilant surveillance and epidemic response. This indicator measures whether a functional system to control malaria outbreaks exists, which will become more important as transmission

decreases. Even with no local malaria transmission, areas at risk should maintain a vigilant surveillance and epidemic response.

Method of Measurement

This indicator utilizes data from NMCP reports or policy documents. For each component of the checklist, the NMCP will need to examine existing policy to determine if the checklist item is satisfied; if it is, the NMCP will report a “Y” or “Yes” response to this item. This indicator is satisfied if the NMCP responds “Yes” to all checklist items, and a “4/4” score is reported.

Strengths

- The data for this indicator should be readily available within NMCP program reports or policy documents.
- Private sector data are frequently missing from surveillance systems; so this indicator requires that they be included.

Limitations

- This indicator gives equal weight to all components of a malaria outbreak detection system; however, some of these components may be more important than others.

References

Date of Last Revision: 27 April 2010

6.3 National malaria risk stratification is developed and updated at least once every 5 years, based on the surveillance data (confirmed cases)

Definition

The NMCP satisfies this indicator if the following condition is met:

- NMCP has developed a risk stratification system for malaria transmission based on surveillance data (confirmed cases) that have been updated within the last 5 years. NMCPs may determine strata cutoffs as the program deems appropriate, but strata should include a stratum without local malaria transmission and absence of vector, a stratum without local malaria transmission and presence of vector, and strata with varying levels of malaria transmission. NMCPs should utilize the smallest administrative unit possible when implementing risk stratification (Y/N).

Clarification

† Administrative unit—The smallest useful geographic/government organizational unit, such as a province, district, county, sous-préfecture, for which an NMCP can get data required by the indicator.

† Local malaria transmission—A malaria case for which local transmission cannot be disproved. This includes delayed first attacks of *P. vivax* due to locally acquired parasites with a long incubation period.

Data Source: NMCP program reports or policy documents.

Data Type: (Y/N) and date.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Malaria is geographically heterogeneous; so programs need to risk stratify the country in order to allocate resources effectively. This indicator measures whether a stratification system based on confirmed cases exists, and, if it does, whether it is updated every 5 years. As transmission decreases, more frequent risk stratification will be crucial for tracking progress and targeting interventions; so countries moving towards elimination may need to re-stratify annually.

Method of Measurement

This indicator utilizes data from NMCP program reports or policy documents such as an annual report and a report or guidelines on risk stratification. If the NMCP has a satisfactory risk stratification system, and it has been updated within the last 5 years, it will report both a “Y” or “Yes” response and the date for this indicator.

Strengths

- The data for this indicator should be readily available within NMCP program reports or policy documents.

Limitations

- With rapid scale-up of interventions, updating risk stratification every 5 years may not adequately keep up with changes in malaria endemicity.
- In areas where a large proportion of cases are not confirmed, there is underreporting of malaria, or poor surveillance systems exist, stratification may not represent the actual incidence of malaria.
- This indicator does not measure whether malaria control programs are utilizing the risk stratification system appropriately. It is not clear that strata chosen by NMCP are reflective of useful strata cutoffs, or that strata are paired with interventions in an effective evidence-based manner.
- Currently most surveillance data are generated by the public sector only.

References

Date of Last Revision: 27 April 2010

6.4 Systematic monitoring of antimalarial* drug efficacy is carried out at least once every 2 years, according to WHO protocol

Definition

The NMCP satisfies this indicator if the following condition is met:

- NMCP has been monitoring antimalarial* drug efficacy in patients infected by *P. falciparum* or *P. vivax* infections within the last 2 years according to WHO protocol: http://whqlibdoc.who.int/publications/2009/9789241597531_eng.pdf (Y/N/NA).

Countries with transmission levels low enough to conduct studies every 3 years will report “NA” and the date the study was completed.

* Monitoring should be carried out for first-line antimalarials.

Data Source: NMCP records and reports.

Data Type: (Y/N/NA) and date study was completed.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Monitoring the efficacy of antimalarial drugs ensures that countries have the information needed to modify their malaria treatment policies. This assures efficacy of treatments and helps to reduce drug resistance where it arises. This indicator measures the degree to which an NMCP is conducting appropriate efficacy tests, and whether this monitoring is up-to-date.

Method of Measurement

This indicator utilizes data from NMCP records and reports. The completion date of the last systematic monitoring of antimalarial drug efficacy following WHO guidelines should be recorded. Dates that fall in the last 2 years satisfy the indicator; earlier dates do not. WHO guidelines for monitoring antimalarial drug efficacy are available at http://whqlibdoc.who.int/publications/2009/9789241597531_eng.pdf.

If the NMCP has conducted drug-efficacy monitoring within the last 2 years, it will report both a “Y” or “Yes” response and the date when the study was completed.

If transmission levels are low enough that studying therapeutic efficacy every 2 years is not possible, the NMCP can conduct studies every 3 years. In this case, the NMCP would report “N/A” and the date the study was completed.

In addition, WHO suggests that in low transmission settings NMCPs can reduce the required sample size per site by combining data from single-arm studies conducted in either multiple centers within one country or within neighboring countries. The statistical implications of this method are being investigated. Studies with molecular markers should be conducted simultaneously with therapeutic efficacy tests, if the molecular markers are known and have been validated (i.e., for mefloquine, sulfadoxine-pyrimethamine, and chloroquine).

Countries that are in the stage of pre-elimination or elimination must initiate active case detection. All patients (of all ages and parasitaemia levels) should preferably be hospitalized until their parasitaemia and symptoms are resolved. As countries in the pre-elimination or elimination stage are advised to follow up on patients for at least 28 days and ensure that no cases are lost to follow-up, data on drug efficacy can easily be collected for almost all patients at the same time. In-vitro and molecular markers can also be used for monitoring drug efficacy.

Strengths

Limitations

- With decreasing malaria incidence, an updated Therapeutic Efficacy Study (TES) protocol for very low transmission settings will be necessary to guide those programs that have exhausted all alternative options recommended in the WHO protocol, including conducting studies every 3 years.
- Since TES are research studies, the protocol should be endorsed by members of the National Ethical Committee and be registered on a dedicated website

References

Date of Last Revision: 27 April 2010

6.5 Systematic monitoring of insecticide efficacy is carried out at least once every 2 years following WHO guidelines

Definition

The NMCP satisfies this indicator if the following condition is met:

- NMCP has monitored insecticide efficacy using valid laboratory tests within the last 2 years. Valid laboratory methodology is either the WHO “Tube Test,” or the CDC “Bottle Bioassay” (Y/N).

Clarification

† The WHO “Tube Test” protocol is available in the WHO document: Test procedures for insecticide resistance monitoring in malaria vectors, bio-efficacy, and persistence of insecticide on treated surfaces (http://whqlibdoc.who.int/hq/1998/WHO_CDS_CPC_MAL_98.12.pdf).

† CDC’s “Bottle Assay” protocol is available at <http://www.cdc.gov/ncidod/wbt/resistance/assay/bottle/index.htm>.

Data Source: NMCP records and reports.

Data Type: (Y/N) and date of completed study.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries.

Purpose/Rationale

Monitoring the efficacy of insecticides ensures that countries have the information needed to modify their vector control policies. This assures efficacy of treatments and helps to reduce insecticide resistance when it arises. This indicator measures the degree to which an NMCP is conducting appropriate efficacy tests, and whether this monitoring is up-to-date.

Method of Measurement

This indicator utilizes data from NMCP records and reports. The date of the last systematic monitoring of insecticide efficacy following WHO guidelines should be recorded. Dates that fall in the last 2 years satisfy the indicator; earlier dates do not.

If the NMCP has conducted insecticide efficacy monitoring within the last 2 years, it will report both a “Y” or “Yes” response and the date of the last tube or bottle test for this indicator.

Strengths

Limitations

- The protocol is specified for only “adulticide” efficacy; studies of other types of insecticides may require a different methodology.

- The fact that countries are monitoring insecticide efficacy may not result in necessary changes of policies and practices if NMCPs do not act on studies showing a decline in the efficacy of insecticides.

References

Date of Last Revision: 27 April 2010

H. Elimination

7.1 Country has reoriented the NMCP towards an elimination program in targeted areas based on listed criteria

Definition

For each component of the checklist, the NMCP will need to examine existing policy documents to determine if the checklist item is satisfied; if it is satisfied, the NMCP will report a “Y” or “Yes” response to this item. This indicator is completely satisfied if the NMCP responds “Yes” to all checklist items. The program will report the proportion of “Yes” responses out of the number of checklist items (10).

1. National strategy updated to incorporate elimination objective.
2. All malaria cases are microscopically confirmed and treated according to national policy (including all cases diagnosed and treated outside the public sector) (Y/N).
3. Microscopy QA systems are fully functional (this is defined by Indicator 4.2) (Y/N).
4. Implementation of public-private sector policy, where applicable (Y/N).
5. All malaria cases are notified, epidemiologically investigated, and centrally registered in a database within 1 week after initial diagnosis (Y/N).
6. Malarious areas are clearly delimited and an inventory of foci has been made (Y/N).
7. The elimination database has been set up, including GIS–system based on foci, cases, vectors, parasite isolates and interventions (Y/N).
8. Strategy in place to appropriately allocate human resources (Y/N).
9. NMCP has conducted a detailed review to calculate projected costs of eliminating malaria over the next 5 years, and have broken this down into annual budgets (Y/N).
10. At least 50% of annual malaria elimination budget is from domestic sources (Y/N).

Clarification

[†] Public-private sector policy must address following 7 components, based on WHO document: Engaging All Health Care Providers in TB Control: Guidance on Implementing Public-Private Mix Approaches (http://whqlibdoc.who.int/hq/2006/WHO_HTM_TB_2006.360_eng.pdf):

1. Formulating objectives—Program goals should be clearly defined in terms of national and international guidelines.
2. Defining the task mix for different providers—This includes mapping all providers and determining the specific clinical and public health tasks they should provide.
3. Developing practical tools to help implementation—Three types of forms are necessary: (1) contracts with providers to facilitate cooperation; (2) appropriate clinical forms for tracking referral, case notification, lab request, etc.; (3) supervisory forms, such as quarterly reports, supervisory checklists, laboratory and treatment registries.
4. Training—Appropriate training materials and programs available for private providers.
5. Certification—Process exists to identify private providers that meet the necessary criteria.
6. Incentives and enablers—Monetary or non-monetary mechanisms exist to reward participating providers.
7. Monitoring and evaluation—Indicators, reporting, and feedback/supervision system exists to monitor private providers.

[†] Investigated case—Malaria case for which enough information is gathered to allow classification of a malaria case by origin of infection. This includes, but is not limited to, administration of a standardized questionnaire to a person diagnosed with a malaria infection in order to determine if the case is imported, locally transmitted, induced, or introduced.

Indicator 7.1 (continued)

† Focus—A defined and circumscribed locality situated in a currently or former malarious area and containing the continuous or intermittent epidemiological factors necessary for malaria transmission. Foci can be classified as residual active, residual non-active, cleared up, new potential, new active, endemic, or pseudo-foci.

† Appropriately allocate human resources—This is based on existence of a human resource policy as stipulated in Indicator 1.1 and adapting this to address specific elimination concerns such as existence of a malaria elimination team, ongoing training and maintenance of high-quality core malaria control functions as incidence is reduced, and transitioning malaria staff to other disease areas.

Data Source: NMCP policy documents.

Data Type: Checklist—the proportion of “Yes” answers out of 10.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries whose NMCP decide to pursue malaria elimination; this should be based on meeting criteria for program reorientation towards malaria elimination.

Purpose/Rationale

Achievement of malaria elimination in countries will require program realignment from a control program to an elimination program. This indicator lists criteria that programs must meet in order to complete program reorientation.

Method of Measurement

This indicator uses data from NMCP policy documents. For each component of the checklist, the NMCP will need to examine existing policy to determine if the checklist item is satisfied; if it is satisfied, the NMCP will report a “Y” or “Yes” to this item. This indicator is satisfied if the NMCP responds “Yes” to all checklist items.

Strengths

- The data for this indicator should be readily available within NMCP policy documents.
- The indicator measures components of program reorientation as delineated by the WHO *Elimination Field Manual*.

Limitations

- This indicator gives equal weight to different components of malaria program management; however, some of these components may be more important than others.

References

Date of Last Revision: 27 April 2010

7.2 Percentage of administrative units in a country with an SPR $\geq 5\%$, SPR $< 5\%$, API $< 1/1,000$, interruption of local transmission, and elimination of malaria

Definition

Country will use an endemicity map of malaria transmission in administrative units to report the following:

- **Numerator:** Number of administrative units with SPR $\geq 5\%$, SPR $< 5\%$, API $< 1/1,000$, interruption of local transmission, elimination of malaria, and historically malaria-free.
- **Denominator:** Number of administrative units within a country.

Note: Includes both *P. falciparum* and *P. vivax*.

Clarification

† Administrative unit—The smallest useful geographic/government organizational unit, such as a province, district, county, sous-préfecture, for which an NMCP can get data required by the indicator.

† SPR (Slide Positivity Rate)—The proportion of slides that are found positive among the slides examined.

† API (Annual Parasite Incidence)—Number of microscopically confirmed malaria cases that are detected during 1 year per unit total population under surveillance.

† Interruption of malaria transmission—No local malaria case is detected over the last year. (A malaria case for which local transmission cannot be disproved. This includes delayed first attacks of *P. vivax* due to locally acquired parasites with a long incubation period.)

† Elimination—Reduction to 0 of the incidence of infection caused by a specified agent in a defined geographical area as a result of deliberate efforts. Continued measures to prevent re-establishment of transmission are required. WHO certification requires 3 consecutive years without local malaria transmission.

† Historically malaria-free—no locally transmitted malaria case for the last 10 years.

Data Source: Routine information and NMCP policy documents.

Data Items

- Total number of administrative units in a country.
- Number of administrative units in following categories:
 - SPR $\geq 5\%$.
 - SPR $< 5\%$ and API $> 1/1,000$.
 - API $< 1/1,000$ and locally transmitted cases detected.
 - Interruption of local transmission during prior year.
 - Malaria eliminated (no locally transmitted cases for 3 years).
 - Historically malaria-free (no locally transmitted cases for the last 10 years).

Data Type: Percentage.

Disaggregation: SPR $\geq 5\%$, SPR $< 5\%$, API $< 1/1,000$, interruption of local transmission, elimination of malaria, and historically malaria-free.

Frequency: Annual.

Applicability: All countries whose NMCP decide to pursue malaria elimination; this should be based on meeting criteria for program reorientation towards malaria elimination.

Purpose/Rationale

The WHO *Malaria Elimination Field Manual* suggests utilizing SPR, and API to gauge progress toward elimination. In addition, interruption of local transmission is an intermediate and necessary step towards achieving elimination. By mapping and calculating the percentage of the country that falls into these malaria elimination strata, programs will be able to track the project's progress towards eliminating malaria.

Method of Measurement

This indicator utilizes data from program records. The denominator should come from NMCP policy documents and maps that identify the name of the appropriate administrative unit and the number of that type of administrative unit in existence within the country. The numerator will be calculated from malaria routine information systems that report the number of malaria cases, the SPR in an administrative unit, and government documents that estimate the population within an administrative unit. These data will be used to construct an endemicity map of malaria transmission. Administrative units will be placed in the following strata:

- SPR $\geq 5\%$
- SPR $< 5\%$ and API $> 1/1,000$
- API $< 1/1,000$ and locally transmitted cases detected
- Interruption of local transmission during prior year
- Malaria eliminated (no locally transmitted cases for 3 years)
- Historically malaria-free (no locally transmitted cases for the last 10 years).

The total number of administrative units in each stratum is then utilized to calculate percentages required by indicator definition.

Strengths

- The denominator is clearly defined and can be calculated exactly from existing records.
- The indicator is based on elimination criteria identified by WHO.

Limitations

- Countries may not choose comparable administrative units, which may change periodically with governmental reorganization. In addition, indicator has greater utility as administrative unit size decreases.

References

Date of Last Revision: 27 April 2010

7.3 Percentage of confirmed malaria cases investigated and responded to in the population targeted for elimination

Definition

Calculate the following two percentages: (1) the percentage of confirmed malaria cases investigated, and (2) the percentage of confirmed malaria cases investigated and responded to.

The percentage of confirmed malaria cases investigated:

- **Numerator:** Number of confirmed malaria cases investigated in the population targeted for elimination.
- **Denominator:** Number of all confirmed malaria cases in the population targeted for elimination.

Clarification

† Confirmed malaria case—malaria case detected through either passive or active case detection that is confirmed by microscopy.

† Investigated case—Malaria case for which enough information is gathered to allow classification of a malaria case by origin of infection. This includes, but is not limited to, administration of a standardized questionnaire to a person diagnosed with a malaria infection in order to determine if the case is imported, locally transmitted, induced, or introduced. This is accomplished by gathering data on nationality, occupation, recent travel, history of previous treatments and receipt of radical treatment, history of blood transfusion, and use of preventive measures.

† Targeted population—Population selected by NMCP for malaria elimination; this should be based on meeting the criteria for program reorientation towards malaria elimination.

Data Source: Routine information.

Data Items

- Number of all confirmed malaria cases in the population targeted for elimination.
- Number of confirmed malaria cases investigated in the population targeted for elimination.

Data Type: Percentage.

Disaggregation: None.

Frequency: Annual.

Applicability: All countries whose NMCP has designated areas for elimination; this should be based on meeting criteria for program reorientation towards malaria elimination.

Purpose/Rationale

When pursuing malaria elimination, programs should investigate all detected malaria cases. Because of the geographical heterogeneity in malaria transmission, the mobility of human populations, and the general presence of potent malaria vectors, it is important to determine the epidemiological origin of each detected malaria case to prevent further transmission. This is especially important when trying to eliminate local transmission, or prevent its reintroduction.

Method of Measurement

This indicator utilizes data from program records. The denominator should come from routine program reports that record the number of confirmed malaria cases. The numerator will be based on the number of case investigations completed, which will most likely equal the number of case investigation forms completed.

Strengths

The numerators and denominators are clearly defined and can be calculated exactly from existing records.

Limitations

- The extent and accuracy of case investigation may vary from country to country.
- The utility of the indicator depends on accurate and thorough surveillance systems for malaria. This may be difficult in systems that require case reporting from a large private health sector, or where self-treatment of malaria is prevalent.

References

Date of Last Revision: 27 April 2010

IV. Plan for Reviewing and Updating the BMIF

The BMIF serves as a “living” document that each GMS NMCPs can use to guide their performance management efforts. As such, it should be reviewed and updated as necessary to ensure that it reflects changes in regional malaria control strategies.

In addition, the BMIF contains reference sheets for the malaria indicators and some guidance on the implementation of these indicators. These indicators should be reviewed and revised approximately 2 years after initial implementation to assess whether the indicators are SMART (Specific, Measurable, Achievable, Realistic, and Timely) and useful for program management. Specifically, when reviewing the BMIF, the relevant partners should consider the following questions:

- Are the performance indicators measuring the intended result?
- Are the performance indicators providing the information needed? For program management purposes? For reporting purposes? For donor purposes?
- Based on feedback from countries and by stakeholders, how can the BMIF be improved?

After the initial 2-year review, the indicators can be reviewed approximately every 5 years.

Revision of the BMIF will occur through a collaborative process similar to its creation. NMCPs and relevant partners will collect and exchange information in order to reach a consensus on proposed changes to the BMIF.

V. Glossary

Adequately Resourced National Outbreak Plan² is a plan that addresses preparing for an emergency, surveillance, case investigation and treatment; preventing the spread of the disease in the community; establishing emergency communication protocols; maintaining essential services; collaborating and communicating with other health programs and non-health sectors; research and evaluation; an annual budget for response; and the existence of SOPs, a formal command and control structure for outbreak response, as well as emergency insecticide and antimalarial stockpiles.

Administrative Unit is the smallest useful geographic/government organizational unit such as a province, district, county, sous-prefecture, etc. for which an NMCP can get data required by the indicator.

Annual Parasite Incidence is the number of microscopically confirmed malaria cases that are detected during 1 year per unit total population under surveillance.

Behavior Change Communication refers to community health-seeking behavior. The term was originally developed for HIV and TB prevention projects. It term is now used more generally for any communication activity with a goal of helping individuals or communities practice behaviors with positive effects on health. Malaria-related examples include use of ITNs, prompt care-seeking for children with fever, and use of IPT by pregnant women.

Confirmed Malaria Case refers to a malaria case detected through either passive or active case detection that is confirmed by microscopy.

Elimination refers to the reduction to 0 of the incidence of infection caused by a specified agent in a defined geographical area as a result of deliberate efforts. Continued measures to prevent re-establishment of transmission are required. WHO certification requires 3 consecutive years without local malaria transmission.

Focus is a defined and circumscribed locality situated in a currently or former malarious area and containing the continuous or intermittent epidemiological factors necessary for malaria transmission. Foci can be classified as residual active, residual non-active, cleared up, new potential, new active, endemic, or pseudo-foci.

Historically Malaria-Free refers to when there has been no locally transmitted malaria case for the last 10 years.

Human resource plan is based on the WHO endorsed health workforce framework from Human Resources for Health document: Addressing the health workforce crisis: towards a common approach, a human resource plan should address (<http://www.human-resources-health.com/content/pdf/1478-4491-4-21.pdf>)—

1. Policy: Rules, regulations, and legislation for conditions of employment, work standards and development of the health workforce
2. Health workforce management: Integrated use of data, policy and practice to plan for necessary staff, recruit, hire, deploy and develop health workers

² Based on the MEASURE Evaluation document: A Guide for Monitoring and Evaluating Avian Influenza Programs in Southeast Asia (<http://www.cpc.unc.edu/measure/publications>)

3. Finance: Obtaining, allocating and dispersing adequate funding for human resources
4. Education: Production and continuous development of an appropriately skilled workforce
5. Partnerships: Formal and informal linkages aligning key stakeholders (e.g., service providers, sectors, donors, to maximize use of human resources)
6. Leadership: Capacity to provide direction, to align people, to mobilize resources and to reach goals

Information, Education, and Communication aims to impart knowledge and skills to members of the general public to enable them to make informed decisions and encourage their participation in malaria prevention, treatment, and control activities. It is also important in raising awareness of malaria through continuous advocacy activities.

Inpatient Cases are malaria cases that are either from hospitals or non-hospital facilities with inpatient beds.

Insecticide-Treated Nets are bed nets that have been treated with insecticides to provide protection by repelling mosquitoes from the net and killing those that land on it. The net is hung over the sleeping area in order to prevent biting by mosquitoes. ITNs require retreatment with insecticides every 6 months in order to maintain their effectiveness. (www.who.int/whopes/en).

Integrated Vector Management, according to WHO (<http://apps.who.int/malaria/integratedvectormanagement.html>), includes—

- Selection of methods based on knowledge of local vector biology, disease transmission and morbidity
- Utilization of a range of interventions, often in combination and synergistically (including chemical, biological, or environmental interventions)
- Collaboration within the health sector and with other public and private sectors that impact on vector breeding
- Engagement with local communities and other stakeholders
- A public health regulatory and legislative framework
- Rational use of insecticides
- Good management practices.

Interruption of Malaria Transmission occurs when no local malaria case is detected over the last year. (A malaria case for which local transmission cannot be disproved. This includes delayed first attacks of *P. vivax* due to locally acquired parasites with a long incubation period.)

Investigated Case is a malaria case for which enough information is gathered to allow classification of a malaria case by origin of infection. This includes, but is not limited to, administration of a standardized questionnaire to a person diagnosed with a malaria infection in order to determine if the case is imported, locally transmitted, induced, or introduced. This is accomplished by gathering data on nationality, occupation, recent travel, history of previous treatments and receipt of radical treatment, history of blood transfusion, and use of preventive measures.

Joint Plan of Action is a plan to share information and coordinate activities to control malaria transmission across an international border on a regular basis. The plan should be made jointly by appropriate authorities on either side of the border. If a province has borders with more than one country, a plan should exist for each bordering country.

Local Malaria Transmission is a malaria case for which local transmission cannot be disproved. This includes delayed first attacks of *P. vivax* due to locally acquired parasites with a long incubation period.

Long-Lasting Insecticidal Nets are bed nets that have been treated with insecticides to provide protection by repelling mosquitoes and killing those that land on it. The net is hung over the sleeping area in order to prevent biting by mosquitoes. LLINs are different from ITNs in that they have insecticide bound to the netting material during production, enabling them to extend their protection to approximately 3 years before requiring retreatment. (www.who.int/whopes/en).

Microscopy is a diagnostic technique for identifying *Plasmodium* species parasites in blood samples. Standard laboratory procedure requires preparation of a thick and thin blood smear. Identification of one *Plasmodium* is sufficient for a positive result. A negative result requires failure to identify a *Plasmodium* in examination of 100 fields assuming 8,000 leukocytes/ μ l of blood. Microscopy is considered the gold standard for diagnosis of *Plasmodium* infection.

Mixed Infection refers to infections due to two or more species of malaria parasite (for calculation purposes, it is assumed that most of these cases are due to *P. falciparum* and *P. vivax*).

Operational Research refers to studies or processes to identify and resolve programmatic bottlenecks for effective implementation and/or to build the evidence base for improving interventions and strategies.

Populations at Risk of Malaria include a population living in area where imported malaria cases exist, or where a locally transmitted malaria case was detected over the last 12 months.

Public-Private Sector Policy must address following 7 components based on WHO document: Engaging All Health Care Providers in TB Control: Guidance on Implementing Public-Private Mix Approaches (http://whqlibdoc.who.int/hq/2006/WHO_HTM_TB_2006.360_eng.pdf):

1. Formulating objectives—program goals should be clearly defined in terms of national and international guidelines.
2. Defining the task mix for different providers—this includes mapping all providers and determining the specific clinical and public health tasks they should provide.

3. Developing practical tools to help implementation—three types of forms are necessary: contracts with providers to facilitate cooperation; appropriate clinical forms for tracking referral, case notification, lab request, etc.; supervisory forms such as quarterly reports, supervisory checklists, laboratory and treatment registries, etc.
4. Training—appropriate training materials and programs available for private providers
5. Certification—process exists to identify private providers that meet necessary criteria
6. Incentives and enablers—monetary or non-monetary mechanisms exist to reward participating providers
7. Monitoring and evaluation—indicators, reporting, and feedback/supervision system exists to monitor private providers

Rapid Diagnostic Test is a diagnostic tool for identifying *Plasmodium* species infections that is easily deployed in field situations where microscopes and/or trained microscopists are not available. Although highly specific, these tests have reported low sensitivity in areas of low endemicity. RDTs capable of detecting specific *Plasmodium* species are now available.

Slide Positivity Rate is the proportion of slides found positive for malaria among all the slides examined.

Strategic Information encompasses the data, methodologies, and systems that are used for planning, monitoring, and managing health programs such as surveillance, M&E, and surveys. This includes standardized plans and methods for collecting data, regular collection of information from surveillance sites and surveys, collection of specific strategic information such as vector entomology, and the production and dissemination of reports that are used for program management.

Targeted Population refers to a population selected by NMCP for malaria elimination; this should be based on meeting the criteria for program reorientation towards malaria elimination.

Vulnerable Populations include pregnant women; children under 5; ethnic minority groups; mobile/migrant populations; HIV Positive persons and others as applicable

WHO/Centers for Disease Control and Prevention/ Malaria Consortium/USAID/MEASURE Evaluation



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