

Monitoring and Evaluation Framework for the Plan of Action for Malaria Elimination 2016- 2020

Background Document for Session 4

REGIONAL MALARIA PROGRAM
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**Pan American
Health
Organization**



**World Health
Organization**
REGIONAL OFFICE FOR THE **Americas**

INTRODUCTION

In support of the implementation of the Global Technical Strategy for Malaria (GTS), the Plan of Action for Malaria Elimination 2016-2020 was approved by the 55th PAHO Directing Council in September 2016. Following an extensive region-wide consultation process, the Region commits to the following list of targets for the 2016-2020 period:

- a) further reduction of malaria morbidity by 40% or more (based on 2015 official figures);
- b) further reduction of malaria-related deaths by 40% or more (based on 2015 official figures);
- c) implementation of efforts to eliminate malaria in 18 of the 21 endemic countries and attainment of malaria-free status in at least four countries;
- d) implementation of innovative approaches to address challenges in countries where progress has been limited; and
- e) prevention of the reestablishment of malaria in countries that have been declared malaria-free.

The Plan of Action contributes to the achievement of impact goals 6 (reduce mortality due to communicable diseases) and 8 (eliminate priority communicable diseases in the Region) of PAHO's Strategic Plan and aligns accordingly with technical guidelines and documents developed and consolidated by the WHO Global Malaria Program, the PAHO Regional Malaria Program and country offices, and various technical partners. The monitoring and evaluation (M&E) of the Plan will be aligned with the Organization's results-based management framework as well as its performance monitoring and assessment processes. Through M&E, the program results can be measured to provide the basis for accountability and informed decision-making at both program and policy level.

The aim of this document is to present to the Malaria Technical Advisory Group some key ideas and proposed roadmap in consolidating the Monitoring and Evaluation Framework for the Region's Plan of Action for Malaria Elimination 2016-2020.

OVERVIEW OF THE PROPOSED M&E FRAMEWORK

Designed primarily for PAHO, this monitoring and evaluation framework outlines the processes, systems, and infrastructure involved in tracking and assessing the results of interventions contemplated under the Plan of Action for Malaria Elimination 2016-2020. The framework, particularly the roster of indicators, can likewise serve as a useful guide in developing malaria M&E plans at country level.

This document includes the technical specifications for the corresponding impact, outcome, and output indicators for the Plan of Action (as chosen by member states and stakeholders) and provides their respective definitions and measurement, in order to facilitate a systematic approach to the joint monitoring and reporting by PAHO Member States. Additional indicators deemed relevant to the context of the Region and proposed by WHO in the Malaria Elimination Framework and the Malaria Surveillance Guidelines are likewise included.

A standard template, adapted from the technical specifications format used by the PAHO Core Health Data and Country Profiles Initiative, is used for all indicators. The list of indicators is organized according to the targets and components of the Plan of Action for Malaria Elimination 2016-2020.

The M&E framework will guide the progress reports that will be developed based on information available at the end of each year, which will be presented annually to the PAHO executive management. In addition, a mid-term report will be presented to the Governing Bodies. With a view to determining the strengths and weaknesses of the overall implementation, causal factors of successes and failures, and future actions, a final evaluation will be conducted during the last year of the plan's implementation.

INDICATORS

The achievement of the targets indicated in the Plan of Action for Malaria Elimination 2016-2020 will be monitored based on the following indicators:

- a) further reduction of malaria morbidity by 40% or more (based on 2015 official figures);
 - Confirmed malaria cases (number and rate per month or per year)
- b) further reduction of malaria-related deaths by 40% or more (based on 2015 official figures);
 - Malaria deaths (number and rate per month or per year)
- c) implementation of efforts to eliminate malaria in 18 of the 21 endemic countries and attainment of malaria-free status in at least four countries;
 - % of cases being investigated
 - % of foci being investigated
 - % of cases being detected and treated from the start of symptom (<24, 24-48, 48-72 and >72 hours)*
 - % of at risk population (API>1 or active/residual foci) covered by IRS or ITNs
 - Number of countries with zero autochthonous cases
- d) implementation of innovative approaches to address challenges in countries where progress has been limited; and
 - Number of countries implementing focused interventions towards increased access to good quality malaria diagnosis and treatment
- e) prevention of the reestablishment of malaria in countries that have been declared malaria-free.
 - Number of non-endemic countries which have remained malaria-free

The implementation of the various strategic lines of the Plan of Action will be monitored based on the following indicators:

Strategic Line of Action 1: Universal access to good-quality malaria prevention interventions, integrated vector management, and malaria diagnosis and treatment

- 1.1.1 Number of Member States and territories implementing malaria prevention and case management efforts

- 1.2.1 Number of countries (both malaria endemic and non-endemic) that are implementing integrated vector management based on PAHO/WHO guidelines (including insecticide resistance surveillance, and vector behavior studies)
- 1.3.1 Number of malaria-endemic countries reporting malaria drug efficacy and drug resistance surveillance data to PAHO, as per PAHO/WHO guidelines
- 1.3.2 Number of countries implementing PAHO/WHO guidelines for quality malaria diagnosis and treatment

Strategic Line of Action 2: Reinforced malaria surveillance towards evidence-based decision making and response

- 2.1.1 Number of countries reporting malaria surveillance data annually to PAHO/WHO, by subnational level, sex, age, and other equity-related variables
- 2.2.1 Number of malaria-endemic countries exhibiting strengthened data informed decision-making (based on the PAHO malaria data verification tool), and sharing epidemiological information

Strategic Line of Action 3: Strengthened health systems, strategic planning, monitoring and evaluation, operational research, and country-level capacity building

- 3.1.1 Number of countries implementing plans for training health personnel on malaria
- 3.2.1 Number of countries with national strategic plans (focusing on/ including malaria) that align with WHO-recommended strategies and components of the PAHO Plan of Action for Malaria
- 3.3.1 Number of malaria-endemic countries with no stock-outs of key malaria supplies (including anti-malarials) at the national level in a given year
- 3.4.1 Number of countries with sustained domestic funding for malaria efforts
- 3.5.1 Number of countries conducting malaria operational research, including IVM topics

Strategic Line of Action 4: Strategic advocacy, communications, and partnerships and collaborations

- 4.1.1 Number of countries participating in regional-level networks and collaborations
- 4.2.1 Number of countries engaged in inter-programmatic and/or synergistic actions advocated under PAHO/WHO initiatives and policies
- 4.3.1 Number of countries with identified best practices in their malaria activities

Strategic Line of Action 5: Focused efforts and tailored approaches to facilitate malaria elimination and prevent reestablishment in malaria-free areas

- 5.1.1 Number of countries implementing strategies to address malaria among populations in situations of vulnerability
- 5.2.1 Number of countries implementing the 2015 WHO P. vivax recommendations
- 5.3.1 Number of countries supported in terms of malaria program reorientation towards malaria elimination
- 5.4.1 Number of non-endemic countries supported in terms of maintaining key malaria capacities

ISSUE(S) FOR CONSIDERATION: PROPOSED PROCESS FOR DEVELOPING THE M&E FRAMEWORK

The proposed process follows three phases:

1. Phase 1: Formation of a Technical Working Group (TWG) for the development of the M&E Framework (July 2017)
2. Phase 2: Conceptual review of the proposed indicators and assessment of the systems, resources, and infrastructure required to implement the M&E Framework (August - September 2017)
3. Phase 3: Completion of the full draft of the M&E Framework (October 2017) for subsequent recommendation to the Malaria TAG

Note: The process will be conducted in conjunction with the on-going review of malaria elimination indicators by WHO.

REQUESTED ACTION BY THE MALARIA TAG

For guidance and feedback regarding the proposed process and timeline in the consolidation of the Monitoring and Evaluation Framework for the Region's Plan of Action for Malaria Elimination 2016-2020.

REFERENCES

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ANNEX 1: INDICATORS FOR THE PLAN OF ACTION

I. Indicators pertaining to the 2020 targets

Code and title of the indicator	Impact indicator A: MALARIA MORBIDITY
Name of the indicator	Reduction in malaria morbidity
Definition of the indicator	Annual malaria morbidity is defined as the number of confirmed malaria cases (diagnosed by microscopy and / or RDTs) in a given year. This indicator measures the decline in the annual malaria morbidity in the Region, measured in 2020 compared to the annual malaria morbidity measured in 2015.
Estimated impact in magnitude	<i>Magnitude target:</i> At least a 40% reduction in morbidity due to malaria by 2020 compared to 2015 (to be determined).
Purpose of the indicator	This indicator evaluates the performance of the countries' malaria programs and health service delivery, particularly their capacity to provide rapid response with quality-assured diagnosis and treatment, hence preventing further transmission of the disease.
Technical note	PAHO/WHO's annual World Malaria Report forms, which are used by countries to send annual updates, facilitate country reporting of important data sets that feed into calculating this indicator, such as: <ul style="list-style-type: none"> • number of malaria cases reported in 2020 • number malaria cases reported in 2015
Type of indicator	Relative
Measurement units	Percentage
Frequency of measurement	Annual; often coinciding, for most countries, with the last semester of the succeeding year and consistent to scheduled year-end annual publication of the WHO World Malaria Report (data from the previous year is published annually on December; e.g., 2015 data will published on December 2016).
PASB unit responsible for monitoring the indicator	Neglected, Tropical and Vector Borne Diseases (CHA/VT)
Data Source	Country reports notified by national authorities to PAHO country offices and corresponding technical unit.
Limitations	Variations in the reporting cycles of countries; indicator does not necessarily include private-sector coverage, which is important in the context of malaria elimination; indicator does not necessarily measure the implementation of other important malaria policies that do not pertain to mortality.
References	Pan American Health Organization (2016) Interactive Malaria Statistics. PAHO, Washington DC. http://www.paho.org/hq/index.php?option=com_content&view=article&id=2632&Itemid=2130&lang=en Annual World Health Organization World Malaria Report. PAHO Directing Council Resolution CD55.R7

Code and title of the indicator	Impact indicator B: MALARIA MORTALITY
Name of the indicator	Reduction in malaria-related deaths
Definition of the indicator	Annual malaria mortality is defined as the number of deaths attributed to malaria in a given year. This indicator measures the decline in the annual malaria mortality in the Region, measured in 2020 compared to the annual malaria mortality measured in 2015.
Estimated impact in magnitude	<i>Magnitude target:</i> At least a 40% reduction in mortality due to malaria by 2020 compared to 2015 (to be determined).
Purpose of the indicator	This indicator evaluates the performance of the countries' malaria programs and health service delivery, particularly their capacity to provide rapid response with quality-assured diagnosis and treatment, hence preventing severe malaria cases and reducing malaria mortality.
Technical note	PAHO/WHO's annual World Malaria Report forms, which are used by countries to send annual updates, facilitate country reporting of important data sets that feed into calculating this indicator, such as: <ul style="list-style-type: none"> • number of deaths attributed to malaria reported in 2020 • number of deaths attributed to malaria reported in 2015
Type of indicator	Relative
Measurement units	Percentage
Frequency of measurement	Annual; often coinciding, for most countries, with the last semester of the succeeding year and consistent to scheduled year-end annual publication of the WHO World Malaria Report (data from the previous year is published annually on December; e.g., 2015 data will be published on December 2016).
PASB unit responsible for monitoring the indicator	Neglected, Tropical and Vector Borne Diseases (CHA/VT)
Data Source	Country reports notified by national authorities to PAHO country offices and corresponding technical unit.
Limitations	Variations in the reporting cycles of countries; indicator does not necessarily include private-sector coverage, which is important in the context of malaria elimination; indicator does not necessarily measure the implementation of other important malaria policies that do not pertain to mortality.
References	Pan American Health Organization (2016) Interactive Malaria Statistics. PAHO, Washington DC. http://www.paho.org/hq/index.php?option=com_content&view=article&id=2632&Itemid=2130&lang=en Annual World Health Organization World Malaria Report. PAHO Directing Council Resolution CD55.R7

Code and title of the indicator	Impact indicator C: EFFORTS AND ATTAINMENT OF MALARIA ELIMINATION
Name of the indicator	Implementation of efforts to eliminate malaria and attainment of malaria-free status
Definition of the indicator	This indicator measures the progress made in the countries towards elimination of malaria by 2020 according to PAHO/WHO elimination criteria.
Estimated impact in magnitude	<i>Magnitude target(s):</i> Implementation of efforts to eliminate malaria in 18 of the 21 endemic countries and attainment of malaria-free status in at least four countries.
Purpose of the indicator	For countries aiming to eliminate malaria, this indicator will measure their compliance with the PAHO/WHO malaria elimination criteria and the installed capacities that the countries have developed.
Technical note	This is an impact indicator that makes a qualitative and quantitative assessment of a country's progress towards malaria elimination. The EMMIE data verification tool which PAHO developed will be used as an important tool for monitoring this indicator. The following relevant process indicators will also be monitored: <ul style="list-style-type: none"> • % of cases being investigated • % of foci being investigated • % of cases being detected and treated from the start of symptom (<24, 24-48, 48-72 and >72 hours)* • % of at risk population (API>1 or active/residual foci) covered by IRS or ITNs
Type of indicator	Absolute
Measurement units	It is expressed as <ul style="list-style-type: none"> • the number of malaria endemic countries which are implementing efforts to eliminate malaria • the number of countries that have eliminated malaria
Frequency of measurement	Biennial / Annual
PASB unit responsible for monitoring the indicator	Neglected, Tropical and Vector Borne Diseases (CHA/VT)
Data source	EMMIE data verification reports; and joint assessment of PAHO country offices, corresponding technical unit, and relevant stakeholders.
Limitations	Variations in the reporting and assessment cycles in the countries. Another limitation includes the possibility of subjectivity during the qualitative assessment. In addition, the possibility that criteria or capacity requirements may evolve and be eventually modified also is a limitation.
References	Pan American Health Organization. EMMIE Data Verification Methodology and Country Reports Pan American Health Organization (2016) Interactive Malaria Statistics. PAHO, Washington DC.

	http://www.paho.org/hq/index.php?option=com_content&view=article&id=2632&Itemid=2130&lang=en Annual World Health Organization World Malaria Report PAHO Directing Council Resolution CD55.R7
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Code and title of the indicator	Impact indicator D: MALARIA IN COUNTRIES WITH LIMITED PROGRESS
Name of the indicator	Number of countries implementing focused interventions towards increased access to good quality malaria diagnosis and treatment
Definition of the indicator	Countries with limited progress refer primarily to the 2 endemic countries which have not demonstrated net reduction on malaria burden between 2000 and 2015 (i.e. Haiti and Venezuela); and to countries which experienced malaria resurgence from previous years or a plateau in their trajectory towards malaria elimination. Innovative approaches refer to specific programs, efforts, and interventions implemented in these countries to enable them to achieve their respective national malaria targets.
Estimated impact in magnitude	<p><i>Magnitude target:</i></p> At least one innovative approach / program for each of the target countries must be implemented during the period. Such innovation(s) should demonstrate contribution towards achieving the national malaria targets of these countries, including increased access to malaria diagnosis and treatment.
Purpose of the indicator	This indicator evaluates the performance of the malaria programs of the target countries to innovate in terms of addressing their respective malaria situations and facilitate the achievement of their respective national malaria targets.
Technical note	Country work plans prepared by the PAHO Regional Malaria Program in collaboration with national counterparts facilitates monitoring of planned and on-going efforts in the countries. PAHO/WHO's annual World Malaria Report forms, which are used by countries to send annual updates, facilitate country reporting of important data sets that feed into calculating this indicator, such as: <ul style="list-style-type: none"> • % of cases being detected and treated from the start of symptom (<24, 24-48, 48-72 and >72 hours)* • number of malaria cases reported in 2020 • number malaria cases reported in 2015 • number of deaths attributed to malaria reported in 2020 • number of deaths attributed to malaria reported in 2015
Type of indicator	Absolute
Measurement units	It is expressed as the number of innovative approach(es) / program(s); with impact measured in terms of malaria cases and deaths per year.
Frequency of measurement	Annual; often coinciding, for most countries, with the last semester of the succeeding year and consistent to scheduled year-end annual publication of the WHO World Malaria Report (data from the previous year is published annually on December; e.g., 2015 data will published on December 2016).

PASB unit responsible for monitoring the indicator	Neglected, Tropical and Vector Borne Diseases (CHA/VT)
Data Source	Country work plans and country reports shared by national authorities to PAHO country offices and corresponding technical unit.
Limitations	Actual linkage of innovative efforts may not necessarily be direct / may require further scientific validation.
References	<p>Pan American Health Organization. EMMIE Data Verification Methodology and Country Reports</p> <p>Pan American Health Organization (2016) Interactive Malaria Statistics. PAHO, Washington DC.</p> <p>http://www.paho.org/hq/index.php?option=com_content&view=article&id=2632&Itemid=2130&lang=en</p> <p>Annual World Health Organization World Malaria Report.</p> <p>PAHO Directing Council Resolution CD55.R7</p>

Code and title of the indicator	Impact indicator E: PREVENTION OF RE-ESTABLISHMENT OF MALARIA
Name of the indicator	Prevention of the reestablishment of malaria in countries that have been declared malaria-free
Definition of the indicator	<p>This indicator counts the number of countries preventing the reestablishment of malaria or those which have no on-going local transmission of the disease for >3 years</p> <p>Baseline 2015:27</p> <p>Target 2020: 30</p>
Estimated impact in magnitude	<p><i>Magnitude target:</i></p> <p>Maintenance of malaria-free status among non-endemic countries</p>
Purpose of the indicator	This indicator evaluates the performance of the non-endemic countries to maintain key malaria capacities and prevent spread of transmission from imported cases.
Technical note	<p>PAHO/WHO's annual World Malaria Report forms, which are used by countries to send annual updates, facilitate country reporting of important data sets that feed into calculating this indicator, such as:</p> <ul style="list-style-type: none"> • number and origin of imported malaria cases
Type of indicator	Absolute
Measurement units	It is expressed as the number of non-endemic countries which have prevented re-introduction of local transmission.
Frequency of measurement	Annual; often coinciding, for most countries, with the last semester of the succeeding year and consistent to scheduled year-end annual publication of the WHO World Malaria Report (data from the previous year is published annually on December; e.g., 2015 data will published on December 2016).
PASB unit responsible for monitoring the indicator	Neglected, Tropical and Vector Borne Diseases (CHA/VT)

Data Source	Country reports shared by national authorities to PAHO country offices and corresponding technical unit.
Limitations	Variations in the reporting cycles of countries; indicator does not necessarily include private-sector coverage, which is important in the context of malaria elimination; indicator does not necessarily measure the implementation of other important malaria policies that do not pertain to mortality.
References	Pan American Health Organization (2016) Interactive Malaria Statistics. PAHO, Washington DC. http://www.paho.org/hq/index.php?option=com_content&view=article&id=2632&Itemid=2130&lang=en Annual World Health Organization World Malaria Report. PAHO Directing Council Resolution CD55.R7

II. Indicators pertaining to the plan components

Strategic Line of Action 1: Universal access to good-quality malaria prevention interventions, integrated vector management, and malaria diagnosis and treatment

Code and title of the indicator	1.1.1 MALARIA PREVENTION AND CASE MANAGEMENT
Name of the indicator	Number of member states and territories implementing malaria prevention and case management efforts
Definition of the indicator	This indicator counts the number of countries and territories implementing malaria prevention and case management efforts based on PAHO/WHO recommendations. Baseline 2015: 33 (ABW, ARG, BHS, BLZ, BOL, BRA, BRB, CAN, COL, CRI, CUB, CUW, DOM, ECU, GLP, GUF, GTM, GUY, HTI, HND, JAM, MEX, MTQ, NIC, PAN, PRY, PER, SLV, SUR, SXM, TTO, USA and VEN) Target 2020: 51
Purpose of the indicator	The Indicator is strongly aligned with the proposed key interventions in the WHO Global Technical Strategy for Malaria (GTS) 2016-2030 and tracks country capacities in terms of access to and compliance with malaria prevention and case management interventions through effective supply chain management, information, education, and communication efforts, among others.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories which follow PAHO/WHO recommendations in malaria prevention and case management
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual; for most countries, often coinciding with the last semester of the succeeding year and consistent with scheduled year-end annual publication of the WHO World Malaria Report (data from previous year is published

	annually in December; e.g., 2015 data will published in December 2015).
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Country reports, using forms for PAHO/WHO's annual World Malaria Report, are submitted by national authorities to PAHO country offices and the corresponding technical unit.
Limitations	Variations in the reporting cycles of countries; indicator does not necessarily include private-sector coverage, which is important in the context of malaria elimination; indicator does not necessarily measure implementation of other important malaria policies that do not pertain to malaria prevention, diagnosis, and treatment.
References	PAHO Directing Council Resolutions CD55.R7 and CD49.R9, WHO Guidelines for the treatment of malaria (2015) WHO recommendations in malaria prevention and case management: http://www.who.int/malaria/mpac/policyrecommendations/en/

Code and title of the indicator	1.2.1 INTEGRATED VECTOR MANAGEMENT
Name of the indicator	Number of countries (both malaria endemic and non-endemic) that are implementing integrated vector management based on PAHO/WHO guidelines (including insecticide resistance surveillance, and vector behavior studies)
Definition of the indicator	This indicator counts the number of countries and territories which satisfy PAHO/ WHO criteria in implementing integrated vector management based on PAHO/WHO guidelines (including insecticide resistance surveillance, and vector behavior studies). Baseline 2015: 15 (BLZ, BOL, BRA, COL, DOM, SLV, GTM, HAI, HND, MEX, NIC, PAN, PER, SUR, and VEN) Target 2020: 18
Purpose of the indicator	This indicator tracks progress among countries on vector control across various vector-borne diseases. The indicator is also very important in terms of monitoring the Region's progress in regards to PAHO's Directing Council resolutions CD55.R7 and CD48.R8.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories which follow PAHO/WHO recommendations on Integrated Vector Management (currently under review by the Public Health Entomology Technical Advisory Group)
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	To be determined by the Public Health Entomology Technical Advisory Group
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Reports regarding Vector Control Needs Assessment (VCNA) missions; and

	joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders;
Limitations	Variations in the reporting and assessment cycles in the countries. Other limitations include the potential subjectivity of qualitative assessments, and the possibility that criteria or capacity requirements may evolve and eventually be modified.
References	World Health Organization. Handbook for integrated vector management 2012. Geneva: WHO; 2012.
Code and title of the indicator	1.3.1 MALARIA DRUG EFFICACY AND DRUG RESISTANCE SURVEILLANCE
Name of the indicator	Number of malaria-endemic countries reporting malaria drug efficacy and drug resistance surveillance data to PAHO, as per PAHO/WHO guidelines
Definition of the indicator	This indicator counts the number of malaria countries and territories which implement malaria drug efficacy and drug resistance surveillance studies and report data based on PAHO/WHO recommendations. Baseline 2015: 14 (BOL, BRA, COL, DOM, ECU, GTM, GUY, HTI, HND, MEX, NIC, PER, SUR, and GUF) Target 2020: 17
Purpose of the indicator	The Indicator is strongly aligned with the proposed continuing global efforts to monitor, prevent, and contain antimalarial drug resistance.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories which follow PAHO/WHO recommendations on malaria drug efficacy and drug resistance surveillance: http://www.who.int/malaria/areas/drug_resistance/en/
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual; for most countries, often coinciding with the last semester of the succeeding year and consistent with scheduled year-end annual publication of the WHO World Malaria Report (data from previous year is published annually in December; e.g., 2015 data will published in December 2016).
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Country reports, using forms for PAHO/WHO's annual World Malaria Report, are submitted by national authorities to PAHO country offices and the corresponding technical unit.
Limitations	Difficulty of implementing PAHO/WHO protocols due to limited number of cases in areas of low malaria transmission.
References	PAHO Directing Council Resolutions CD55.R7 and CD49.R9, PAHO. Framework for the Prevention and Containment of Artemisinin Resistance in South America (2016) WHO. Methods and techniques for assessing exposure to antimalarial drugs in clinical field studies (2011).

	WHO. Methods for surveillance of antimalarial drug efficacy (2009)
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Code and title of the indicator	1.3.2 QUALITY OF MALARIA DIAGNOSIS AND TREATMENT
Name of the indicator	Number of countries implementing PAHO/WHO guidelines for quality malaria diagnosis and treatment
Definition of the indicator	This indicator counts the number of countries and territories which satisfy PAHO/ WHO criteria for quality malaria diagnosis and treatment. Baseline 2015: 23 (ARG, BHS, BLZ, BOL, BRA, COL, CRI, DOM, ECU, SLV, GTM, GUY, HTI, HND, JAM, MEX, NIC, PAN, PRY, PER, SUR, USA, and GUF) Target 2020: 51
Purpose of the indicator	The indicator tracks compliance of PAHO/WHO member states and territories in terms of quality assurance for malaria diagnosis and treatment.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories which follow PAHO/WHO recommendations on terms of the quality of malaria diagnosis and treatment; and prospects for malaria elimination
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	External Quality Assurance Program (EQAP) Reports; and joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Variations in the reporting and assessment cycles in the countries. Other limitations include the potential subjectivity of qualitative assessments, and the possibility that criteria or capacity requirements may evolve and eventually be modified.
References	PAHO. Technical Report: Fourth Slide Panel 2014-2015. External Quality Assurance Program for Malaria Microscopy Diagnosis; 2016 World Health Organization. WHO Malaria Elimination Operational Guidelines (2017). WHO. Technical consultation to update the WHO Malaria microscopy quality assurance manual; 2014

Strategic Line of Action 2: Reinforced malaria surveillance towards evidence-based decision making and response

Code and title of the indicator	2.1.1 MALARIA SURVEILLANCE DATA
Name of the indicator	Number of countries reporting malaria surveillance data annually to PAHO/WHO, by subnational level, sex, age, and other equity-related variables ¹
Definition of the indicator	This indicator counts the number of countries and territories which satisfy PAHO/ WHO recommendations for reporting malaria surveillance data. Baseline 2015: 27 (ARG, BLZ, BOL, BRA, COL, CRI, DOM, ECU, SLV, GTM, GUY, HTI, HND, MEX, NIC, PAN, PRY, PER, SUR, VEN, and GUF) Target 2020: 51
Purpose of the indicator	The Indicator tracks the improvement in the surveillance systems in terms of collection of malaria data (by case, including information on age, sex, ethnicity, and other variables) that facilitate appropriate analysis of disparities and inequalities between populations.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories which follow PAHO/WHO recommendations on malaria surveillance.
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual; for most countries, often coinciding with the last semester of the succeeding year and consistent with scheduled year-end annual publication of the WHO World Malaria Report (data from previous year is published annually in December; e.g., 2015 data will published in December 2016).
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Country reports, using forms for PAHO/WHO's annual World Malaria Report, are submitted by national authorities to PAHO country offices and the corresponding technical unit.
Limitations	Variations in the reporting and assessment cycles in the countries. The indicator also does not necessarily facilitate early detection of cases and outbreaks. Other limitations include the potential subjectivity of qualitative assessments, and the possibility that criteria or capacity requirements may evolve and eventually be modified.
References	World Health Organization (2017). WHO Malaria Elimination Framework

Code and title of the indicator	2.2.1 DATA-INFORMED DECISION-MAKING
Name of the indicator	Number of malaria-endemic countries exhibiting strengthened data informed decision-making (based on the PAHO malaria data verification tool), and sharing epidemiological information
Definition of the	This indicator counts the number of malaria-endemic countries and

¹ Place of residence, race/ethnicity/culture/language, occupation, religion, education, socioeconomic status, social capital, and other possible factors such as disease status or disability.

indicator	territories which share epidemiological information, and consider the results of the PAHO malaria data verification tool as basis for malaria technical and programmatic decisions Baseline 2015: 0 Target 2020: 21
Purpose of the indicator	This indicator tracks improvement in data informed decision making through epidemiological information exchange at all levels (i.e. regional, between countries with common borders, and within the countries themselves)
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories which follow PAHO/WHO recommendations on malaria surveillance.
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual; for most countries, often coinciding with the last semester of the succeeding year and consistent with scheduled year-end annual publication of the WHO World Malaria Report (data from previous year is published annually in December; e.g., 2015 data will published in December 2016).
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	EMMIE data verification reports; and joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Variations in the reporting and assessment cycles in the countries. Other limitations include the potential subjectivity of qualitative assessments, and the possibility that criteria or capacity requirements may evolve and eventually be modified.
References	Pan American Health Organization. EMMIE Data Verification Methodology and Country Reports World Health Organization (2017). WHO Malaria Elimination Operational Guidelines

Strategic Line of Action 3: Strengthened health systems, strategic planning, monitoring and evaluation, operational research, and country-level capacity building

Code and title of the indicator	3.1.1 MALARIA HEALTH PERSONNEL TRAINING
Name of the indicator	Number of countries implementing plans for training health personnel on malaria
Definition of the indicator	This indicator counts the number of PAHO/WHO member states and territories which are implementing / participating in programs that train their health personnel on malaria.

	Baseline 2015: 21 (ARG, BLZ, BOL, BRA, COL, CRI, DOM, ECU, SLV, GTM, GUY, HTI, HND, MEX, NIC, PAN, PRY, PER, SUR, VEN, and GUF) Target 2020: 33
Purpose of the indicator	This indicator contributes in tracking malaria capacity development efforts in the countries to facilitate relevant technical cooperation at various levels of work.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories which participated in malaria-related and other relevant workshops organized by PAHO and / or collaborating partners.
Type of indicator	Relative
Measurement units	Percentage
Frequency of measurement	Biennial
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Joint assessment of PAHO country offices, corresponding technical unit, and relevant stakeholders.
Limitations	The indicator does not necessarily advise in terms of Improvements in recruitment, training, and retention of health personnel trained in malaria and in the country health systems.
References	World Health Organization (2017). WHO Malaria Elimination Framework

Code and title of the indicator	3.2.1 NATIONAL MALARIA PLANS
Name of the indicator	Number of countries with national strategic plans (focusing on/ including malaria) that align with WHO-recommended strategies and components of the PAHO Plan of Action for Malaria
Definition of the indicator	This indicator counts the number of malaria-endemic countries and territories which have national strategic plans (focusing on/ including malaria) that align with WHO-recommended strategies and components of the PAHO Plan of Action for Malaria Baseline 2015: 31 (ARG, BHS, BLZ, BOL, BRA, COL, CRI, DOM, ECU, SLV, GTM, GUY, HTI, HND, JAM, MEX, NIC, PAN, PRY, PER, SUR, VEN, BRB, TTO, USA, ABW, CUW SXM, GUF, GLP, and MTQ) Target 2020: 51
Purpose of the indicator	The indicator facilitates the monitoring of malaria policy development and strategic planning in collaboration with countries and stakeholders
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member states and territories with national strategic plans (focusing on/ including malaria) that align with WHO-recommended strategies and components of the PAHO Plan of Action for Malaria

Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual; for most countries, often coinciding with the last semester of the succeeding year and consistent with scheduled year-end annual publication of the WHO World Malaria Report (data from previous year is published annually in December; e.g., 2015 data will published in December 2016).
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	The indicator does not necessarily advise in terms of the actual implementation of the respective plans of the countries.
References	Pan American Health Organization (2016) Plan of Action for Malaria Elimination 2016-2020. PAHO, Washington DC.

Code and title of the indicator	3.3.1 STOCK-OUTS OF KEY MALARIA SUPPLIES (including anti-malarials)
Name of the indicator	Number of malaria-endemic countries with no stock-outs of key malaria supplies (including anti-malarials) at the national level in a given year
Definition of the indicator	This indicator counts the number of malaria-endemic countries and territories which had no stock-outs of key malaria supplies (including anti-malarials) at the national level within the year. Baseline 2015: 19 (BLZ, BOL, BRA, COL, CRI, DOM, ECU, SLV, GTM, GUY, HTI, HND, MEX, NIC, PAN, PRY, PER, SUR, and VEN) Target 2020: 21
Purpose of the indicator	This indicator tracks the capacity of national programs in the areas of management and logistics in collaboration with partners and stakeholders.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of malaria-endemic countries with no stock-outs of key malaria supplies (including anti-malarials) at the national level within the year
Type of indicator	Relative
Measurement units	Percentage
Frequency of measurement	Annual; facilitated in coordination with the PAHO HSS Medicines and Health Technologies Unit
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Country reports, using supply management / procurement forms submitted by national authorities to PAHO country offices and the corresponding technical unit.
Limitations	The indicator does not necessarily advise in terms of the management / leadership skills of key personnel which are key in malaria elimination efforts
References	World Health Organization (2017). WHO Malaria Elimination Framework

Code and title of the indicator	3.4.1 DOMESTIC FUNDING FOR MALARIA EFFORTS
Name of the indicator	Number of countries with sustained domestic funding for malaria efforts
Definition of the indicator	This indicator counts the number of PAHO/WHO member state and territories with sustained and / or increased domestic funding for malaria efforts Baseline 2015: 20 (ARG, BLZ, BOL, BRA, COL, CRI, DOM, ECU, SLV, GTM, GUY, HND, MEX, NIC, PAN, PRY, PER, SUR, VEN, and GUF) Target 2020: 51
Purpose of the indicator	This indicator tracks financial strategies to sustain malaria prevention and elimination efforts at different levels in collaboration and synergy with partners and stakeholders.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member state and territories with sustained and / or increased domestic funding for malaria efforts.
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual; for most countries, often coinciding with the last semester of the succeeding year and consistent with scheduled year-end annual publication of the WHO World Malaria Report (data from previous year is published annually in December; e.g., 2015 data will published in December 2016).
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Country reports, using forms for PAHO/WHO's annual World Malaria Report, are submitted by national authorities to PAHO country offices and the corresponding technical unit.
Limitations	Variations in the reporting and assessment cycles in the countries.
References	World Health Organization. Annual World Malaria Report

Code and title of the indicator	3.5.1 MALARIA OPERATIONAL RESEARCH
Name of the indicator	Number of countries conducting malaria operational research, including IVM topics
Definition of the indicator	This indicator counts the number of PAHO/WHO member state and territories conducting malaria operational research, including IVM topics. Baseline 2015: 13 (BOL, BRA, COL, ECU, GUY, HND, PAN, PER, SUR, BLZ, DOM, SLV, HAI, and MEX) Target 2020: 21
Purpose of the indicator	This indicator tracks country achievement in terms of reinforcing operations research in program development and management

Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member state and territories conducting / participating in malaria operational research, including IVM topics.
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual;
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Country reports / updates during technical meetings; joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Indicator does not necessarily advise on specific operational research areas being pursued / covered by the countries.
References	PAHO Directing Council Resolution CD55.R7

Strategic Line of Action 4: Strategic advocacy, communications, and partnerships and collaborations

Code and title of the indicator	4.1.1 MALARIA NETWORKS AND COLLABORATIONS
Name of the indicator	Number of countries participating in regional-level networks and collaborations
Definition of the indicator	This indicator counts the number of PAHO/WHO member state and territories participating in regional-level malaria (and related) networks and collaborations Baseline 2015: 19 (BLZ, BOL, BRA, COL, CRI, DOM, ECU, SLV, GTM, GUY, HAI, HND, MEX, NIC, PAN, PER, SUR, VEN, and GUF) Target 2020: 42
Purpose of the indicator	This indicator tracks the development and strengthening of capacities through existing malaria networks, partnerships, and collaborations in the Region.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member state and territories which participated in regional-level malaria (and related) activities over the past year.
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Biennial
PAHO responsible	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)

unit for the indicator	
Data source	Joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Indicator does not necessarily advise on the level of participation and corresponding capacities developed among countries.
References	World Health Organization. World Malaria Report 2012. Geneva: WHO; 2012. (Table R.2; page 67)

Code and title of the indicator	4.2.1 INTER-PROGRAMMATIC AND / OR SYNERGISTIC ACTIONS
Name of the indicator	Number of countries engaged in inter-programmatic and/or synergistic actions advocated under PAHO/WHO initiatives and policies
Definition of the indicator	This indicator counts the number of PAHO/WHO member state and territories engaged in inter-programmatic and/or synergistic actions advocated under PAHO/WHO initiatives and policies over the last year
Purpose of the indicator	This indicator tracks how opportunities for coordination, synergy, and information sharing with other existing PAHO/WHO initiatives and policies are optimized.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member state and territories which engaged in inter-programmatic and/or synergistic actions advocated under PAHO/WHO initiatives and policies over the last year (e.g. integration of malaria efforts with maternal and child health in community and local health care programs, communications and social mobilization, health promotion and education interventions, programs on neglected diseases, and occupational health). PAHO/WHO initiatives refer to those which are developed / organized by PAHO/WHO and those which the organization supports with various partners.
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual;
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Indicator does not necessarily advise on the nature and depth of inter-programmatic and/or synergistic actions
References	PAHO Directing Council Resolutions CD55.R7 and CD49.R9

Code and title of the indicator	4.3.1 MALARIA BEST PRACTICES
Name of the indicator	Number of countries with identified best practices in their malaria activities

Definition of the indicator	This indicator counts the number of PAHO/WHO member state and territories with identified best practices in their malaria activities Baseline 2015: 13 (BRA, COL, DOM, ECU, GTM, HND, MEX, NIC, PRY, SUR, ARG, JAM, and PAN) Target 2020: 15
Purpose of the indicator	This indicator tracks reinforcement of efforts to identify, document, and replicate best practices, including models of disease elimination and successful integration of cross-cutting issues
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of PAHO/WHO member state and territories with identified best practices in their malaria activities, as may be advised by nominations / documents submitted through the Malaria Champions of the Americas.
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Malaria Champions of the Americas nomination documents
Limitations	Not all countries may have the capacity / resources to submit appropriate documentation of their best practices on malaria.
References	Pan American Health Organization. Malaria Champions of the Americas. Retrieved from: : http://www.paho.org/campeonesmalaria/?lang=en

Strategic Line of Action 5: Focused efforts and tailored approaches to facilitate malaria elimination and prevent reestablishment in malaria-free areas

Code and title of the indicator	5.1.1 MALARIA AMONG POPULATIONS IN SITUATIONS OF VULNERABILITY
Name of the indicator	Number of countries implementing strategies to address malaria among populations in situations of vulnerability
Definition of the indicator	This indicator counts the number of malaria-endemic countries implementing strategies to address malaria among populations in situations of vulnerability Baseline 2015: 10 (BRA, COL, DOM, GTM, GUY, HND, MEX, NIC, PAN, and SUR) Target 2020: 18
Purpose of the indicator	This indicator tracks the process of resolving critical gaps in key target populations in relation to the achievement of malaria elimination goals
Technical note	Calculation at the regional level:

	The regional indicator is obtained by counting the number of malaria-endemic countries currently implementing strategies and activities to address malaria among populations in situations of vulnerability
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual;
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Situations of vulnerability vary extensively across countries.
References	Pan American Health Organization (2016) Plan of Action for Malaria Elimination 2016-2020. PAHO, Washington DC.

Code and title of the indicator	5.2.1 <i>P. vivax</i> MALARIA
Name of the indicator	Number of countries implementing the 2015 WHO <i>P. vivax</i> recommendations
Definition of the indicator	This indicator counts the number of PAHO/WHO member state and territories which are implementing the 2015 WHO <i>P. vivax</i> recommendations Baseline 2015: 0 Target 2020: 16
Purpose of the indicator	This indicator tracks down country progress in terms of addressing critical knowledge and technical gaps, particularly those pertaining to <i>P. vivax</i>
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of <i>P. vivax</i> endemic countries which follow PAHO guidelines referring to the implementation of the 2015 WHO <i>P. vivax</i> recommendations
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Biennial
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Possibility that criteria or capacity requirements may evolve and eventually be modified.
References	World Health Organization (2015). Control and elimination of Plasmodium vivax malaria – A technical brief. Retrieved from: http://www.who.int/malaria/publications/atoz/9789241509244/en/

Code and title of the indicator	5.3.1 MALARIA PROGRAM REORIENTATION TO MALARIA ELIMINATION
Name of the indicator	Number of countries supported in terms of malaria program reorientation towards malaria elimination
Definition of the indicator	This indicator counts the number of malaria endemic countries which are receiving support in terms of malaria program reorientation towards malaria elimination Baseline 2015: 10 (BLZ, CRI, DOM, SLV, GTM, HTI, HND, MEX, NIC, PAN) Target 2020: 18
Purpose of the indicator	This indicator tracks the process of malaria program reorientation towards malaria elimination and certification.
Technical note	Calculation at the regional level: The regional indicator is obtained by counting the number of countries supported through the various malaria program reorientation efforts (e.g. malaria elimination workshops; data validation exercises, etc.)
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Annual;
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	EMMIE data verification reports; and joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Limitations include the potential subjectivity of qualitative assessments, and the possibility that criteria or capacity requirements may evolve and eventually be modified.
References	Pan American Health Organization. EMMIE Data Verification Methodology and Country Reports World Health Organization (2017). WHO Malaria Elimination Framework

Code and title of the indicator	5.4.1 Prevention of re-establishment
Name of the indicator	Number of non-endemic countries supported in terms of maintaining key malaria capacities
Definition of the indicator	This indicator counts the number non-endemic countries which are receiving support in terms of maintaining key malaria capacities according to PAHO/WHO recommendations Baseline 2015: 9 (BHS, BLZ, BRB, CUW, GLP, JAM, MTQ, SXM, TTO) Target 2020: 17
Purpose of the indicator	This indicator tracks the status of key capacities in countries that have eliminated local malaria transmission and are preventing re-establishment of local transmission
Technical note	Calculation at the regional level:

	The regional indicator is obtained by counting the number of non-endemic countries supported through the various malaria program activities designed towards maintaining key malaria capacities according to PAHO/WHO recommendations
Type of indicator	Absolute
Measurement units	Number of countries and territories
Frequency of measurement	Biennial
PAHO responsible unit for the indicator	Neglected, Tropical, and Vector Borne Diseases (CHA/VT)
Data source	Joint assessments of PAHO country offices, corresponding technical unit, and relevant stakeholders
Limitations	Limitations include the potential subjectivity of qualitative assessments, and the possibility that criteria or capacity requirements may evolve and eventually be modified.
References	World Health Organization (2017). WHO Malaria Elimination Framework

Annex 2: WHO MALARIA ELIMINATION INDICATORS (Malaria Surveillance Manual)

I. Core surveillance indicators in areas where main program focus is burden reductions

1. Confirmed malaria cases (number and rate per month or per year)

Formula $1000 * \frac{\text{Number of confirmed malaria cases}}{\text{Population at risk of malaria}}$

Numerator The number of people with suspected malaria confirmed by either microscopy or RDT. The number should include both outpatient and inpatient cases. The number should include cases detected passively (attending health facilities or seen by community health workers) or actively (sought in the community); it is often useful to provide a breakdown of cases detected passively and actively. Regardless of transmission setting, any person with a positive result in a parasite-based test (microscopy or RDT), irrespective of clinical symptoms, should be considered to have a (confirmed) case of malaria.

Denominator The number of people living in areas where malaria transmission occurs. Areas with malaria transmission can be defined as those from which locally acquired, confirmed cases of malaria are reported. Population sizes should be adjusted for population growth according to projections from the national census or, when not available, United Nations Population Division projections.

It is sometimes useful to use the total population of an area or country as the denominator in order to compare overall levels of risk among geographical areas or countries.

If rates are calculated per month, as when plotting rates on a graph, the population size should be divided by 12 to obtain an annual incidence rate.

<i>Breakdown</i>	<p>High and moderate transmission: Age group (all ages, < 5 years), parasite species, geographical area, time (year and month)</p> <p>Low transmission: Sex, 5-year age groups, type of detection (passive, active, community)</p> <p>Elimination: Foci, village, source of infection: imported, local (introduced, indigenous, relapsing), induced</p>
<i>Purpose</i>	To measure trends in malaria morbidity and to identify locations of ongoing malaria transmission. This indicator is the most important measure of progress and management in low-incidence areas.
<i>Interpretation</i>	<ul style="list-style-type: none"> • Trends can be affected by: <ul style="list-style-type: none"> • completeness of reporting: Trends can change if the percentage of health facilities reporting in a month changes or if different sets of health facilities are included, e.g. including health posts or private hospitals. • number of tests undertaken (slides examined, RDTs performed) • changes in use of health facilities owing to greater availability of antimalarial drugs or implementation of user fees • actual changes in the incidence of malaria <p>In order to conclude that changes in the value of the indicator reflect a real change in the incidence of malaria in the community, indicators for completeness of reporting, annual blood examination rate and total number of outpatient visits per 1000 population must be examined, to confirm that they are reasonably constant over time.</p>
<i>Other</i>	The indicator is also known as the annual parasite index.

2. Inpatient malaria cases (number and rate per month or per year)

<i>Formula</i>	$10\,000 \times \frac{\text{Number of inpatient malaria cases}}{\text{Population at risk of malaria}}$
<i>Numerator</i>	<p>The number of inpatients with a primary diagnosis of malaria at discharge or death. Patients who have absconded or been transferred should be excluded. All cases should have had a parasite-based test for malaria (microscopy and/or RDT) and a discharge diagnosis based on this test result.</p> <p>Malaria inpatient numbers should include patients from both hospitals and other facilities with beds.</p>

<i>Denominator</i>	<p>The number of people living in areas where malaria transmission occurs. Areas with malaria transmission can be defined as those in which locally acquired, confirmed cases of malaria are reported. Population sizes should be adjusted for population growth according to projections from the national census or, when not available, United Nations Population Division projections.</p> <p>It is sometimes useful to use the total population of an area or country as the denominator in order to compare overall levels of risk among geographical areas or countries.</p> <p>If rates are calculated per month, as when plotting rates on a graph, the population size should be divided by 12 to obtain an annual incidence rate.</p>
<i>Breakdown</i>	Age group (all ages, < 5 years), geographical area, time (year and month)
<i>Purpose</i>	To monitor the impact of programmes on severe disease. This indicator may reflect the impact of treatment, as treatment attenuates clinical progression from uncomplicated to severe disease.
<i>Interpretation</i>	<p>Inpatient cases are markers of severe disease and death and indicate failure of the health system to either prevent or effectively treat malaria.</p> <p>The numbers of inpatient cases are generally larger than those of health facility deaths, allowing trends to be more easily discerned.</p> <p>This indicator is most useful in high- and moderate-transmission settings in which the rates of severe morbidity are significant.</p> <p>In some countries, inpatient cases may also include uncomplicated <i>P. falciparum</i> cases (according to national guidelines) to ensure full treatment, recovery and parasite clearance.</p> <p>Trends can be affected by:</p> <ul style="list-style-type: none"> • completeness of reporting: Trends can change if the percentage of health facilities reporting in a month changes or if different sets of health facilities are included, e.g. including private hospitals. • changes in diagnostic practice: e.g. introduction of more diagnostic testing may reduce the number of inpatients in whom malaria is diagnosed. • changes in use of health facilities owing to greater availability of antimalarial drugs or implementation of user fees • actual changes in the incidence of severe malaria. <p>In order to conclude that changes in the value of the indicator reflect a real change in the incidence of severe malaria in the community, indicators must be examined for</p>

completeness of reporting, changes in the percentage of cases that have had a diagnostic test and total number of inpatient visits per 10 000, to confirm that they are reasonably constant over time.

3. Inpatient malaria deaths (number and rate per month or per year)

<i>Formula</i>	$100\,000 \times \frac{\text{Number of inpatient malaria deaths}}{\text{Population at risk of malaria}}$
<i>Numerator</i>	<p>Cases in which the underlying cause of death is malaria. All recorded malaria deaths should have had a parasite-based test for malaria (microscopy and/or RDT) and a diagnosis based on the test result.</p> <p>Data on malaria deaths from hospitals and other facilities with beds should be included.</p>
<i>Denominator</i>	<p>The number of people living in areas where malaria transmission occurs. Areas with malaria transmission can be defined as those in which locally acquired, confirmed cases of malaria are reported. Population sizes should be adjusted for population growth according to projections from the national census or, when not available, United Nations Population Division projections.</p> <p>It is sometimes useful to use the total population of an area or country as a denominator in order to compare the overall level of risk among geographical areas or countries.</p> <p>If rates are calculated per month, as when plotting rates on a graph, the population size should be divided by 12 to obtain an annual incidence rate.</p>
<i>Breakdown</i>	Age group (all ages, < 5 years), geographical area, time (year and month)
<i>Purpose</i>	To monitor the impact of programmes on the number of malaria deaths
<i>Interpretation</i>	<p>Inpatient deaths are markers of very severe disease and indicate failure of the health system to either prevent or effectively treat malaria.</p> <p>The numbers of deaths are generally small, and trends may be difficult to discern, but clusters of deaths may occur in time and space.</p> <p>This indicator is most useful in high-transmission settings in which malaria death rates are high.</p> <p>Trends can be affected by:</p>

- completeness of reporting: Trends can change if the percentage of health facilities reporting in a month changes or if different sets of health facilities are included, e.g. including private hospitals.
- changes in diagnostic practice, e.g. the introduction of more diagnostic testing may reduce the number of malaria deaths diagnosed.
- changes in use of health facilities owing to greater availability of antimalarial drugs or implementation of user fees
- actual changes in the number of malaria deaths

In order to conclude that changes in the value of the indicator reflect a real change in malaria mortality in the community, the indicators should be examined for completeness of reporting, changes in the percentage of cases that had a diagnostic test, total number of inpatient visits per 10 000 and number of deaths per 100 000, to confirm that they are reasonably constant over time.

4. Malaria test positivity rate (RDT and/or blood slide)

<i>Formula</i>	$1000 * \frac{\text{Number of confirmed malaria cases}}{\text{Number of patients receiving a parasitological test}}$
<i>Numerator</i>	Number of cases of suspected malaria confirmed by either microscopy or RDT. The number should include both outpatient and inpatient cases. The number should include cases detected passively (attending health facilities or seen by community health workers) or actively (sought in the community); it is often useful to provide a breakdown of cases detected passively and actively. Any person with a positive result in a parasite-based test (microscopy or RDT), irrespective of clinical symptoms, should be considered to have confirmed malaria case.
<i>Denominator</i>	Total number of suspected malaria cases tested
<i>Breakdown</i>	Type of diagnostic test (microscopy or RDT), parasite species, geographical area, time (year and month), type of detection (passive, active, community)
<i>Purpose</i>	To reflect trends in malaria morbidity and identify areas with the most intense malaria transmission. Partially 'corrects' for incompleteness of reporting and RDT stock-outs because the numerator is derived from the same source as the denominator.
<i>Interpretation</i>	RDT and slide positivity rates can differ and should therefore be reported separately. RDTs reflect the presence of antigens and may remain positive after parasites have been cleared by treatment.

Test positivity rates can change if parasitological diagnosis has been extended to populations living in intense transmission areas that previously did not have access to testing. Care should be taken, therefore, to take into account possible confounding factors when interpreting trends.

Changes in test positivity rates do not reflect percentage changes in malaria cases or incidence, as the number of malaria cases is part of the denominator.

5. Percentage of cases due to *P. falciparum*

<i>Formula</i>	$100 * \frac{\text{Number of confirmed } P. falciparum \text{ malaria cases}}{\text{Number of confirmed malaria cases}}$
<i>Numerator</i>	<p>Number of <i>P. falciparum</i> cases confirmed by either microscopy or RDT. The number should include both outpatient and inpatient cases. Mixed infections with <i>P. falciparum</i> should be counted as <i>P. falciparum</i>.</p> <p>The number can include cases detected passively (attending health facilities or seen by community health workers) or actively (sought in the community); it is often useful to provide a breakdown of cases detected passively and actively.</p>
<i>Denominator</i>	Total number of cases of malaria confirmed by either microscopy or RDT. The number should include both outpatient and inpatient cases. The number should include cases detected passively (attending health facilities or seen by community health workers) or actively (sought in the community); it is often useful to provide a breakdown of cases detected passively and actively.
<i>Breakdown</i>	Type of diagnostic test (microscopy or RDT), geographical area, time (year and month), type of detection (passive, active, community)
<i>Purpose</i>	To reflect the proportion of cases due to <i>P. falciparum</i> and provide information on the likelihood of observing severe cases
<i>Interpretation</i>	<p>Can provide information on the likelihood of observing severe cases and the extent to which programmes should be adjusted to address <i>P. vivax</i> or other species</p> <p>Can provide information on the degree of malaria control, as, in areas where control measures are scaled up, the proportion of cases due to <i>P. falciparum</i> may decrease; <i>P. vivax</i> appears to be respond less quickly to control measures because it can tolerate a wider range of environmental conditions and because the dormant liver stage (hypnozoite) enables infections to persist in the absence of mosquito transmission. <i>P. ovale</i> and <i>P. malariae</i> may also become more frequent, but these are rare in most settings.</p> <p>As the ability to detect <i>P. falciparum</i> may vary by type of test (microscopy or RDT), care</p>

should be taken to ensure that the proportion of cases due to *P. falciparum* is not influenced by changes in the ratio of different types of test used, i.e. the results of microscopy and RDTs should be analysed separately.

6. Percentage of inpatient cases with a discharge diagnosis of malaria

<i>Formula</i>	$100 * \frac{\text{Number of inpatient cases with a discharge diagnosis of malaria}}{\text{Total number of discharges and deaths}}$
<i>Numerator</i>	<p>Number of inpatients with a primary diagnosis of malaria at discharge or death. Patients who have absconded or been transferred should be excluded. All cases should have had a parasite-based test for malaria (microscopy and/or RDT) and a discharge diagnosis based on this test result.</p> <p>Malaria inpatient numbers should include patients from both hospitals and other facilities with beds.</p>
<i>Denominator</i>	<p>Total number of inpatients discharged or died (inpatients who have absconded or been transferred should be excluded).</p> <p>Total inpatient numbers should include patients from both hospitals and other facilities with beds.</p>
<i>Breakdown</i>	Age group (all ages, < 5 years), geographical area, time (year and month)
<i>Purpose</i>	To monitor the impact of programmes on severe disease. Partially ‘corrects’ for incompleteness of reporting because the numerator is derived from the same source as the denominator.
<i>Interpretation</i>	<p>Inpatient cases are markers of severe disease and death and indicate failure of the health system to either prevent or effectively treat malaria.</p> <p>The number of inpatient cases is generally larger than the number of health facility deaths, so that trends can be more easily discerned.</p> <p>This indicator is most useful in high- and moderate-transmission settings in which the rates of severe morbidity are significant.</p> <p>In some countries, inpatient cases may also include uncomplicated <i>P. falciparum</i> (according to national guidelines) in order to ensure full treatment, recovery and parasite clearance.</p> <p>Trends can be affected by:</p> <ul style="list-style-type: none"> • completeness of reporting: Trends can change if different sets of health facilities are included, e.g. private hospitals with different proportions of inpatients due to

malaria.

- changes in diagnostic practice; e.g. introduction of more diagnostic testing may reduce the number of malaria deaths diagnosed.
- changes in attendances for conditions other than malaria; e.g. malaria inpatient proportions may decrease if the number of skilled deliveries increases.
- actual changes in the incidence of severe malaria.

In order to conclude that changes in the value of the indicator reflect a real change in the incidence of malaria, the indicators should be examined for completeness of reporting, percentage of cases that had a diagnostic test and the numbers of inpatient cases of malaria and other conditions, to confirm that they are reasonably constant over time.

Changes in the percentage of inpatients with a discharge diagnosis of malaria do not reflect changes in the number of malaria inpatient cases or inpatient case incidence as the number of malaria cases is part of the denominator.

7. Percentage of inpatient deaths due to malaria

<i>Formula</i>	$100 * \frac{\text{Number of inpatient deaths due to malaria}}{\text{Total number of inpatient deaths}}$
<i>Numerator</i>	<p>Number of inpatients with a primary diagnosis of malaria at death. All cases should have had a parasite-based test for malaria (microscopy and/or RDT) and a diagnosis based on this test result.</p> <p>The numbers of malaria deaths should include patients from both hospitals and other facilities with beds.</p>
<i>Denominator</i>	<p>Total number of inpatient deaths</p> <p>The numbers of deaths should include patients from both hospitals and other facilities with beds.</p>
<i>Breakdown</i>	Age group (all ages, < 5 years), geographical area, time (year and month)
<i>Purpose</i>	To monitor the impact of programmes on the number of malaria deaths. Partially 'corrects' for incompleteness of reporting because the numerator is derived from the same source as the denominator.
<i>Interpretation</i>	<p>Inpatient deaths are markers of very severe disease and indicate failure of the health system to either prevent or effectively treat malaria.</p> <p>The numbers of deaths are generally small, and trends may be difficult to discern, but</p>

clusters of deaths may occur in time and space.

This indicator is most useful in high-transmission settings, in which malaria death rates are high.

Trends can be affected by:

- completeness of reporting: Trends can change if different sets of health facilities are included, e.g. private hospitals with different proportions of deaths due to malaria.
- changes in diagnostic practice, e.g. introduction of more diagnostic testing may reduce the number of cases of malaria diagnosed in inpatients.
- changes in attendance for conditions other than malaria, e.g. malaria inpatient proportions may decrease if the number of skilled deliveries increases.
- actual changes in malaria death rates.

In order to conclude that changes in the value of the indicator reflect a real change in malaria death rates, the indicators must be examined for completeness of reporting, percentage of cases that had a diagnostic test and the numbers of deaths from malaria and other conditions, to confirm that they are reasonably constant over time.

Changes in test positivity rates do not reflect percentage changes in the number of malaria cases or incidence, as the number of malaria cases is part of the denominator.

8. Annual blood examination rate

<i>Formula</i>	$100 * \frac{\text{Number of patients receiving a parasitological test}}{\text{Population at risk of malaria}}$
<i>Numerator</i>	Total number of suspected malaria cases tested. This can include active and passive case detection. Patients tested by both RDT and microscopy should be counted only once.
<i>Denominator</i>	Number of people living in areas where malaria transmission occurs. Areas with malaria transmission can be defined as those in which locally acquired, confirmed cases of malaria are reported. Population sizes should be adjusted for population growth according to projections from the national census or, when not available, United Nations Population Division projections. If rates are calculated per month, as when plotting a graph, the population size should be divided by 12 to obtain an annual rate.
<i>Breakdown</i>	Type of diagnostic test (microscopy or RDT), geographical area, time (year and month), type

	of detection (passive, active, community)
<i>Purpose</i>	To reflect the extent of diagnostic testing in a population; aids interpretation of other surveillance indicators.
<i>Interpretation</i>	Higher annual blood examination rates generally reflect more complete malaria surveillance. Some past guidance suggests that the annual blood examination rate should be about 10% in order to provide reliable trends, but the empirical evidence for such a target is not strong. In high-transmission settings, the rate is likely to greatly exceed 10% due to passive case detection alone.
9. Percentage of suspected malaria cases that have had a diagnostic test	
<i>Formula</i>	$100 * \frac{\text{Number of patients receiving a parasitological test}}{\text{Number of suspected cases of malaria}}$
<i>Numerator</i>	Total number of suspected malaria cases tested. This should include those found by passive case detection only; patients identified by active case detection should be excluded. Patients tested by both RDT and microscopy should be counted only once.
<i>Denominator</i>	Number of suspected malaria cases attending health facilities (i.e. passive case detection).
<i>Breakdown</i>	Type of diagnostic test (microscopy or RDT), geographical area, time (year and month)
<i>Purpose</i>	WHO recommends that all suspected malaria cases should receive a diagnostic test by microscopy or RDT, regardless of age. The indicator reflects the extent to which malaria programmes are able to achieve this goal and where further effort may be required.
<i>Interpretation</i>	A value less than 100% may indicate problems in data recording, policy adoption, financing, stock-outs of RDT at national or health facility level or clinician adherence.

10. Completeness of health facility reporting	
<i>Formula</i>	$100 * \frac{\text{Number of health facilities reports received}}{\text{Number of health facilities expected}}$

<i>Numerator</i>	<p>Number of monthly reports received from health facilities. It may be necessary to consider the number of health facility reports for different data elements, e.g. if outpatient cases are reported on different forms from inpatient cases.</p> <p>If a health facility does not submit a report, e.g. because it is temporarily closed, a null report showing zero cases and activities should be created and the reported marked as received.</p>
<i>Denominator</i>	Number of health facility reports expected. Generally, this is the number of health facilities expected to report multiplied by the number of months considered.
<i>Breakdown</i>	Geographical area, time (year and month), report type (e.g. inpatient, outpatient)
<i>Purpose</i>	Regular monitoring and follow-up can improve the completeness of reporting until all health facilities are consistently reporting every month. Aids interpretation of other surveillance indicators.
<i>Interpretation</i>	<p>The completeness of reporting of health facilities should be near 100%. Values < 100% may indicate problems with supplies of stationary, communications, staff availability, motivation or skills.</p> <p>The indicator gives equal weight to all health facilities and therefore may not reflect the completeness of case reporting; missing reports from district hospitals are likely to account for a larger number of missing cases than missing reports from remote rural health facilities.</p>
<i>Other</i>	<p>If data reported from district to regional or national level are summarized by district (rather than by health facility), the district summary form should contain two variables: number of health facilities expected to report and number of health facilities that reported.</p> <p>If community workers report malaria information to health facilities every month, the completeness of reporting by community workers should also be calculated. The health facility reporting form should contain two additional data elements: number of community workers expected to report and number that reported during the month.</p>

Annex 3. Monitoring and evaluation indicators for interventions in an elimination programme

The list in **Table A3** is largely restricted to indicators specific to elimination programmes. It is illustrative, and each programme should modify or complement it according to their priorities; process indicators should be aligned with strategic and operational plans.

Additional indicators for national monitoring are provided in WHO operational manuals for disease surveillance, entomology, vector control and drug resistance, which are regularly updated and posted on the WHO Global Malaria Programme website at <http://www.who.int/malaria/publications/en/>.

TABLE A3.
Monitoring and evaluation indicators for interventions in an elimination programme

INDICATOR	NORM OR TARGET	DATA SOURCE
IMPACT		
Number and incidence rate (per 1000 population) of malaria cases • by species, classification, sex, age group; • by source (e.g. imported, indigenous), by ACD and PCD, by sector	Target values to be projected by the programme year by year	Malaria case database
Number of foci by classification	Target values to be projected by the programme year by year	Malaria focus database
Number of people and percentage of population living in active foci		Malaria focus database
Number of malaria deaths by species and by imported or locally acquired		Malaria case database
QUALITY AND PERFORMANCE OF SURVEILLANCE		
Annual blood examination rate by district and focus and by RDT or microscopy ^a		Malaria case and case detection databases
Percentage of microscopy results cross-checked by national reference laboratory	100% of positive results 10% of negative results	Reference laboratory database
Percentage of testing laboratories participating in WHO-recommended microscopy quality assurance assessments	100%	Reference laboratory database
Percentage of expected monthly reports received from health facilities and other service providers (with number of patients tested for malaria and number positive)	100%	Malaria case and case detection databases
Percentage of cases notified within 24 h of detection	100%	Malaria case and case detection databases
Percentage of cases with completed case investigation form submitted within stipulated delay	100%	Malaria case and case detection databases
Percentage of foci for which completed investigation form submitted within stipulated delay	100%	Malaria focus database

INDICATOR	NORM OR TARGET	DATA SOURCE
CASE MANAGEMENT		
Percentage of patients with suspected malaria who received a parasitological test	100%	Malaria case and case detection databases
Percentage of patients with confirmed malaria who received first-line anti-malarial treatment according to national policy	100%	Malaria case and case detection databases
VECTOR CONTROL		
Percentage of active and residual non-active foci and percentage of population living in receptive areas covered by appropriate vector control (IRS and/or LLINs), by year	100% of targeted population	Operations records
Percentage of active and residual non-active foci protected by IRS, by year	100% of targeted foci	Independent focus surveys
Percentage of population living in active and residual non-active foci protected by IRS, by focus and year	100% of targeted population	Independent focus surveys
Percentage of population in active foci and residual non-active foci with high receptivity and vulnerability protected by LLINs, by focus and year	100% of targeted population	Independent focus surveys
Percentage of potential larval habitats in active and residual non-active foci in which environmental modification is implemented	As per national target, depending on vector species	Independent vector survey
Percentage of potential larval habitats in active and residual non-active foci treated with larvicides or insect growth regulators	As per national target based on identified key habitats	Independent survey
PROGRAMME MILESTONES		
Malaria is a notifiable disease		Policy documents
Standard operating procedures for all components of surveillance have been prepared, field tested and are in use		Surveillance and routine information systems assessment surveys
There is a national reference laboratory for microscopy, with a slide bank and implementation of external quality assurance		Surveillance and routine information systems assessment surveys
An independent national malaria elimination advisory committee has been set up		Malaria programme reviews
A comprehensive report on the elimination programme is prepared annually and shared with all district health offices		Malaria programme reviews
The national malaria elimination plan has been approved and endorsed by the minister of health		Malaria programme reviews
There is functional inter-sectoral collaboration in all districts concerned		Malaria programme reviews
There is an updated list of all public and private health facilities and community health workers who provide malaria diagnosis or treatment		Surveillance and routine information systems assessment surveys
Each facility is registered to receive appropriate supervision ^a		Surveillance and routine information systems assessment surveys

^a There should be some case detection activities in each focus and each highly receptive village, workplace or other site every month during the transmission season.

^a The nature and frequency of "supervision" depend on the country.