National Malaria Control Programme of Sri Lanka

Monitoring and Evaluation Plan

2010-2014

DRAFT

Forward

The Monitoring & Evaluation (M & E) Plan of the National Malaria Control Programme of Sri Lanka has been developed through the active participation of stakeholders following detailed consultations. The successful implementation of this M & E plan will result in the elimination of malaria from Sri Lanka.

It is a privilege and honour to extend my blessings to the Anti Malaria Campaign for their contribution, high level of attention and untiring efforts of making the malaria programme a success. On the direction of elimination of malaria from Sri Lanka, this M & E plan would help everyone immensely to guide their malaria control activities in respective districts effectively.

I wish you all the success.

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Abbreviations and Acronyms

Acronym / Abbreviation	Meaning
ACD	Active Case Detection
ACT	Artemisinin based Combination Therapy
AMC	Anti Malaria Campaign
AMC HQ	Anti Malaria Campaign Headquarters
AMP	Anti Malaria Programme
AMP	Assistant Medical Practitioner
APCD	Activated Passive Case Detection
API	Annual Parasite Index
BCC	Behaviour Change Communication
CME	Continuing Medical Education
COMBI	Communication for Behavioural Impact
CQ	Chloroquine
DOTS	Directly Observed Treatment Short Course
EA	Entomological Assistant
FMC	Faculty of Medicine, Colombo
GF	Global Fund to fight AIDS, Tuberculosis & Malaria
GIS	Geographical Information Systems
GND	Grama Niladhari Division (administrative unit)
GP	General Practitioner
G6PD	Glucose 6-phosphate dehydrogenase
HA	Health Assistant
IDP	Internally Displaced People
IEC	Information, Education & Communication
IMPA/IHP	Independent Medical Practitioners Association
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Nets
LLIN	Long Lasting Insecticidal Nets
MBS	Mass Blood Survey
MCP	Malaria Control Programme
MMC	Mobile Malaria Clinic
MLT	Medical Laboratory Technologist

MO	**Medical Officer**
MoH	**Ministry of Health**
NA	**Not Available**
NMCP	**National Malaria Control Programme**
PHI	**Public Health Inspector**
PHFO	**Public Health Field Officer**
PHLT	**Public Health Laboratory Technician**
Pf	***Plasmodium falciparum***
Pv	***Plasmodium vivax***
PSA	**Parasitological Surveillance Assistant**
NGO	**Non Governmental Organization**
RDT	**Rapid Diagnostic Tests**
RMP	**Registered Medical Practitioner**
RMO	**Regional Malaria Officer**
Sarvodaya	**Lanka Jathika Sarvodaya Shramadana Sangamya**
SJP	**Faculty of Medical Sciences, University of Sri Jayawardenapura**
SMO	**Spray Machine Operator**
TEDHA	**Tropical and Environmental Diseases & Health Associates**
TSG	**Technical Support Group**
QA	**Quality Assurance**
QC	**Quality Control**

Executive summary

Sri Lanka has been traditionally identified as a country that is a classical example for unstable malaria transmission. This was primarily due to the fact that the country receives rainfall during two monsoonal seasons, giving raise to the formation of millions of malaria vector breeding sites resulting in malaria outbreaks. However during the past several years the magnitude of such outbreaks have decreased significantly and in several years no increase in transmission has been detected during monsoon seasons, indicating an effective clearance of the parasite reservoir among the population.

Sri Lanka has been affected by a brutal civil conflict during most of the last three decades resulting in massive displacement of civilians and interruption to the provision of basic services. This situation resulted in much of the countries malaria being limited to the conflict affected Northern & Eastern Provinces during much of the last two decades. The successful resolution of the conflict in 2009 has finally opened up avenues for addressing the malaria situation in these provinces and Sri Lanka can now move rapidly to effectively controlling malaria throughout the country.

The National Malaria Control Programme, Sri Lanka comprising of the Anti Malaria Campaign of the Central Ministry of Health and the Provincial Malaria Control Programmes belonging to the nine provinces together with civil society and private sector stakeholders has been able to reduce the burden of malaria during the last decade by nearly 99%. This is indeed a significant achievement for a developing country facing a civil conflict. During the last four years the annual reported number of malaria cases has been less than one thousand. This is evidence of very good control achieved in a country populated by nearly 21 million people.

The National Malaria Control Programme formulated a Strategic Plan for the phased elimination of malaria starting with the areas not affected by the conflict in 2008. The country successfully applied for a malaria elimination grant from the Global Fund during the Round 8 funding in 2008. The implementation of this grant commenced in October 2009 and the civil conflict was concluded in May 2009. The success achieved in the control of malaria with an ongoing civil conflict and the successful resolution of the conflict have today opened up the possibility of moving more rapidly towards elimination. This monitoring and evaluation plan is based on new objectives formulated after the resolution of the conflict by the National Malaria Control Programme, and envisages the phased elimination of malaria from the country by the end of 2014. Accordingly it is planned to eliminate falciparum malaria transmission by end 2012 and vivax transmission by end 2014.

This monitoring & evaluation plan is developed with the objective of interrupting malaria transmission in the country and achieving zero transmission. The indicators and definitions incorporated herein are in line with international definitions. This effort has been particularly challenging as there is very little recent literature on the topic and the need to have good monitoring & evaluation plan which includes the recent interventions has been especially challenging. In this respect I wish to acknowledge the active role played by Marcel Tanner of the Swiss Tropical & Public Health Institute and Dr. Christian Lenegler of the same institute without whose efforts this plan would not have been possible.

Chapter 1: Brief description of the National Malaria Control Programme, Sri Lanka

The National Malaria Control Programme of Sri Lanka is composed of the National Anti Malaria Campaign of the Central Line Ministry of Health and the eight provincial malaria control programmes (excluding Western Province) of the provincial governments, civil society organizations engaged in malaria control and private sector organizations contributing to malaria control. The technical directions and strategies of the National Malaria Control Programme are formulated by the Anti Malaria Campaign Headquarters in consultation with the Technical Support Group and the other stakeholders.

Epidemiological and operational risk stratification in Sri Lanka

Since May 2009 the civil war has ended in the country and hence the basic conditions for return to normal civil administration are given for the entire territory. As a result, it is now possible to extend full national malaria control operations to the northern areas as well. This has some major implications for the national malaria control programme, as well as for the GFATM funded malaria control projects.

Currently control efforts are being intensified in the previous conflict areas and hence it is proposed to replace the old stratification of the country shown on page 7 of the Round 8 proposal (non-conflict districts, conflict affected districts, transition districts) by the following new stratification, which is in line both with the current epidemiology of malaria in the country and the socio-political state of the country since the end of the conflict.

- Zone A: districts with no risk of transmission (Western Province, Nuwara Eliya district in Central Province, and the Galle & Matara districts of Southern Province)

- Zone B: districts with transmission potential but currently no ongoing transmission because of successful malaria control activities

- Zone C: districts with transmission potential and ongoing sporadic transmission where considerable strengthening of surveillance and control is required (largely former conflict-affected areas).

In the future, operational stratification will follow these three categories (see Figure 1 below) as a basis for both organizing control activities and evaluation and monitoring.

Figure 1. The overall goal and an outline of key strategies proposed:

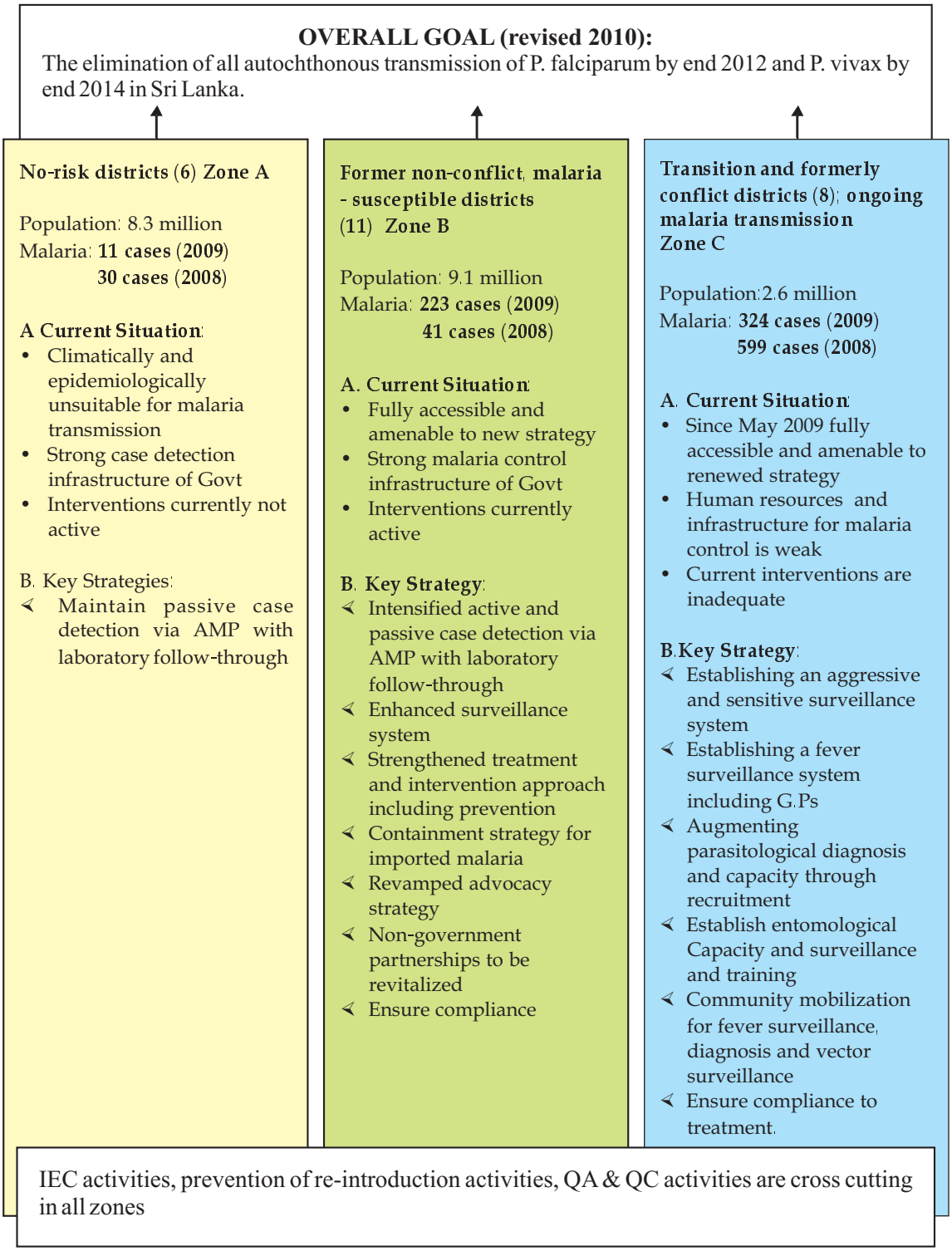
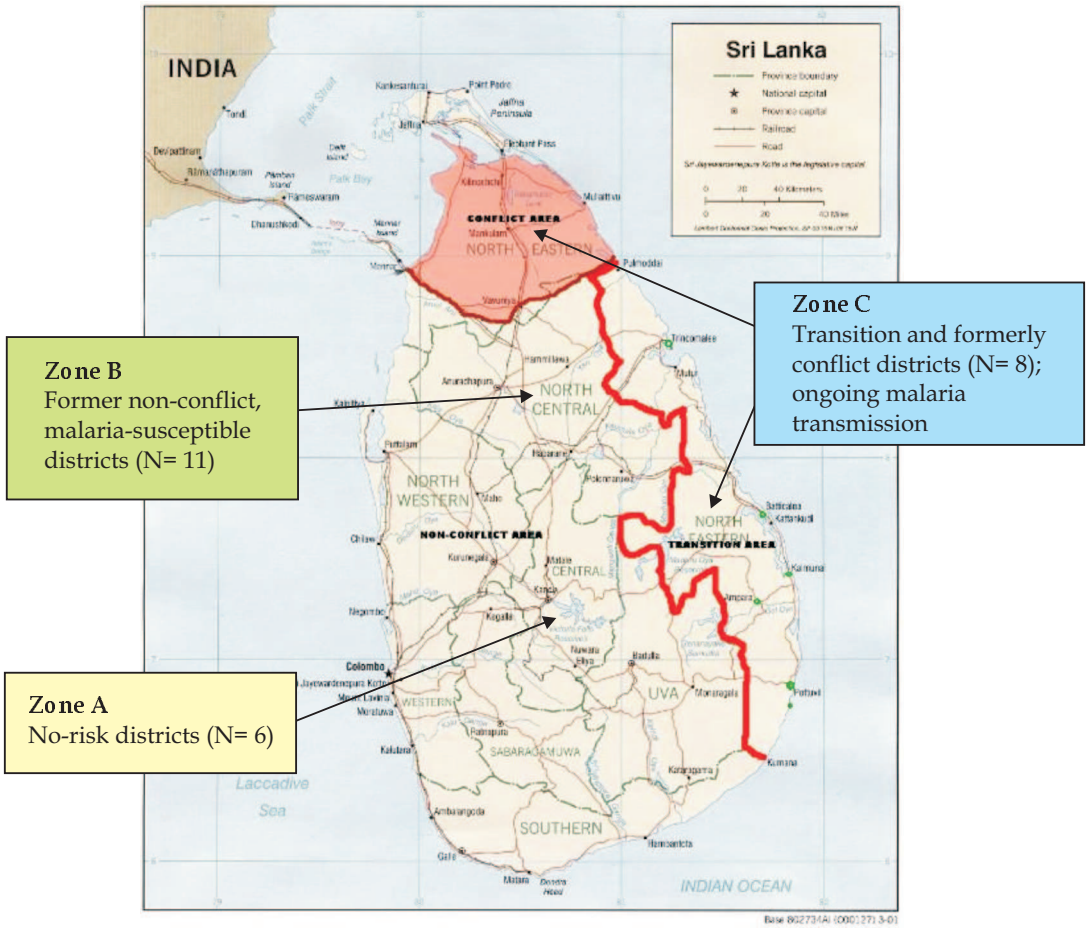


Figure 2. Epidemiological and socio-political stratification of Sri Lanka in view of planned malaria elimination by 2014.



National Malaria Control Programme in Sri Lanka

VISION

Sri Lanka with no indigenous malaria

MISSION OF THE PROGRAMME

Plan and implement a comprehensive malaria control programme to interrupt the indigenous transmission of malaria in Sri Lanka

Objectives of the Anti Malaria Campaign

1. To eliminate transmission of indigenous *P. falciparum* malaria by the end of year 2012.

2. To eliminate transmission of indigenous *P. vivax* malaria by the end of year 2014.

3. To maintain zero mortality from malaria in Sri Lanka

4. To prevent the reintroduction of malaria into the country

Strategies for malaria elimination in Sri Lanka

- Ensure 100% case detection and confirmation by microscopy or RDT
- Notification and investigation of all cases to ensure radical cure & prevention of secondary transmission.
- Strengthening malaria surveillance system
- Implement radical treatment policy for all *P. vivax* infections
- Continue ACT and gametocyte treatment policy for *P. falciparum* malaria.
- Implementing a quality control and quality assurance for diagnostic and treatment services including anti malarial drugs.
- Ensure total indoor residual spray coverage in and around each malaria case and implementing an integrated vector management strategy including the distribution of LLINs/ITNs where appropriate to control vector densities and eliminate disease transmission.
- Implementation of an outbreak preparedness and rapid response strategy for early containment of outbreaks
- Prevention of malaria in travelers overseas and prevention of re-introduction of malaria acquired in other countries
- Re-orienting public and private health sector staff towards the new goals of malaria elimination.

- Advocacy for political commitment, partnerships and enhancing community participation
- IEC activities targeting eliminaton
- Human resource development and capacity building in programme management, planning and implementation
- Operational research

Major activities to be implemented under the above strategies for malaria elimination in Sri Lanka

Ensure 100% case detection and confirmation by microscopy or RDT, notification and radical cure.

- Strengthening diagnostic facilities to achieve 100% case confirmation by microscopy and/or RDT and ensuring the availability of such facilities.
- Follow up of all malaria positive cases for four weeks to ensure complete clearance of parasitaemia
- Implement radical treatment policy for all *P. vivax* infections
- Continue ACT and gametocyte treatment policy for *P. falciparum* malaria
- The banning of artemisinin mono therapy through appropriate legislative measures
- Strengthening of active case surveillance.
- Conducting ACD in selected localities during transmission season
- Ensure availability of all anti malarial drugs including ACTs.
- Introduction of a DOTS strategy for treatment of all *P. falciparum* infections through hospitalization for a minimum of three days. Introduction of a suitable DOTS strategy for management of *P. vivax* infections.
- Quality control and quality assurance of diagnostic services and anti malarial drugs
- Monitoring anti malarial drug resistance
- Ensuring availability of preventive therapy for people at risk traveling to malarious areas both in and outside the country.
- Elimination of parasite reservoir through active detection and treatment of carriers
- Establishment and maintenance of a Malaria Elimination Database
- Introduction of PCR for screening of Blood Bank samples
- COMBI for improving effective diagnosis, treatment and chemoprophylaxis
- Introduction of blister packaging of anti malarial drugs and treatment cards

Strengthening the malaria surveillance system

- Strengthening & expanding APCD and selective ACD including MBS in transmission season
- Introduction of the internet based data management system and a website
- Enhance case investigation and follow up of malaria positives and clinical cases
- Screening, treatment and follow up of travelers and risk groups at ports of entry
- Enhance case notification in both public and private sectors
- Improve the epidemic forecasting capacity

- Enhance use of selective "indicator localities" for monitoring trends in vector dynamics
- Maintain a database on drug resistance to anti malarial drugs to guide national treatment policy
- Maintain a database on insecticide susceptibility status and insecticide usage for decision making

Implementation of an epidemic preparedness and rapid response strategy

- Introduction of real time monitoring of malaria cases through the strengthening of surveillance systems
- Establishment of a National Level and district level rapid response teams for rapid containment of outbreaks
- Ensure availability of buffer stocks of antimalarials including ACTs and insecticides for IRS
- Establishment and maintenance of a malaria elimination database

Ensure total indoor residual spray coverage in and around each malaria case and implementing an integrated vector management strategy including the distribution of LLINs/ITNs where appropriate to control vector densities and eliminate disease transmission.

- Total IRS coverage in around each malaria case and in foci. Application of IRS in at-risk situations/localities
- Expanding LLIN coverage and usage to protect risk populations
- Implementation of an IVM strategy where feasible
- COMBI for improving acceptance and usage of mosquito nets and other vector control interventions
- Selective application of eco friendly larval control measures and chemical larvicides
- Promotion of other personal protection methods (housing)
- Monitoring the impact of vector control interventions through entomological surveillance
- Monitoring bio-efficacy of insecticides on malaria vectors and its operational impact
- Monitoring the persistence of insecticides on applied surfaces
- Ensure availability and quality assurances of entomological equipments & supplies, spray equipments including protective gear, insecticides, biocides, LLINs
- Quality control of entomological surveillance and vector control activities
- Use of GIS for monitoring vector densities and implementation of selective vector control
- Ensuring safe storage, transport and handling of insecticides
- Advocacy measures to minimize mosquito-genic potential and human-vector contact in developmental activities
- Appropriate vector control measures in ports of entry to the country

Re-orienting public and private health sector staff towards the new goals of malaria elimination.

- Conducting awareness programmes for both public and private sector health staff on the new goals of malaria elimination
- Introduction of CME packages for health staff on radical treatment of malaria infections
- Introduction of in-service training for laboratory personnel engaged in malaria microscopy

Advocacy for political commitment, partnerships and enhancing community participation

- Establishment and sustaining high level National, Provincial and District working groups for malaria control with clear Plan of Action
- Establishment and strengthening of inter-sectoral partnerships including community based organizations
- Enhance use of target oriented advocacy instruments
- Increasing public awareness of malaria elimination intentions through "Malaria Day"
- Resource mobilization for the implementation of the programme

Human resource development & capacity building

- Ensuring adequate availability of essential cadres both at central level and in the regions
- Development and revision of duty lists for all cadres in keeping with re-orientation of programme objectives
- Provision of adequate job oriented training in keeping with the requirements of the programme, including basic and regular in-service training
- Providing identified cadres with needed foreign experience & training necessary to implement a successful programme
- Development of capacity of cadres to perform their scope of work through the provision of essential infrastructure facilities
- Seek necessary technical assistance
- Reorientation of programme structure, activities and staff according to the objectives and tasks
- Strengthening logistical management through procurements and improved management

Operational research

- Identification of evolving research needs in consultation with the Technical Support Group (TSG).
- Utilization of locally and internationally available expertise to carry out operational research

Chapter 2: Malaria Monitoring and Evaluation Framework

2.1 The RBM - MERG malaria monitoring and evaluation framework

The following Monitoring and evaluation (M&E) model by RBM Monitoring and Evaluation Reference Group – MERG) illustrates the general M&E components that need to be addressed by any national malaria control programme (Figure 1). It represents the framework adopted in Sri Lanka.

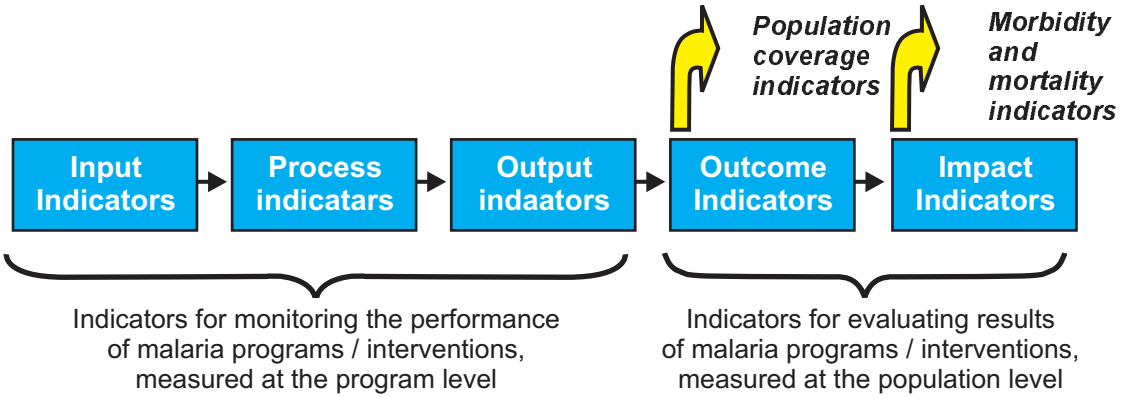


Figure 1. RBM-MERG (2009) monitoring and evaluation framework

Monitoring is the routine tracking of the key elements of programme performance through record keeping, regular reporting, surveillance systems and periodic surveys. Monitoring assists programme managers to determine how successful their operations are against set targets and where strengthening is required. Monitoring is also necessary to inform any evaluation that is conducted, as monitoring provides contextual information to assist with interpretation. Indicators selected for monitoring will be different depending on the reporting level within the health system and the epidemiological situation of the country. At the national and sub-national levels, the emphasis will be on utilizing programmatic records, health system data, and sentinel site data to monitor inputs, processes, and outputs. A list of key output and process indicators are included in Appendix A.

Impact evaluation is required to determine and document the extent to which any expectant population-level results are attributable to a particular intervention or set of interventions, as measured through outcome and impact indicators. In the case of Sri Lanka the goal is the elimination of all malaria transmission (for both P. falciparum and P. vivax) by the year 2014. Hence this should results in zero autochthonous cases and zero morbidity and mortality from malaria.

Aspects specific to malaria elimination (which is not addressed in the current RBM-MERG framework) have been based on the WHO (2007) field manual, which includes a section on M & E requirements for elimination.

2.2 Performance-based funding and M&E (GFATM framework – GFATM 2009)

The GFATM aims to "raise funds, spend them and help prove their contribution to fight the diseases" in partnership with other international and national organizations, and crucially with those that implement the programs and projects supported by the Global Fund. Performance-based funding is central to the Global Fund mechanism, to ensure that raising, spending and proving the contribution of funds are closely related. Funds are released when progress against agreed targets are met. This requires that:

- Overall goals be clearly formulated
- Services be clearly defined, grouped into service delivery areas (SDA) (related to goals)
- A reliable M&E system is in place
- Indicators be chosen, targets set and progress reported regularly

Performance is based on how well indicators can be measured, documented and verified against agreed targets to achieve the goals of the round 8 proposal for malaria elimination in Sri Lanka.

Performance-based funding helps ensure that money is well spent relative to project goal and, ultimately, that services are provided to those affected by disease. Here we fully integrate these notions in the national M & E plan. Since the current GFATM funding for malaria in Sri Lanka only makes up a limited percentage of the total funding required for malaria control in the country it is necessary to embed the M & E activities specifically required by the GFATM within a wider national data collection and analysis effort.

2.3 Main tasks and activities of the malaria M&E plan

- Collect a comprehensive set of basic indicators to assess progress towards the goal of malaria elimination in Sri Lanka
- Contribute to the continuous improvement of the national anti-malaria campaign
- Coordinate all monitoring and evaluation processes in the country and integrate them in one comprehensive framework
- Assess data quality in terms of collection, reproducibility, and quantitative and qualitative data collection techniques.
- Collect, process, and analyze data, and interpret and report.
- Disseminate progress reports on a regular basis.

The target audience for this M & E plan include the following: MOH senior leadership, Anti Malaria Campaign personnel belonging to the national & provincial programmes, GFATM Secretariat & LFA staff, all partners involved in malaria control in the country including Tropical and Environmental Disease Associates (TEDHA) and Lanka Jathika Sarvodaya Shramadana Sangamaya and all their respective sub recipients,

Secondary target audience include multilateral and bilateral agencies involved in malaria control (WHO, UNICEF) as well as all other stakeholder in the country including academic and research organizations.

Chapter 3: A standardized framework with key indicators

This framework is spells out an ambitious programme of work targeting malaria elimination from the country by end 2014. The framework is broadly consistent with the national malaria control strategic plan (2008-2013) as well as with the GFATM round 8 proposal. The GFATM round 8 proposal envisages a phased elimination of malaria from Sri Lanka through a partnership with three main stakeholders comprising the National Malaria Control Programme; i.e. the Anti Malaria Campaign of the Ministry of Health, the Tropical and Environmental Diseases and Health Associates (Private Sector Organization) and the Lanka Jathika Sarvodaya Shramadana Sangmaya (a leading Civil Society Organization). Under each of these main stakeholders there are several minor stakeholders.

The proposal clearly spells out the leadership provided by the National Programme (the Anti Malaria Campaign and the eight provincial malaria programmes) in moving towards elimination, the role of TEDHA in strengthening surveillance related activities in some previously conflict affected districts and the role of Sarvodaya in scaling up of IEC activities to facilitate elimination in addition to contributing the strengthening malaria vector control through the facilitation of distributing LLINs. The monitoring of progress towards elimination and implementation of grant related activities while being the responsibility of individual stakeholders will be reviewed monthly under the leadership of the National Programme (AMC) at progress review meetings with the participation of all stakeholders.

All data collection activities are routinely implemented by the AMC and other stakeholders.

Impact indicators

Primary impact target: zero morbidity and mortality from malaria, based on the elimination of autochtonous transmission of all species of human malaria

Secondary impact target: reduction in poverty in the country

Outcome indicators

These will include the number of malaria cases detected and treated, the number of patients completing treatment as per the national guidelines and others.

Process indicators

Please see separate Excel spreadsheet.

Chapter 4: Data collection and analysis

4.1 Coordination of malaria M & E Activities

The Anti Malaria Campaign Headquarters has developed new data collection tools that are being used to strengthen malaria surveillance and facilitate quick processing, reporting and responding to data collected in the field. This is viewed as an essential requirement in strengthening surveillance as the programme moves from control towards elimination.

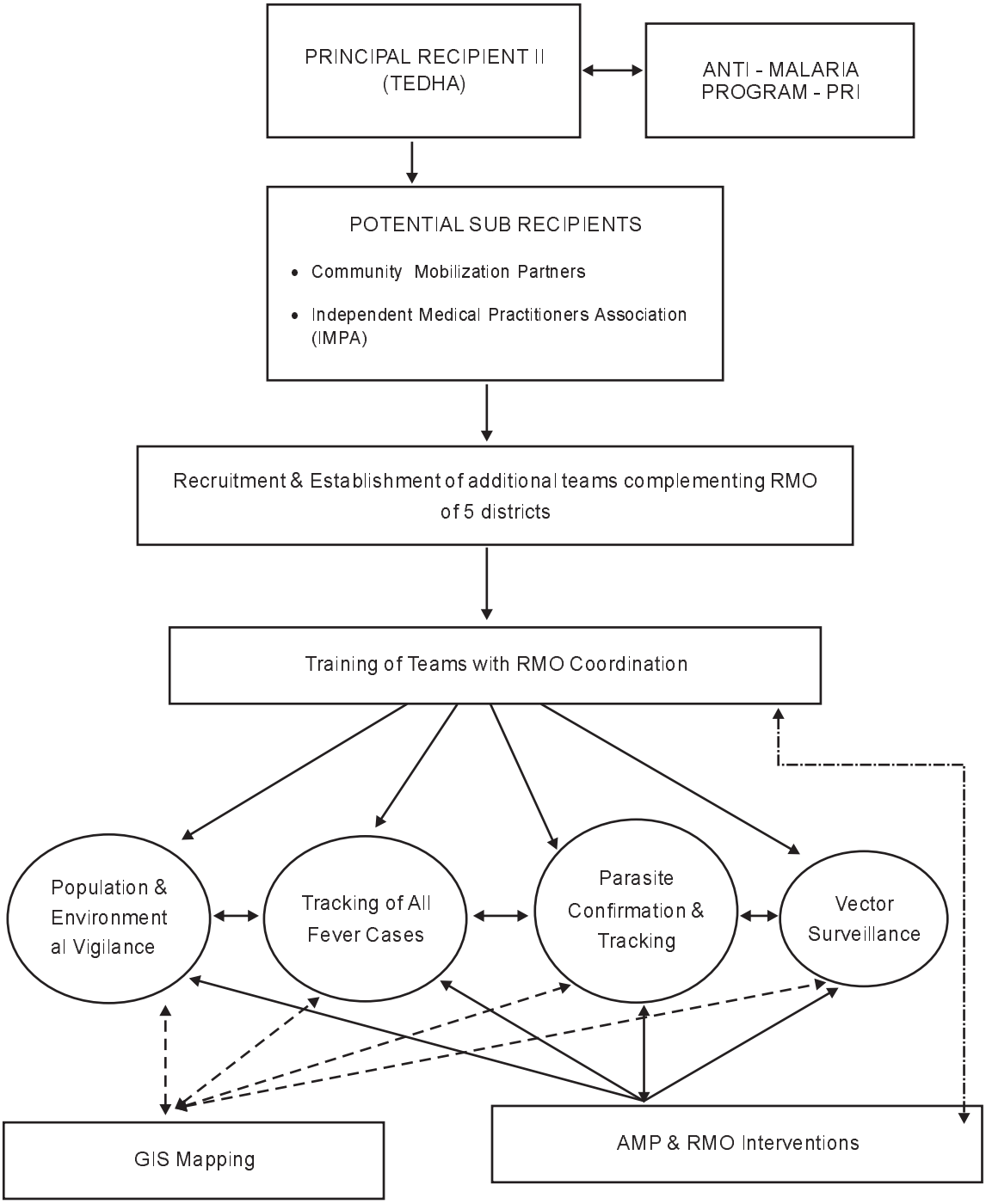
The Anti Malaria Campaign Headquarters has also contributed to the development of a tool set that will facilitate the efficient collection of data by TEDHA as a partner in strengthening surveillance related to malaria elimination and the integration of this data into the national malaria database. The tools developed for collection of information are attached as annexures.

The data collected at the periphery are processed for meaningful interpretation and standard definitions listed below are utilized in this process. Data processing is carried out at Regional Medical Officer Anti Malaria Campaign level in the districts, in the Medical Officer of Health offices/Medical Institutions. The data is collected according to the smallest administrative units available the Grama Niladari Divisions (GND) and in some instances at even smaller village level. Strengthening surveillance requires that this data is used where indicated for urgent corrective action or rapidly processed and transmitted to higher levels i.e district/regional, provincial and national levels. It also requires that there is a regular feedback to the periphery from the centre on the information received. This is carried out on a case by case basis based on urgency of the situation or through regular monthly meetings with the district teams and other stakeholders.

Monitoring and evaluation of malaria related activities are coordinated at district level by the Regional Medical/Malaria Officers of the Campaign and at national level by the Directorate.

Flow chart with MOH information flow

PR II TEDHA INTENSIFIED SURVEILLANCE PLAN- TRANSITION AREAS



A. Indicators

This section includes all National Malaria Control Programme impact indicators, all outcome indicators and selected output indicators. It is organized by indicators specific to:

- Disease Surveillance & management indicators including diagnosis, morbidity & Mortality
- Vector Surveillance and control including entomological surveillance, vector control interventions

1) Disease Surveillance & Management Indicators

Annual Parasite Incidence (API)

$$\text{Annual Parasite Incidence} = \frac{\text{No. confirmed positive malaria cases}}{\text{Population at risk in a defined area}} \times 1000$$

API is defined as the number of positives or confirmed malaria cases (reported by microscopic examination of blood slides or rapid diagnostic test (RDT)) per thousand persons at risk per year. Numerator is the number of confirmed positive cases reported and the denominator is the population at risk of malaria.

Malaria positives are routinely reported by all activated health facilities having public health laboratory technicians, health assistants or RDT through Health Management Information System (HMIS).

Proportion of clinical malaria cases

The clinical diagnosis and treatment of malaria is strongly discouraged and all suspected cases are subject to laboratory testing. However in exceptional situations clinicians are expected to treat patients suspected of having malaria without laboratory confirmation due to the condition of the patient warranting it or due to the absence of laboratory facilities. All clinical malaria cases who have been treated with antimalarial agents will be subjected to antibody assays to determine the actual presence or absence of infections.

$$\text{Proportion of clinical malaria cases} = \frac{\text{Number of clinically diagnosed patients responding to anti malarial therapy}}{\text{No. confirmed positive malaria cases from district / country}} \times 100$$

The proportion of clinical malaria cases is defined as the number of clinically suspected malaria cases responding to anti malarial therapy in relation to the total number of malaria cases detected. Numerator is the number of clinically diagnosed malaria cases (laboratory unconfirmed, either

negative or not performed) responding to anti malaria treatments and the denominator is the total number of malaria cases detected.

Proportion of indigenous malaria cases:

$$\text{Proportion of indigenous malaria cases} = \frac{\text{Number of confirmed positive malaria cases with no history of visiting other districts/ countries within 4 weeks before the appearance of fever}}{\text{Number of confirmed positive malaria cases from district/country}} \times 100$$

Defined as the proportion of diagnosed malaria cases (by microscopy and/or RDT), who have no history of visiting any other district/country four weeks prior to the appearance of fever. This data is collected through the regular HMIS reporting and through case investigation data.

Proportion of imported malaria cases:

$$\text{Proportion of imported malaria cases} = \frac{\text{Number of confirmed positive malaria cases with a history of visiting other districts/countries within 4 weeks before the appearance of fever}}{\text{Number of confirmed positive malaria cases from district/country}} \times 100$$

Defined as the proportion of malaria cases diagnosed and confirmed by laboratory investigations who have a history of visiting other districts/countries during a four week period preceding the appearance of fever. This data is collected through the regular HMIS reporting and through case investigation data.

Proportion of *P. falciparum cases:*

$$\text{Proportion of P. falciparum cases} = \frac{\text{Number of laboratory confirmed P. falciparum malaria cases reported}}{\text{Total number of malaria cases detected following laboratory testing}} \times 100$$

Defined as the proportion of *P. falciparum* malaria cases diagnosed and confirmed by laboratory assays to the total number of malaria cases detected. Data is collected through regular HMIS reporting.

Proportion of *P. vivax cases:*

$$\text{Proportion of } P.\ vivax \text{ cases} = \frac{\text{Number of laboratory confirmed } P.\ vivax \text{ cases reported}}{\text{Total number of malaria cases detected following laboratory testing}} \times 100$$

Defined as the proportion of *P. vivax* malaria cases diagnosed and confirmed by laboratory assays to the total number of malaria cases detected. Data is collected through regular HMIS reporting.

Proportion of mixed infections:

$$\text{Proportion of mixed infections} = \frac{\text{Number of confirmed } P.\ falciparum \text{ \& } P.\ vivax \text{ positive malaria cases reported following laboratory confirmation}}{\text{Total number of malaria cases detected following laboratory testing}} \times 100$$

Defined as the proportion of *P. falciparum and P. vivax* mixed infections diagnosed and confirmed by laboratory assays to the total number of malaria cases detected. Data is collected through regular HMIS reporting.

Proportion of indigenous *P. falciparum* cases:

$$\text{Proportion of indigenous } P.\ falciparum \text{ cases} = \frac{\text{Number of laboratory confirmed } P.\ falciparum \text{ malaria cases with no history of visiting other districts/countries within four weeks preceding the appearance of fever}}{\text{Number of confirmed } P.\ falciparum \text{ positive malaria cases}} \times 100$$

Defined as the total number of *P. falciparum* malaria cases that are diagnosed as *P. falciparum* malaria cases who have no history of visiting other districts/countries within a four week period preceding appearance of fever. Data is collected through regular HMIS reporting.

Proportion of imported *P. falciparum* cases:

$$\text{Proportion of imported } P.\ falciparum \text{ cases} = \frac{\text{Number of confirmed } P.\ falciparum \text{ cases with history of visiting other endemic countries within 4 weeks preceding the onset of fever}}{\text{Number of confirmed } P.\ falciparum \text{ positive malaria cases}} \times 100$$

Defined as the total number of *P. falciparum* malaria cases that are diagnosed and confirmed as *P. falciparum* malaria cases (by microscopy and/or RDT) who have a history of visiting another malaria endemic country or countries within 4 weeks preceding the onset of fever. Data is collected through regular HMIS reporting.

Proportion of indigenous *P. vivax* cases:

$$\text{Proportion of indigenous } P.\ vivax \text{ cases} = \frac{\text{Number of confirmed } P.\ vivax \text{ malaria cases with NO history of visiting other endemic areas within 4 weeks prior to appearance of fever}}{\text{Total number of confirmed } P.\ vivax \text{ positive malaria cases}} \times 100$$

Defined as the total number of *P. vivax* malaria cases that are diagnosed and confirmed as *P. vivax* malaria cases (by microscopy and/or RDT) who have no history of visiting other malaria endemic districts/countries within 4 weeks preceding the onset of fever. Data is collected through regular HMIS reporting.

Proportion of imported *P. vivax* cases:

$$\text{Proportion of imported } P.\ vivax \text{ cases} = \frac{\text{Number of confirmed } P.\ vivax \text{ cases with history of visiting other endemic countries within 4 weeks preceding the onset of fever}}{\text{Number of confirmed } P.\ vivax \text{ positive malaria cases}} \times 100$$

Defined as the total number of *P. vivax* malaria cases that are diagnosed and confirmed as *P. vivax*

malaria cases (by microscopy and/or RDT) who have history of visiting another malaria endemic country or countries within 4 weeks preceding the onset of fever. Data is collected through regular HMIS reporting.

Annual blood examination rate (ABER) :

$$\text{Annual Blood Examination Rate} = \frac{\text{Number of blood smears examined during a given year}}{\text{Population at risk in a defined geographical area}} \times 100$$

Defined as the number of blood smears and rapid diagnostic test (RDT) used for detection of malaria infections per hundred persons per year. The numerator is the sum of the number of blood smears and RDTs examined and the denominator is the population at risk of malaria. Data is collected through analysis of regular HMIS reporting data.

Annual vivax incidence (AVI) :

$$\text{Annual Vivax Incidence} = \frac{\text{Number of blood smears \& RDTs determined positive for vivax malaria during a given year}}{\text{Population at risk in a defined geographical area}} \times 1000$$

Defined as the number of blood smears and rapid diagnostic test (RDT) determined to be positive for vivax malaria during a given year in proportion to 1000 people at risk in a given geographical area. The numerator is the sum of the number of blood smears and RDTs found to be positive for vivax malaria and the denominator is the population at risk of malaria. Data is collected through analysis of regular HMIS reporting data.

Annual falciparum incidence (AFI) :

$$\text{Annual Falciparum Incidence} = \frac{\text{Number of blood smears \& RDTs determined positive falciparum malaria during a given year}}{\text{Population at risk in a defined geographical area}} \times 1000$$

Defined as the number of blood smears and rapid diagnostic test (RDT) determined to be positive for falciparum malaria during a given year in proportion to 1000 people at risk in a given geographical area. The numerator is the sum of the number of blood smears and RDTs found to be positive for falciparum malaria and the denominator is the population at risk of malaria. Data is collected through analysis of regular HMIS reporting data.

Slide positivity rate:

$$\text{Slide Positivity Rate} = \frac{\text{Number of blood smears determined to be positive for malaria}}{\text{Total number of blood smears examined}} \times 100$$

Defined as the number of confirmed malaria cases per hundred blood smears examined. Data is collected through analysis of regular HMIS reporting data.

Slide *falciparum* positivity rate:

$$\text{Slide Falciparum Rate} = \frac{\text{Number of blood smears determined to be positive for falciparum malaria}}{\text{Total number of blood smears examined}} \times 100$$

Defined as the number of confirmed falciparum malaria cases per hundred slides examined. Data is collected through analysis of regular HMIS reporting data.

Proportion of uncomplicated *P. falciparum* malaria cases treated according to national guidelines

$$\text{Proportion of falciparum malaria treated according to National Guidelines} = \frac{\text{Number of falciparum malaria cases treated according to national treatment guidelines}}{\text{Total number of falciparum malaria cases diagnosed}} \times 100$$

Defined as the proportion of confirmed falciparum malaria cases treated according to National Treatment Guidelines. For proportion, the numerator is number of confirmed falciparum malaria cases treated according to national guidelines and denominator is the total number of falciparum malaria cases diagnosed (by microscopy and/or RDTs). Data is obtained through analysis of case investigation data.

Proportion of *P. vivax* malaria cases treated according to national guidelines

$$\text{Proportion of vivax malaria treated according to National Guidelines} = \frac{\text{Number of vivax malaria cases treated according to national treatment guidelines}}{\text{Total number of vivax malaria cases diagnosed}} \times 100$$

Defined as the proportion of confirmed vivax malaria cases treated according to National Treatment Guidelines. For proportion, the numerator is number of confirmed vivax malaria cases treated according to national guidelines and denominator is the total number of vivax malaria cases diagnosed (by microscopy and/or RDTs). Data is obtained through analysis of case investigation data.

Proportion of malaria cases investigated as per the national guidelines

$$\text{Proportion of malaria cases investigated according to National Guidelines} = \frac{\text{Number of malaria cases investigated according to national guidelines within 2 weeks}}{\text{Total number of malaria cases diagnosed}} \times 100$$

Defined as the proportion of confirmed malaria cases investigated within two weeks of diagnosis as per defined Scope of Work developed by the Anti Malaria Campaign Directorate. For proportion, the numerator is number of confirmed malaria cases investigated according to national scope of work and denominator is the total number of malaria cases diagnosed (by microscopy and/or methods). Data is obtained through analysis of case investigation data.

Proportion of public sector medical institutions with no stock-out of nationally recommended antimalarials continuously for 1 week

$$\text{Proportion of public sector medical institutions with no stock outs of anti malarials} = \frac{\text{Number of medical institutions with no stock outs of anti malarials continuously for one week}}{\text{Total number of medical institutions provided with malaria diagnostic facilities}} \times 100$$

Defined as the proportion of public sector medical institutions with no stock outs of anti malarials continuously for one week out of all medical institutions provided with facilities for laboratory diagnosis of malaria in the district/country. Data is obtained through analysis of HMIS data and field reports.

Number of laboratories strengthened/equipped with adequate diagnostic capacity

Defined as the total number of laboratories in medical institutions, regional offices and directorate strengthened through the provision of additional/new equipment and/or reagents to enhance diagnostic capacity.

Number of clinicians in state sector facilities trained in the management of malaria patients as per the new national guidelines

Defined as the total number of clinicians trained in the management of malaria patients as per the new national guidelines for the treatment of malaria. The trainings are aimed at sustaining zero mortality and reducing morbidity. Clinicians in state medical institutions include medical officers engaged in public health institutions who are engaging in part time private practice in addition to clinicians working in government hospitals. Data is collected through the HMIS information system. Activity will be conducted by the Anti Malaria Campaign Directorate.

Number of clinicians in private sector facilities trained in the management of malaria patients as per the new national guidelines

Defined as the total number of clinicians trained in the management of malaria patients as per the new national guidelines for the treatment of malaria practicing full time or part time in the private sector. The trainings are aimed at sustaining zero mortality and reducing morbidity. Private healthcare providers include state sector clinicians engaged in part time private practice in addition to private sector clinicians engaged in full time private practice. Data is collected through the HMIS information system of the non government stakeholders. Activity will be conducted jointly by the Anti Malaria Campaign Directorate and the non-government stakeholders.

2) Vector Surveillance & Control Indicators

Proportion of sentinel site entomological surveillance programmes conducted as per national guidelines

$$\text{surveillance programmes conducted according to National Guidelines} = \frac{\text{Number of entomological sentinel site surveillances completed}}{\text{Total number of entomological sentinel sites identified}} \times 100$$

Defined as the proportion of entomological sentinel site surveillances completed within a year in out of all sentinel sites identified for entomological surveillance. Data is obtained through HMIS information system.

Number of additional entomological surveillance days conducted utilizing GFATM funds

Defined as the number of additional entomological surveillance days conducted by the entomological surveillance teams utilizing GFATM funds to augment entomological surveillance. Data is obtained through HMIS information system.

Proportion of houses in which indoor residual spraying of insecticides was conducted

Proportion of houses in which indoor residual application of insecticides was conducted = Number of houses where IRS was conducted / Total number of houses targeted for application of IRS X 100

Defined as the proportion of houses in which IRS was conducted out of all houses targeted for the application of IRS. Data is obtained through HMIS information system.

Percentage of houses which have at least one Long Lasting Insecticidal Net

Percentage of houses which have at least one LLIN = Number of houses which have at least one LLIN / Total number of houses targeted for LLIN distribution in the community X 100

Defined as the percentage of houses which reported having at least one LLIN from among houses that were targeted for distribution of LLINs. Data will be obtained through periodic surveys.

Percentage of residents who slept under a LLIN the previous night

Percentage of residents who slept under a LLIN the previous night = Number of residents sleeping the previous night under a LLIN / Total number of residents in houses owning at least one LLIN X 100

Defined as the percentage of people who slept under a LLIN from the number of residents living in houses owning at least one LLIN. Data will be obtained through periodic surveys.

Percentage of children under 5 years of age who slept under a LLIN the previous night

Percentage of children under age of 5 years who slept under a LLIN the previous night = Number of children under 5 years who slept under a LLIN the previous night / Total number of children under 5 years in houses owning at least one LLIN X 100

Defined as the percentage of children less than 5 years of age who slept under a LLIN the previous night in relation to total number of children under 5 years who sleep in houses owning at least one LLIN. Data will be obtained through periodic surveys.

Number of LLINs distributed

Defined as the number of LLINs distributed to a given community or health area.

LLIN coverage of households

$$\text{Percentage of households owning at least one LLIN} = \frac{\text{Number of households having at least one LLIN per household}}{\text{Total number of households targeted for LLIN distribution}} \times 100$$

Defined as the percentage of households owning at least one LLIN in relation to the total number of houses targeted for LLIN distribution in a health area/district. Data will be obtained through periodic surveys.

LLIN coverage of population

Determined as the number of people protected by LLINs assuming that a family size LLIN protects two adults and a child under 5 years (if present in the household) and a single net protects one individual. Data will be obtained through periodic surveys.

Number of sites to which larvivorous fish were introduced

Determined as the number of Anopheline breeding sites to which larvivorous fish were introduced during a given period. Data is collected through the HMIS information system.

Proportion of sites in which insecticide susceptibility has been monitored.

$$\text{Proportion of sites where insecticide susceptibility was monitored} = \frac{\text{Number of sites where insecticide susceptibility was assessed}}{\text{Total number of sentinel sites where entomological surveillance was conducted}} \times 100$$

Defined as the percentage of sites where insecticide susceptibility was assessed in relation to the

total number of sentinel sites surveyed. Data is collected through the HMIS information system.

Proportion of sites in which insecticide residual efficacy was determined in relation to IRS carried out.

$$\text{Proportion of sites where insecticide residual was monitored} = \frac{\text{Number of sites where insecticide residual efficacy was determined through bio assay tests}}{\text{Total number of sentinel sites where entomological surveillance was conducted within the effective period of IRS application}} \times 100$$

Defined as the percentage of sites where insecticide residual efficacy was determined through bio assay tests in relation to the total number of sentinel sites surveyed within the effective period of IRS application. Data is collected through the HMIS information system.

Proportion of sites in which insecticide residual efficacy was determined in LLINs.

$$\text{Proportion of sites where insecticide residual efficacy was monitored in LLINs} = \frac{\text{Number of sites where insecticide residual efficacy was determined through bio assay tests on LLINs}}{\text{Total number of sentinel sites where entomological surveillance was conducted where LLINs were distributed within the past three years.}} \times 100$$

Defined as the percentage of sites where insecticide residual efficacy was determined through bio assay tests on LLINs in relation to the total number of sentinel sites surveyed where LLINs were distributed within the past three years.

Number of districts in which rapid response teams are established

Determined as the number of districts where rapid response teams have been established for dealing with malaria outbreak situations. Data is collected through the HMIS information system.

Number of private healthcare providers trained in the notification of all malaria cases as per the new surveillance system

Determined as the number of private healthcare providers trained in the notification of all malaria

infections as per the new surveillance system. Private healthcare providers include state sector clinicians engaged in part time private practice in addition to private sector clinicians engaged in full time private practice. Data is collected through the HMIS information system of the non-government stakeholders. The activity will be conducted jointly by the Anti Malaria Campaign Directorate and the non-government stakeholders.

Number of public sector officials for whom advocacy programmes on malaria elimination was conducted

Determined as the number of key public sector officials for whom advocacy programmes on malaria elimination were conducted. Data is collected through the HMIS information system of the non-government stake holders.

Number of community leaders for whom advocacy programmes on malaria elimination was conducted

Determined as the number of community leaders at village level for whom advocacy programmes on malaria elimination were conducted. Data is collected through the HMIS information system of the non-government stakeholders.

B. Data sources

Data is collected from the districts and relate to activities conducted within the district for malaria elimination. The Regional Malaria Officer is responsible for the assimilation and transmission of data to the directorate from the district. Malaria elimination activities conducted by key non government and private sector partners for malaria elimination are conducted under the overall guidance of the district RMO and the technical guidance of the AMC directorate. The Anti Malaria Campaign directorate will be responsible for the monitoring of data collected by other stakeholders at monthly intervals. Non government stakeholders are expected to process the data rapidly and report to the AMC Directorate/RMO. This includes but is not limited to data on advocacy programmes conducted, number of LLINs distributed, number of private sector clinicians trained in management of malaria patients, number of private sector clinicians trained in the new surveillance system, parasitological and entomological surveillance activities conducted etc.

C. Data Management

Data management is an integral part of an efficient programme. Individual partners are responsible for their own data management systems. All the data collected at the directorate is routinely backed up at weekly intervals and precautions are in place to restrict accessibility to authorized officers and personnel only. Measures are being put in place for the electronic transfer of all data from the periphery to the directorate thereby considerably reducing the delays in data transmission.

Periodic review of data collection mechanisms and tools are carried out to streamline data collection and minimize duplication of data. Uploaded data from district level will be randomly cross checked for accuracy by both the district level staff and the staff at the directorate.

D. Data Analysis

Data analysis will be conducted regularly based on need for analysis and interpretation of findings for strengthening of control activities. Central data bases will be analyzed by the epidemiological unit of the directorate. The Consultant Epidemiologist, the M & E Officer at the directorate and other staff of the directorate at national level and the regional officers at district level are tasked with performing regular analysis of data to obtain performance indicators necessary for reporting to the donor, LFA or other government agencies. The sharing of data with the district level staff regularly to facilitate evidence based decision making is encouraged.

E. Data Quality Assurance

All data collected in the districts is based on clearly defined standard definitions. Regional officers and other staff are encouraged to enter collected data into formats developed for the purpose and transmit the data early to the national directorate electronically. The timely transmission of data is necessary and M & E staff is expected to follow up reporting in a timely manner. All Regional Officers are expected to ensure accuracy of data collected and processed. Electronic data formats received at the directorate will be periodically cross checked with manual forms to ensure data quality accuracy and quality assurance. The M & E Officer and staff of the directorate will conduct random field visits to regional offices and institutions at district level to verify data quality, reporting and storage of information.

F. Partner Organization Data Quality Assurance

Regular supervision and monitoring visits to intervention areas are carried out by non government stakeholders to ensure quality of data collected during private sector clinician trainings, collection of parasitological and entomological surveillance data, LLIN distribution, BCC activities etc. Field records and reports are cross validated during routine monitoring visits. All partner organizations are expected to conduct joint field visits with regional officers and directorate staff to ensure data quality is maintained. Survey data is cleaned and subjected to different statistical tests to check reliability and validity.

Chapter 5: Operational Research Plan

Operational research is essential for monitoring programme progress, establishing which malaria prevention and control interventions are effective, and for providing contextual information regarding the success or failure of malaria prevention and control interventions in specific areas, or among sub-groups within the population. Identified priority areas for this purpose are;

- Insecticide resistance studies
- Residual efficacy studies for assessing longevity of ITN/IRS effectiveness
- Drug resistance and therapeutic response studies
- Factors associated with ITN use in the context of a full coverage delivery system with BCC activities
- Distribution & ecology of malaria vectors
- Determination of cultural and other social barriers to the uptake of key malaria prevention and control interventions
- Compliance studies on treatment regimens
- LLIN usage and acceptability studies
- Efficacy of non chemical vector control interventions
- Identification of effective IEC messages & strategies
- Determination of thresholds for reducing the application of residual insecticides

Chapter 6: M & E Budget

Detailed budgets for monitoring and evaluation work have been worked out in the detailed workplans already submitted to the Global Fund.

Data Collection and Frequency

The data source and frequency of collection is identified in Annex 1 M & E Framework, which is appended to this plan.

Emphasis is placed on the collation of data that provides specific, quantifiable and time bound reporting of progress towards the achievement of results that can, as necessary, be independently verified.

In most cases, data collection at the national level will be on-going, and will draw on the strengthened surveillance and monitoring system of the national programme. Reports will be submitted at three monthly and six - monthly intervals to the LFA as required.

Standard reporting templates have been developed to enable the PR to summarise data into a "Project Report", while tying results and activities to expenditure. In country members of the TSG will assist the PRs and Sub-recipient compile reports prior to submission to the LFA/CCMSL if so required. Written reports will be supplemented where appropriate with other 'physical' evidence of achievements against reported results, such as copies of IEC materials.

The financial monitoring of the project will be part of the normal functions of the PR, with continuous inputting of financial data on a daily basis. Internal monitoring will comply with the standard existing, well defined procedures within the PR. Sub-recipients will initially submit financial reports to the PR on a three monthly basis.
Reports of a technical nature will generally be subject to a 'peer review' process by the TSG prior to using the data within the M & E framework.

The PR in accordance with the Grant Agreement will forward reports to the Global Fund of both the programmatic and financial aspects of the project through the Local Fund Agent.

Responsibilities for M & E

The table below details the various aspects of M & E, together with the assigned responsibilities;

Monitoring and Evaluation Component	*Responsible*
Overall M & E of the project at the strategic level	Director GFATM Project
Financial monitoring of the project	Director GFATM Project/ Project Accountant. Annual audit by approved auditors.
Monitoring the Impact of the project on the disease	Director, Anti Malaria Campaign. Deputy Director General (Public health Services).
Monitoring the coverage of the project	Secretary, Ministry of Health
Monitoring the implementation of individual activities	Director GFATM Project, Director AMC, CCMSL and TSG

At the strategic level, the **CCMSL** will periodically monitor the progress within the project on a six monthly basis, at the time the report is submitted to the LFA. The information contained in the report will include specific reporting against the key indicators outlined in the M & E framework, plus an attached narrative produced by the project directors, using a standard reporting format that exists.

The **Director GFATM Project** will monitor the overall progress of the project from the perspective of the PR.

The **Project Coordinators** on behalf of the PR, will consolidate individual monitoring reports into the M & E framework and will undertake an analysis of progress made against the plan. The Project Coordinators will also periodically monitor the implementation of activities. The Project Coordinators will also independently monitor activities at the district level in collaboration with the Regional Officers of the Campaign.

The **Project Accountant** will monitor the financial performance of the project and the use of financial resources, both at the PR level and, as required, at SR level. Annual independent audits will validate the financial reports.

The **Technical Support Group** will provide technical assessments of specialised inputs (such as surveys etc;), and will provide monitoring assistance at the country level to the CCMSL on technical aspects of project delivery.

The **Ministry of Health** will monitor case reporting on a continuous basis through their health information systems and will make this data available for the six monthly reports to the PR, together with the results of any periodic national health surveys.

Local NGO's will monitor the impact of the project on local populations and vulnerable groups through small-scale participatory surveys including KAP surveys which will complement national surveys.

Key references

Global Fund to fight HIV, Tuberculosis and Malaria (2009). HIV, Tuberculosis and Malaria and Health Systems Strengthening Part 1: The M&E system and Global Fund M&E requirements. Third edition. Geneva, Switzerland.

National Malaria Control Programme of Sri Lanka (2010). Strategic plan for phased elimination of malaria (2010-2014). Ministry of Health, Colombo.

RBM-MERG (2009). Guidelines for core population-based indicators. RBM Technical Paper Series No 1, January 2009. Geneva, Switzerland.

WHO (2007). Malaria elimination: a field manual for low and moderate endemic countries. World Health Organization, Geneva, Switzerland.