

# **National Malaria Strategic Plan for Elimination and Prevention of Re-introduction - Sri Lanka**

2014 - 2018

**Anti Malaria Campaign  
Ministry of Health Sri Lanka**

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## **List of Abbreviations**

ABER	-	Annual Blood Examination Rate
ACD	-	Active Case Detection
ACT	-	Artemisinin Combination Therapy
ACTMalaria	-	Asia Collaborative Training Network for Malaria
AMC	-	Anti Malaria Campaign
APCD	-	Activated Passive Case Detection
API	-	Annual Parasite Incidence
APMEN	-	Asia Pacific Malaria Elimination Network
BCC	-	Behavioural Change Communication
CCP	-	Consultant Community Physician
D/AMC	-	Director, Anti Malaria Campaign
DDT	-	Dichlorodiphenyltrichloroethane
DGHS	-	Director General of Health Services
DOTS	-	Directly Observed Treatment Strategy
GDP	-	Gross Domestic Product
GFATM	-	Global Fund to fight against AIDS, Tuberculosis and Malaria
GIS	-	Geographical Information System
GMP	-	Global Malaria Programme
GP	-	General Practitioners
G6PDd	-	Glucose-6-Phosphate Dehydrogenase deficiency
HQ	-	Headquarters
HSS	-	Health Systems Strengthening
ICNO	-	Infection Control Nursing Officer
IEC	-	Information, Education and Communication
IOM	-	International Organization for Migration
IRS	-	Indoor Residual Spraying
IT	-	Information Technology
IVM	-	Integrated Vector Management
LLIN	-	Long Lasting Insecticide treated Nets
MDG	-	Millennium Development Goals
MMC	-	Mobile Malaria Clinic
MO	-	Medical Officer
MOH	-	Medical Officer of Health
MoH	-	Ministry of Health
MSD	-	Medical Supplies Division, Ministry of Health

M&E	-	Monitoring and Evaluation
NGO	-	Non-Governmental Organization
NMCP	-	National Malaria Control Programme
NMS	-	National Malaria Strategy
NMSP	-	National Malaria Strategic Plan
PCD	-	Passive Case Detection
PCR	-	Polymerase Chain Reaction
PHLT	-	Public Health Laboratory Technician
PUO	-	Pyrexia of Unknown Origin
Pv	-	<i>Plasmodium vivax</i>
Pf	-	<i>Plasmodium falciparum</i>
RDT	-	Rapid Diagnostic Test
RMO	-	Regional Malaria Officer
SOP	-	Standard Operating Procedures
STI	-	Sexually Transmitted Infections
TEDHA	-	Tropical and Environmental Diseases and Health Associates
TSG	-	Technical Support Group
UN	-	United Nations
UNHCR	-	United Nations High Commission for Refugees
WHO	-	World Health Organization

## Executive Summary

The National Malaria Strategic Plan (NMSP) for elimination and prevention of its re-introduction for the period 2014-2018 is primarily targeted to achieving and sustaining a malaria free Sri Lanka. Considerable progress has been made against malaria since the beginning of the century with drastic decreases in cases and no indigenous case of malaria being reported since October 2012. This NMSP presents a roadmap to prevent re-introduction of malaria in Sri Lanka focusing on intensified surveillance and response, outbreak preparedness, prevention, early diagnosis and treatment with radical cure. It builds on the achievements of the previous strategic plan and is aimed at achieving World Health Organization (WHO) certification of a “malaria free Sri Lanka”. Another objective of the AMC is to maintain zero mortality due to malaria in Sri Lanka.

The NMSP has been developed to enable the AMC to achieve its goals. It supports advocating for continued commitment against the disease and provides justification for sustained investment for the prevention of re-introduction of malaria in Sri Lanka. The NMSP provides a framework for the programme to work within the existing structures and modification of others, and defines specific milestones towards maintaining malaria elimination and preventing its re-introduction in Sri Lanka.

The National Malaria Strategy (NMS) draws on the evolved consensus of stakeholders from the health and non-health sectors of governmental, private sector organizations, NGOs, and International Organizations at central, provincial and district levels. It assembles an evidence-based plan of action derived from the Ministry of Health, and WHO Global Malaria Programme (GMP) and Southeast Asia Regional Malaria control guidelines and recommendations.

The National Malaria Strategy is based on key guiding principles: 1) using locally appropriate evidence based strategies conforming to recommendations of WHO’s Global Malaria Programme and the SEA Regional strategy for malaria control; 2) equity; 3) universal access to quality malaria diagnosis, treatment and prevention; 4) emphasis on coverage of vulnerable populations; 5) value for money; 6) good governance; and 7) being gender responsive.

The NMS provides four strategic approaches that will 1) guarantee all people have access to early case detection through reliable and accurate diagnostic services and prompt and effective treatment through strengthening of surveillance for malaria case detection; 2) guarantee that health care staff are competent and maintain skills to detect malaria cases early and to provide effective treatment to prevent deaths due to malaria; 3) improve systems for outbreak forecasting, preparedness, prevention and response; and 4) ensure the use of other appropriate and selective vector control methods with the aim of reducing local vector populations by strengthening of entomological surveillance and response through integrated vector control.

In addition to the 4 thrust strategies above, the following five cross-cutting strategies are proposed: 1) establishing a rigorous quality assurance programme for malaria elimination to ensure that cases are not being missed and interventions are carried out according to plan with a view to ensure that malaria is not re-introduced in to the country; 2) strengthening information, education and communication activities so as to strengthen intersectoral collaboration for malaria elimination and to strengthen the knowledge within communities; 3) improving programme management and performance to build capacity to ensure prevention of re-introduction of malaria in the country; 4) engaging in operational and implementation research so as to provide evidence based guidance for future modifications of malaria elimination policies/strategies; and 5) monitoring and evaluation to ensure optimal programme implementation, management and performance which is a key element in obtaining performance based funding.

The NMS aims to set up an enabling environment for the creation and implementation of strategic approaches to malaria elimination by 1) coordinating stakeholders and their respective programmes; 2) strengthening partnerships; 3) integrating health systems; 4) advocating for resource priorities; 5) focusing on national commitment; and 6) designing national guidelines for malaria elimination and prevention of re-introduction.

Under each strategy, the policy framework is listed and implementation of the policy is outlined. The Anti Malaria Campaign will take the lead role in elimination of malaria and preventing its re-introduction with provision of support to districts. De-centralization of implementation to districts in alignment with the National Health Sector Strategy will ensure that they are directly responsible to provide funds and human resources for malaria elimination activities in the future.

This NMSP outlines broad activities and projected costs for the period 2014-2018.

# 1. Introduction

The National Malaria Strategic Plan (NMSP) for elimination and prevention of re-introduction for the period 2014-2018 is primarily targeted to achieving and sustaining a malaria free Sri Lanka. Considerable progress has been made against malaria since the beginning of the century with drastic decreases in cases and no indigenous case of malaria being reported since October 2012. This NMSP presents a roadmap to prevent re-introduction of malaria in Sri Lanka focusing on intensified surveillance and response, outbreak preparedness, prevention, early diagnosis and treatment with radical cure. It builds on the achievements of the previous strategic plan and is aimed at achieving World Health Organization (WHO) certification of a “malaria free Sri Lanka”.

The NMSP supports advocating for continued commitment against the disease and provides justification for sustained investment for the prevention of re-introduction of malaria in Sri Lanka. The NMSP provides a framework for the programme to work within the existing structures and defines specific milestones towards maintaining malaria elimination and preventing its re-introduction in Sri Lanka. This NMSP outlines broad activities and projected costs for the period 2014-2018.

## 2. Planning and partnerships for joint strategic planning

In September 2013, the Technical Support Group (TSG) for Malaria Elimination under the chair of the Director General of Health Services tasked a special subcommittee of the TSG to assist the AMC to develop the National Malaria Strategic Plan for Elimination and Prevention of Re-introduction to Sri Lanka. The subcommittee conducted a series of meetings with key staff of the Anti Malaria Campaign Headquarters (AMC HQ) and Regional Malaria Officers (RMOs) to identify strategic approaches for the next five years. Based on these discussions, a draft strategic and action plan was developed. The preliminary draft was circulated and discussed among the Principal Recipients of the Round 8 Global Fund grant, AMC, Tropical and Environmental Diseases and Health Associates Private Limited (TEDHA Pvt. Ltd.) and Sarvodaya. Their comments were incorporated and the revised draft NMSP was presented at a multi-stakeholder meeting. The NMSP was further revised based on the comments and recommendations made by the stakeholders.

## 3. Situational Analysis

### 3.1 Review of the performance of the previous strategic plan

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The National Strategic Plan 2008-2012 for malaria outlined a pre-elimination strategy with the aim of eliminating indigenous *Plasmodium falciparum* infections by end 2012 and eliminating indigenous *P.vivax* by end 2014 while maintaining zero mortality due to malaria. There have been zero cases of indigenous malaria since October 2012 and zero malaria deaths reported since 2007 indicating that the targets set out in the previous strategic plan have been achieved ahead of time. This represents a major achievement towards a malaria free Sri Lanka.

Two historical occurrences facilitated the early achievement targets of the previous strategic plan; the end of the separatist war in the North and East of the country and the implementation of pre-elimination interventions which changed the overall epidemiology of malaria in the country. These included intensified surveillance, introduction of Artemisinin Combination Therapy (ACT) for treatment of *P.falciparum* infections, fostering partnerships, and sustained political commitment. In addition, funding from the government and external partners particularly the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and WHO. Currently, the major risk group for malaria is Sri Lankan travellers to malaria endemic countries and travellers from malaria endemic countries to Sri Lanka.

This Plan builds on the achievements of the previous plan with a focus to achieve and sustain a “malaria free Sri Lanka”.

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### 3.2 Malaria Programme Performance Review

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Two malaria programme performance reviews were conducted in 2012 and 2013. The 2013 review was an external review comprising internationally recognized experts on malaria. Both reviews commended the remarkable success of the Malaria Control Programme; however, several technical and operational issues were outlined that will need to be urgently addressed if Sri Lanka is to achieve its elimination and WHO certification goals. These include a lack of human resource capacity and expertise and the need to re-orient the programme towards the prevention of re-introduction of malaria through sustained intensive surveillance and outbreak preparedness, prevention and response. A pressing issue that was highlighted was the waning priority given to malaria control and the decreasing level of interest and awareness amongst clinicians, administrators and health care providers that may contribute to the risk of re-introduction of malaria in the country. With this current zero disease burden, malaria is rapidly becoming a “forgotten” disease, making case detection a major challenge, both amongst individuals returning from malaria endemic countries and potential indigenous malaria cases. Referral by clinicians for malaria diagnosis has deteriorated as malaria is not considered in the differential diagnoses of fevers despite the excellent coverage of diagnostic services (microscopy and Rapid Diagnostic Tests) throughout the country.

This NMSP for 2014-2018 has addressed the recommendations made by the two review teams.

### 3.3 Country profile

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Sri Lanka is a tropical country having a land area of approximately 65,610 square kilometres, and a population of approximately 21 million (Dept. of Census & Statistics, 2012). It has a central mountainous region surrounded by plains stretching to coastal areas. The mean temperature varies between 26°C–28°C in the low country, and between 14°C-24°C in the central hill country. For administrative purposes, the country is divided into 9 provinces, 26 districts and 321 Divisional Secretary areas. The Ministry of Health (MoH) recognizes a Divisional Secretary Area as a health unit; preventive health care in a health unit is provided by the Medical Officer of Health (MOH) of the area and the Primary Health Care team.

Approximately 23% of the country's population inhabits urban areas. The country has a high population density of 298 persons per km<sup>2</sup>. Life expectancy is around 75 years and the literacy rate is 96.9%. Sri Lanka had a meagre economic growth rate of about 3.9% per year during the period 1981–1991 during which time a separatist war in the North and East raged in the country; a significantly higher growth rate of approximately 7–8% is currently recorded with the cessation of hostilities in May 2009.

With the cessation of the separatist war in 2009, a massive development drive was undertaken by the government extending throughout the country including the previously war affected areas of the North and East that were endemic for malaria. There has also been a surge in the influx of tourists from various countries. In addition, with the initiation of massive development projects in various parts of the country there has been an influx of a large number of foreign workers, mainly from India and China, who are employed in Sri Lanka and are a potential threat for the re-introduction of malaria in Sri Lanka. A large number of Sri Lankans are also traveling to malaria endemic countries especially in Asia and Africa for various purposes including business. Most imported malaria cases reported since October 2012 have been among Sri Lankans who had acquired the disease overseas, the rest being among foreigners who were visiting the country but had acquired the disease overseas.

Sri Lanka is a lower middle income country with a per capita Gross Domestic Product (GDP) of USD 2,923 in 2013. The economy of the country is mainly agricultural with industries rapidly becoming a major contributor to the country's economy. Sri Lanka's traditional exports of tea, rubber and as well as other exports, garments, tourism and inward remittances of Sri Lankans working overseas have significantly contributed to the economy in the last 30-35 years.

The road network in the country is reasonably well developed and organized with all areas being largely accessible including the previously inaccessible conflict areas of the North and East of the country.

A midterm review in 2008 and recent statistics reveal that Sri Lanka is on track to achieve all of the 8 Millennium Development Goals (MDGs) by 2015. Impressive statistics are available for the health related MDGs 4, 5 and 6. A "malaria free Sri Lanka" is on the post MDG agenda.

### **3.4 Burden of disease**

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Sri Lanka is experiencing an epidemiologic and demographic transition with an ageing population and non-communicable diseases being major causes of morbidity and mortality. The burden of infectious diseases has drastically reduced in the past decades due to investments in public health. The immunization coverage is over 98%; the maternal mortality ratio is 39 per 100,000 live births and the infant mortality rate is less than 10 per 1000 live births.

The country has targeted eight diseases including malaria for elimination. The government is committed to the elimination of these diseases as enshrined in the *MahindaChintanaya-idiridekma*, the official policy document of the government of Sri Lanka.

Among the infectious diseases, the highest morbidity and mortality burden is Dengue Fever. Dengue is endemic in the country and has been progressively increasing in incidence in recent years with epidemics occurring every 1-2 years. Often AMC staff are called upon for dengue control work detracting them from the malaria elimination programme. This requires urgent attention and emphasis should be on strengthening dengue control activities without adverse implications on malaria elimination efforts.

Although the burden of malaria is extremely low or non-existent at present, the potential for malaria outbreaks and a resurgence of malaria is enormous with the ongoing presence of the vector in traditional malarious areas as well as the increasing number of travellers to and from malaria endemic countries who place a risk of re-introduction of the parasite to the country. Most development activities are taking place in the dry zone of the country where malaria was historically endemic. These traditionally malaria endemic areas are highly receptive to malaria transmission as recorded vector densities suggest the potential for re-establishing malaria transmission. These are also the areas of greatest tourist attraction.

In 2013, 12 of the 95 malaria cases reported were severe malaria cases largely due to delayed diagnosis. Doctors do not consider malaria in the differential diagnosis of fever and fail to obtain a relevant travel history in fever cases.

The cost benefit of malaria activities should consider the past history of malaria in Sri Lanka that may repeat itself if the present efforts are discontinued. If such a situation arose, the cost to the country and health system would be enormous with a potential stifling of the economy and human development.

### **3.5 Health sector profile**

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Health represents 2% of the annual government budget at SLR 150 billion in 2014 (approximately USD 1.2 billion).

Health care services in Sri Lanka are provided by both the public and private sectors; nearly 60% of the total population and approximately 90% of the population in previously malarious areas are served by the public sector. In the public sector, the Department of Health Services, represented by both the central and provincial health care services is responsible for the provision of the entire range of promotive, preventive, curative and rehabilitative healthcare services. Over 90% of inpatient care is provided by the extensive network of public sector hospitals. Specialist care is provided in government hospitals. There is approximately 1 doctor for 1200 persons.

The private sector is mainly responsible for the provision of curative care services, and has until recently been largely concentrated in urban and suburban areas. In addition to western medicine, traditional medicine is widely practised in the country.

Currently, there are about 325 health units in the country, referred to as Medical Officer of Health areas that provide grass roots level public health services. The Medical Officer of Health is in charge of the Primary Health Care team comprising Public Health Midwives, Public Health Inspectors, Public Health Nursing Sisters, and Supervising Public Health Midwives and Inspectors. The Primary Health Care team is supported by other staff.

Health care including tertiary care is provided free of charge in government hospitals. Less than 5% of the population has health insurance. Almost 85% of inpatient care is provided by government hospitals; approximately 50% of outpatient care is provided by the private sector. On average, a health care facility is available for Sri Lankans within a distance of 3-5 kilometres.

With devolution of powers in 1989, the health sector was devolved. Currently each province has a Provincial Health Authority under the Chief Minister and Governor of the Province. Funding for health care is provided by the Centre and the Province. A few large hospitals in provinces are managed by the central line ministry of health and supported by the Centre.

Preventive health services are organized through the general health services of the country and through vertical programmes under the Ministry of Health. Where preventive services are provided through the general health services, technical guidance is provided by specialized units within the Ministry of Health, such as the Anti Malaria Campaign being one of them.

## **3.6 Malaria profile**

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### **3.6.1 Malaria situation in the country**

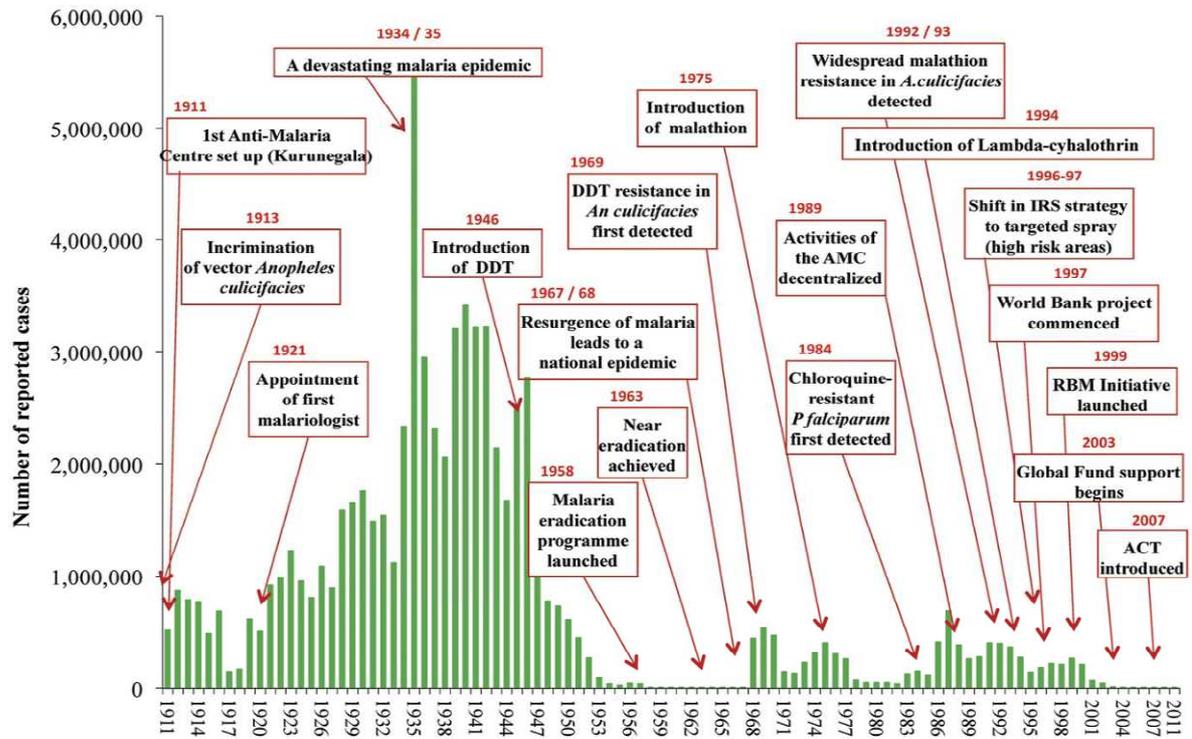
Malaria has been endemic in Sri Lanka for many centuries and several major epidemics have been historically experienced in Sri Lanka (Figure 1). The most devastating of these was in 1934–1935 during which time approximately 1.5 million individuals contracted the disease and 80,000 deaths due to malaria were reported affecting even traditionally non-malarious areas in the wet and intermediate zones of the country. There have also been epidemics of malaria recorded in 1967-69, 1986-87 and in 1990-92.

For many centuries, malaria was traditionally prevalent in the dry zone of the country in the plains, North and East of the central mountains and stretching from the South-East to the North-West of the island (Figure 2 and Table 1). The almost 30-year separatist war in the north and east of the country that ended in 2009 had a major impact on the incidence of malaria in the affected areas. The malaria situation of the country has dramatically changed during the past decade with no indigenous cases of malaria being reported since October 2012 (Table 1). The situation the country is currently in is similar to that experienced in the early 1960s (Figure 3). During the past few years, a large proportion of cases have been imported malaria cases, and since October 2012, all cases reported have been imported where the malarial infection was acquired overseas. Most of the imported cases have been acquired in India with the majority of the rest in African countries by peace keeping forces and business travellers (Table 2).

During the last decade, the most affected groups of people included internally displaced persons, security force personnel serving in the previously conflict affected districts or districts with malaria

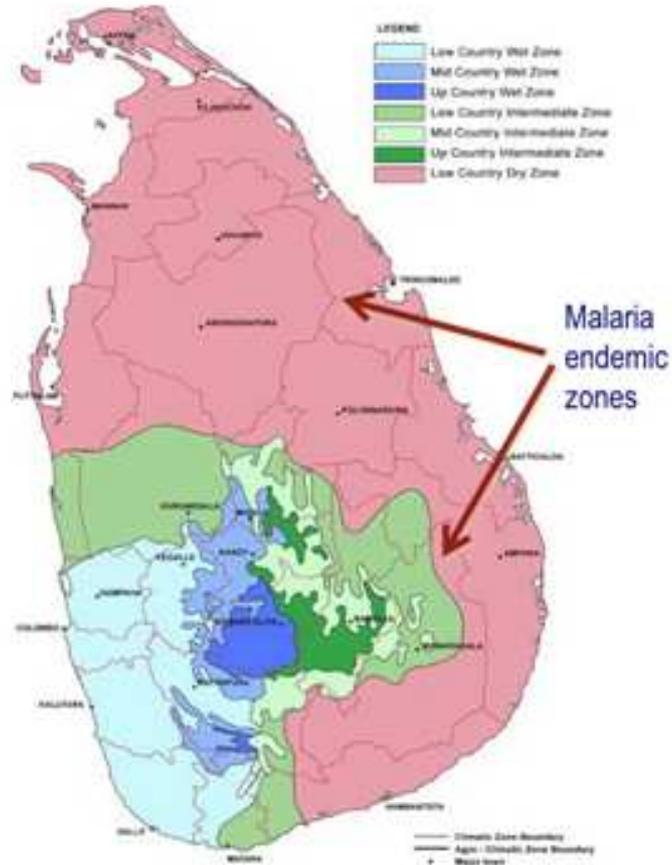
foci, construction workers working in rehabilitation projects and agricultural workers. At present, the most vulnerable groups are persons traveling overseas to malaria endemic countries.

**Figure 1. Milestones in malaria control in Sri Lanka**

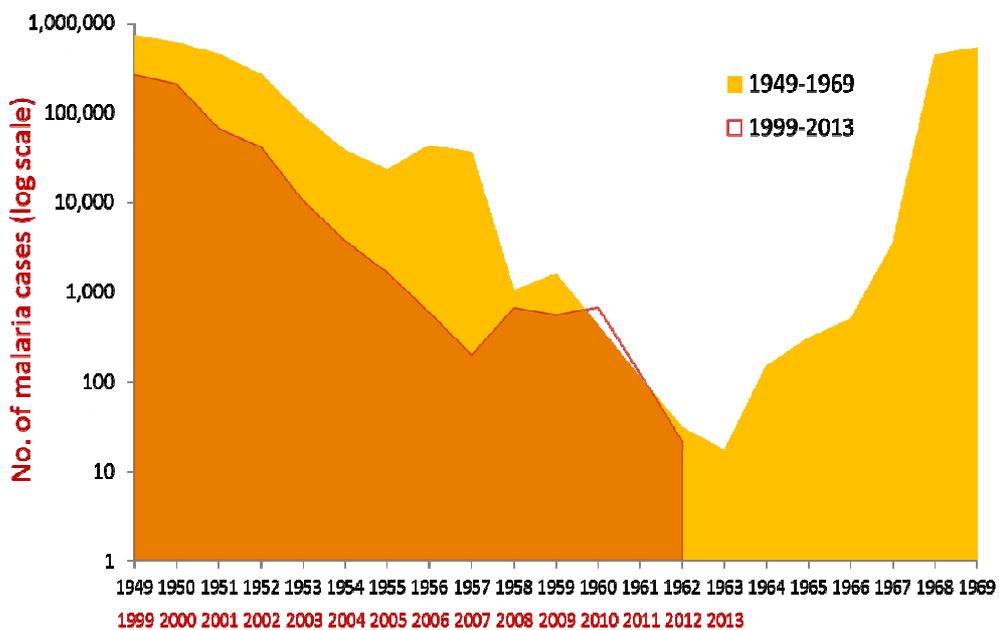


There is currently no evidence of active local transmission in the country. With imported malaria cases being reported, there remains a potential for outbreaks and a resurgence of malaria in the country as the vector population prevails at densities and conditions conducive for transmission. In addition, a susceptible non-immune population provide risk to outbreaks.

**Figure 2. Map of Sri Lanka showing the different climatic zones**



**Figure 3. Opportunities for malaria elimination from Sri Lanka**



**Table 1. Malaria incidence in Sri Lanka 1999-2013**

Year	Number of cases			No. of deaths
	Indigenous	Imported	Total	
1999			264,549	102
2000			210,039	76
2001			66,522	53
2002			41,411	30
2003			10,510	4
2004			3,720	1
2005			1,640	-
2006			591	-
2007			198	1
2008	649	23	672	-
2009	531	27	558	-
2010	684	52	736	-
2011	124	51	175	-
2012	23	70	93	-
2013	-	95	95	-

**Table 2. Distribution of imported cases by country of origin - 2012**

Country	Total	Case detection site & type of malaria						
		At PoE		Within the country				
		Pf	Total	Pv	Pf	Po	Mixed	Total
Benin	20	16	16		4			4
Ghana	1				1			1
Guinea	5	1	1		3		1	4
Haiti	2	1	1		1			1
India	28			24	1		3	28
Liberia	4				2	2		4
Nigeria	3				3			3
Pakistan	2			2				2
Sierra Leone	2				1		1	2
Togo	2	2	2					
West Africa (Gabon)	1				1			1
<b>Total</b>	<b>70</b>	<b>20</b>	<b>20</b>	<b>26</b>	<b>17</b>	<b>2</b>	<b>5</b>	<b>50</b>

PoE- Points of entry

**Figure 4. Malaria incidence in Sri Lanka 2000-2010**

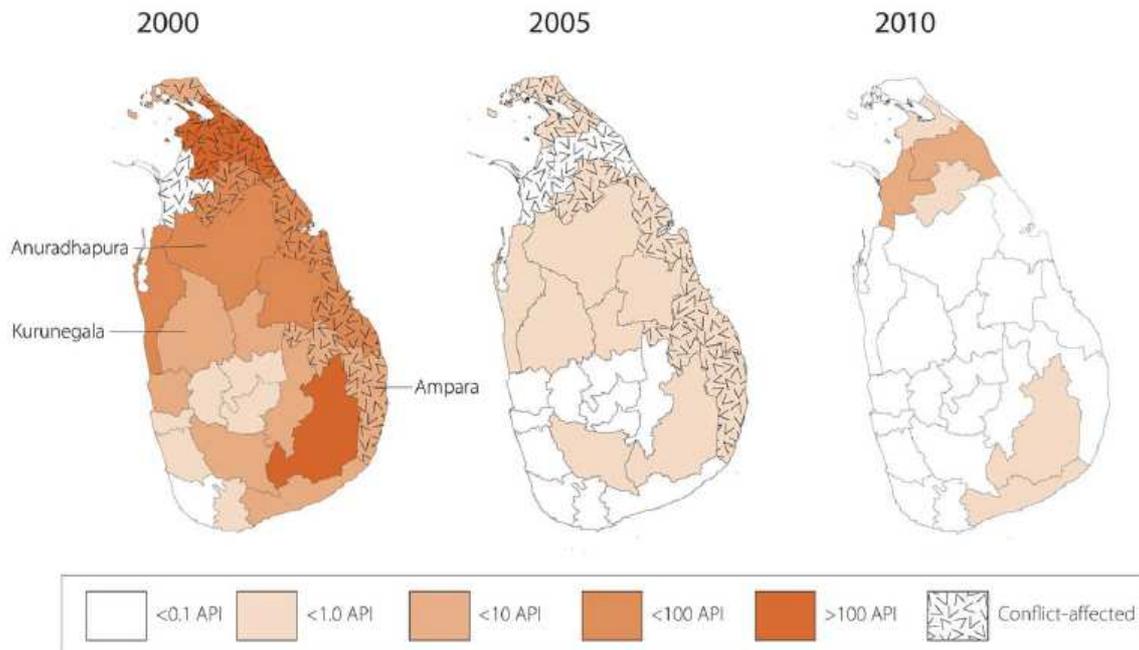


Figure 4 illustrates the decreasing malaria incidence in Sri Lanka from 2000 to 2010. The indigenous malaria cases reported in Sri Lanka in 2012 is plotted in Figure 5 which shows that the last few indigenous malaria cases were reported from the previous war torn malarious areas. At present, a large proportion of the imported malaria cases have been reported from the Western Province of Sri Lanka where the more affluent reside which was not previously endemic for malaria. The dry zone, which is now a tourist attraction and is undergoing the most development has a high receptivity for re-introduction of indigenous malaria transmission. This area is therefore considered to be a “hotspot” with high malariogenic potential.

**Figure 5. Map showing distribution of indigenous malaria cases in Sri Lanka - 2012** (Northern and Eastern Provinces which were affected by the 30-year long conflict are marked in shaded colour)



The decreasing interest, commitment, dedication and motivation of administrators, health care personnel and the general public to a waning disease and the emergence of competing public health priorities such as dengue, makes continuing the high level of surveillance, and outbreak preparedness and response for malaria a major challenge.

A well established health system with an effective surveillance system and availability of trained staff in the periphery is a major strength of the programme. In addition, partnerships with other organizations, continued funding by the Global Fund and technical expertise from the WHO have sustained malaria control and the elimination drive. High literacy and the improvement of living standards are likely to have contributed to a decline in the incidence of rural malaria which has traditionally affected the poor peasantry of the dry zone of the country.

A notable feature of the malaria elimination programme in Sri Lanka is the scale-up of malaria diagnostic and treatment facilities throughout the country. However, these services are still poor at primary care level. Other components of the programme that need to be addressed are the lack of trained staff in certain areas of the country as well as strengthened central level capacity. Routine transfers of trained staff have played a major role towards this human resource gap. The use of staff of the national malaria control programme (NMCP) for other diseases such as dengue leaves a capacity gap.

A visible malaria elimination programme such as those of other diseases such as polio and other vaccine preventable diseases will enable continued focus on malaria by health authorities at provincial and central levels. The success of a malaria elimination programme also depends on mopping up of residual infections and eliminating foci. Intensified surveillance with early detection of cases, case investigations and sustained vigilance play a critical role. In Sri Lanka, testing for malaria parasites in the blood is partly based on doctor referrals. With the waning incidence of malaria, doctors no longer consider malaria in the differential diagnosis of fever and there have been some cases of severe malaria in the recent past as a result of delayed diagnosis and treatment. This needs a multipronged approach including collaborations with academic institutions training health care personnel and professional medical organizations.

The AMC, despite having a history of over 100 years, has not evolved sufficiently to meet the challenges of sustaining the malaria elimination and prevention of re-introduction strategy. A key element in the move from control to elimination phase is the re-orientation and re-structuring of the programme focusing on intense surveillance and vigilance, which has not been done to date. There is a lack of procedures and Standard Operating Procedures (SOPs) to sustain a quality intensified surveillance to prevent re-introduction.

The zero disease burden of indigenous malaria is also a major threat to sustaining malaria elimination due to dwindling funding provided by the government for malaria in the face of other competing challenges. With the end of the separatist war, the undocumented travel which was taking place through a porous border across the Palk Strait has been minimized, making it possible to screen persons arriving in the country. Travellers also have the potential of introducing drug resistant strains of malaria parasites into the country (drug resistant malaria has not been a major issue in Sri Lanka thus far due to adoption of timely and evidence based treatment guidelines and a well regulated medicine importation system that has made availability of counterfeit substandard drugs almost non-existent in the country).

A feature of disease elimination programmes is the disbanding of the vertical programme and integration of the programme with the general health services. In the case of the national malaria control programme this has been done to an extent with the 13<sup>th</sup> Amendment to the Constitution in 1989, almost 20 years prior to Sri Lanka embarking on a pre-elimination strategy of malaria control. Although the provision was available for malaria control to be conducted by the general health services, the peripheral structure of the AMC remained intact and for all practical purposes, malaria activities were conducted and coordinated as a vertical programme of the AMC even though funding was provided through the Provincial Health Authorities of the regions. This structure has played a pivotal role in the success of the programme to date and modifying this working arrangement could spell disaster for the programme. Integration of the leprosy control programme into the general health services in 2001 led to an increase in the leprosy cases detected in the past decade possibly a result of a too quick transition. Incorporation of the malaria control programme with the general health services of the country should therefore not be considered for at least the next 5 years, after which, it should be approached gradually.

The national malaria control programme has largely benefitted from external funding. Serious cutbacks in external funding are likely to hamper the current elimination efforts and pose a major threat to elimination. External funding provided for improving programme management and performance has enabled the AMC to bridge gaps that could not be addressed by government funds and procedures. Sustaining continued investments in the programme is in the interest of all, in general, and health in particular.

**Table 3. Situation analysis**

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> <li>▪ Well established systems for parasitological and entomological surveillance</li> <li>▪ Political commitment</li> <li>▪ Partnerships with other organizations (academia, other sectors, NGOs, private sector etc.</li> <li>▪ External funding</li> <li>▪ Well educated literate health conscious population</li> <li>▪ Well established health care system at grass root levels</li> <li>▪ Good availability of malaria drugs and treatment facilities throughout the country</li> <li>▪ Reasonable level of socioeconomic development and improvement in living standards</li> <li>▪ No existing conflicts</li> <li>▪ Proven feasibility of achieving malaria elimination</li> <li>▪ External review of NMCP and recommendations available and incorporated in strategy</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of trained staff in certain areas of the country</li> <li>▪ Lack of experienced staff at the central level</li> <li>▪ Poor visibility of the national malaria control programme within the health sector and outside</li> <li>▪ Reduced funding from the GFATM</li> <li>▪ Routine transfer of trained staff</li> <li>▪ health workers forgetting the disease</li> <li>▪ Waning priority by the health authorities for malaria</li> <li>▪ Dedicated malaria staff used for control of other diseases</li> <li>▪ No re-orientation and restructuring of the malaria control programme for the elimination and prevention of re-introduction phase</li> <li>▪ Operational and implementation research not very well coordinated</li> <li>▪ Poor health worker and community awareness of the malaria elimination programme</li> <li>▪ No systematic process available to screen foreign labour forces for malaria entering the country</li> <li>▪ Information provided to travellers to and from malaria endemic countries insufficient.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potential to be certified as a malaria free country by the WHO</li> <li>▪ Enormous economic benefit of being malaria free to the country</li> <li>▪ To enhance national development with increase in tourism, agriculture, industrial growth etc. in the absence of malaria</li> <li>▪ To achieve national development goals and vision of becoming a regional economic hub</li> <li>▪ Removing risk of introducing drug and insecticide resistance</li> <li>▪ Validating global and national investments in malaria elimination</li> <li>▪ Likelihood of achieving national and ethnic reconciliation through improving health services in previous conflict areas which are highly receptive and vulnerable to malaria.</li> <li>▪ Serve as a success model for elimination of communicable diseases in the country and the region.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Zero disease burden leading to reduced visibility and attention</li> <li>▪ Competition with other vector borne disease</li> <li>▪ Rising numbers of Imported malaria cases</li> <li>▪ Prevalence of vector mosquitoes</li> <li>▪ Potential for outbreaks, epidemics and resurgence of malaria</li> <li>▪ Withdrawal of external funding</li> <li>▪ Risk of increased spending on malaria control especially for insecticides and LLINs if resurgence occurs</li> <li>▪ Early integration of the AMC with other vector borne diseases and General Health Services with the risk of losing specificity</li> <li>▪ Drug and insecticide resistance</li> </ul>

Sri Lanka has previously missed the opportunity for eliminating malaria in 1963 (Figure 3). The country is presently better prepared for maintaining elimination due to economic development, stronger technology and infrastructure as well as strong political commitment. This opportunity is likely to have enormous economic benefits that would enable additional development goals. The success of the elimination programme is regionally and globally important to illustrate feasibility and validate global and national investments for malaria. In addition, it provides a benchmark for elimination of other communicable diseases in Sri Lanka.

### **3.6.2 Anti-Malaria Campaign and malaria control in Sri Lanka**

The need for an effective response to malaria was recognised prior to independence. Organized malaria control activities commenced in 1911 with the establishment of the Anti Malaria Campaign in Kurunegala when Sri Lanka was still a British colony. Subsequently, several more units of the Anti Malaria Campaign were established in other highly malarious regions of the country. A major achievement was the dramatic reduction in the countrywide malaria incidence after the introduction of dichlorodiphenyltrichloroethane (DDT) in 1946. In 1958, the Government of the newly independent Ceylon launched a malaria eradication programme, in keeping with the WHO recommendations at that time (Figure 1).

Remarkable gains were achieved during the “Attack Phase” of the eradication programme, and near eradication status was reached in 1963 (with 17 reported cases of which 11 were imported cases). However, during the subsequent “Consolidation Phase” a major setback was experienced which culminated in a massive malaria epidemic in 1967–1969. Several factors were thought to contribute to the failure; persistence of several undetected foci of malaria transmission, extensive intra-country population movements particularly related to gemmining, and complacency of many malaria control personnel rank high among these. It has also been reported that adequate financial support was not forthcoming from the government at the time when the incidence was extremely low. The programme continued on eradication principles for several years and subsequently re-oriented as a control programme which included many elements of the earlier eradication programme.

Operationally, the AMC functioned as a vertical programme with a centralized structure until 1989. In 1989, the programme was transformed into a decentralized campaign implemented by 9 provincial health authorities under the technical guidance of the National Anti Malaria Campaign Directorate. The AMC Directorate is under the purview of the Line Ministry of Health whereas the Provincial Programmes are managed by the Provincial Health Authorities under the Provincial Councils. Regional Malaria Officers are the focal persons responsible for malaria control and elimination in the provinces and districts. They report administratively to the Provincial Director of Health Services, but receive technical guidance from the Directorate of the AMC.

During the 30 year old separatist war, government facilities and services were disrupted in most of the Northern and Eastern Provinces. There were restrictions on transport of goods and hospitals lacked equipment, facilities and human resources to carry out routine work in these parts of the country. Several primary and secondary healthcare institutions were closed as a result. Shortage of healthcare personnel and the reluctance of medical staff to serve in these areas due to the prevailing security conditions further compounded this situation. Organized malaria control activities were difficult but continued at a considerable cost throughout the conflict period, with the support of health staff, armed forces, international Non-Governmental Organizations as well as the terrorist outfits. The humanitarian crisis that prevailed in the war-affected areas resulted in the displacement of large populations. Many of these populations were protected through free distribution of Long Lasting Insecticidal Nets (LLIN) and Indoor Residual Spraying (IRS) wherever feasible. Other necessary commodities such as malaria diagnostics and medicines were supplied

to the north and east despite challenges in transport and delivery. This led to a steady decrease in the incidence of malaria throughout the past decade, despite an on-going war.

Sri Lanka introduced ACT as the first line treatment for *P.falciparum* infections in 2008. In 2009, Sri Lanka embarked on a phased malaria pre-elimination programme. In the same year, the separatist war in the Northern and Eastern provinces of country ended which was a major boost for the malaria pre-elimination phase. During the war, the most number of cases were reported from the conflict areas. These numbers would have been an underestimate due to inadequate surveillance and reporting in the conflict areas. During this period, the vulnerable groups recognized by the AMC included security forces personnel and internally displaced persons.

### **3.6.3 Lessons Learnt**

Sri Lanka achieved a 99.9% reduction in the incidence of malaria from 1999 to 2011. In tandem, the Annual Parasite Incidence (API) decreased rapidly from 22.1 per 1000 population in 1999 to less than 1 since 2004. Sri Lanka has benefitted from a long history of malaria control and a strong Passive Case Detection (PCD) system. Entomological surveillance which began in the 1960s has been continuing to date giving feedback into programme management. In the pre-elimination phase, intensified surveillance was the mainstay of malaria elimination.

In the early 1960's, the country experienced a period of very low malaria incidence in its first attempt at malaria elimination. Although this second attempt has progressed far beyond the first attempt, there are similarities and major differences in the strategies and tools used in the two attempts. The country has progressed technologically and economically since the last attempt at malaria elimination 50 years ago; new tools and strategies, and lessons learnt from the first elimination experience are available today. The first elimination attempt relied heavily on universal coverage of IRS with DDT to reduce transmission. While IRS is still the primary means of vector control, targeted, rational IRS is now used. There is a wider choice of insecticides permitting the rotation of several types and classes of insecticides. This strategy is used to decrease the risk of developing insecticide resistance, which was probably a factor in the unsuccessful result of the first elimination attempt. The use of different insecticides and highly targeted spraying may also have increased community acceptance of IRS. The new vector control tools available today include LLINs which are useful for groups that are difficult to reach through IRS operations. The role of insecticide treated bed nets was particularly important during active conflict, as the LLINs gave populations 3 years of protection when IRS teams could not reach the area for months or even years.

During the first elimination attempt, vigilance units were deployed for malaria surveillance to investigate cases with active case detection (ACD) in cleared foci and to ensure that transmission was interrupted. This surveillance complemented PCD. It was noted in a 1961 WHO report that surveillance had not been intensive to the degree needed to find and eliminate the remaining parasite reservoir due to the scattered residual foci in jungle areas which had not been detected. The programme today uses ACD as part of case investigations and among population groups that are hard to reach or have poor access to diagnosis and treatment on a voluntary basis, in addition to routine PCD and activated passive case detection (APCD) through malaria screening and treatment centres. Case investigation is carried out for each case detected, and includes mass blood surveys to identify additional malaria cases in an affected area. Monthly case review meetings, led by the AMC Directorate with Regional Malaria Officers, allow feedback and discussion of best practices. Reporting of cases and deaths was a priority in the first elimination phase. The programme has improved reporting by instituting reporting within 24 hours; however, measures to increase reporting from private clinics and physicians need further attention.

The first elimination attempt relied on entomological surveillance teams to forecast potential epidemics on the basis of patterns of vector breeding. Today, entomological surveillance has been enhanced and includes evaluation of breeding sites and the effectiveness of insecticides used for IRS and LLINs.

Both elimination phases included radical cure of *P.vivax* cases (using a 14-day primaquine therapy) and primaquine use as a gametocytocide in *P. falciparum* infections. Today, ACTs are used instead of chloroquine for *P. falciparum* cases; primaquine is still used to eliminate gametocytes in *P.falciparum* infections. The same treatment for *P.vivax* is used for cases of *P.ovale* and *P. malariae* (except for the use of primaquine in *P. malariae*).

### **3.6.4 The way forward**

*Surveillance* and response for malaria needs now to be the singular focus of Sri Lanka's elimination and prevention of re-introduction programme. Given the cost of malaria to the country over the years, the required effort and resource investment for a rigorous surveillance and response system is entirely justified. Ports of entry to the country, both sea and airports, building construction sites such as the accelerated building of highways, free-trade zones, new sea ports and industrial parks and other imported-labour intensive activities will need to be the focus of enhanced surveillance for malaria. The necessary policy and strategy adjustments to act within the recently adopted "Migration Health Policy" of Sri Lanka have been implemented to allow compulsory screening of migrant labour from neighbouring highly malarious countries. Other collaborations with neighbouring countries and other organizations also need to be initiated and strengthened.

*Sustaining awareness* of malaria among medical practitioners through in-service training, and continued collaboration with medical educators and professional medical associations and colleges would be a priority. A high quality malaria diagnostic service accredited to an international institution needs to be established and maintained by the AMC to ensure quality diagnostic services.

*Advocacy:* The focus on malaria elimination and prevention of re-introduction at the highest levels of Government is now needed to seek the co-operation and partnerships of sectors beyond health, which govern and regulate major development efforts in the country. Rigorous economic analysis to demonstrate the cost effectiveness of preventing malaria re-introduction would help as an advocacy tool for the much-needed continued national and international investments for malaria elimination and prevention of re-introduction.

Retrospection on the previous near "eradication" effort of the 1960s dictates two critical interventions to achieve and sustain elimination of malaria. One is to ward off complacency and to refrain from shifting resources and focus from malaria to other health and non-health priorities. Sri Lanka's recent experience with an unsuccessful leprosy elimination drive serves as a stark reminder that proposals on integration of malaria services with the general health services or with any other disease control programme must be carefully evaluated before being implemented.

The AMC needs, rather, to be re-programmed, vastly strengthening its surveillance and response arm, improving the quality of diagnostic services, and shifting its geographical focus on the strict basis of receptivity and vulnerability in different parts of the country. The second is to sustain a focus and investment on research and technical guidance for malaria elimination and prevention of re-introduction, for which steps are already being taken at a national level - the Sri Lankan research funding agencies have earmarked modest funds for research on malaria for the next several years. One among the many factors, which are widely believed to have contributed to the

decline of malaria in Sri Lanka during the past few decades, is the deployment of evidence-based control operations on the basis of an extensive national research effort on malaria. Such a strong research and technical basis would well serve the elimination, and prevention of resurgence of malaria now.

### **The Way Forward**

- Surveillance and Response
  - Detect and provide effective treatment to imported cases early
  - Investigate cases
  - Identify highly receptive areas and vulnerable populations
  - Respond to potential threats
- Raise awareness of medical practitioners regarding malaria elimination
- Ensure a quality diagnostic service
- Ensure political commitment and adequate funding
- Foster and build partnerships
- Ensure a focused AMC dedicated for malaria elimination
- Invest in research for malaria elimination

## 4. Evidence based strategic planning

### 4.1 Strategic priorities

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With no reports of indigenous transmission of malaria in Sri Lanka since October 2012 and as the vectors responsible for malaria transmission is present in the country, the strategic priority is to prevent its re-introduction through imported malaria cases. Based on this principle, four strategic approaches are proposed:

- 1) Strengthening surveillance for early detection and effective treatment of malaria cases,
- 2) Maintaining skills and diagnostic facilities to diagnose and treat malaria cases,
- 3) Strengthening outbreak preparedness, prevention and response to focal malaria outbreaks, and
- 4) Strengthening entomological surveillance and response through integrated vector management.

Detecting malaria cases early and their effective treatment and management through intensified surveillance are of paramount importance. As much as there is a need to identify vulnerable populations, most cases are likely to present in clinical care settings. Provision of quality diagnosis should be made available in all primary care institutions. As recent evidence suggests that time to diagnosis is long due to malaria being a “forgotten disease”, raising awareness among practitioners and motivating them to refer fever cases for blood smear/RDT examination is extremely important. This will be done through advocacy, training and continuing medical education programmes through incorporating modules on malaria in training programmes of health professionals and through professional medical associations. In addition, vigilance should be intensified through ACD in previously malarious areas.

In order to ensure a timely diagnosis and effective treatment, a quality diagnostic service will be established and WHO prequalified diagnostics and antimalarials will be procured. Microscopy services will be strengthened in all areas and an accreditation system will be established with international agencies such as APMEN.

Vigilance and outbreak response will be key to prevention of re-introduction. Systems will be developed and implemented to detect cases and to respond early. Specially trained teams under the AMC HQ and the RMOs will be deployed for this activity.

Although the parasite is currently not circulating in the country and is not being transmitted, the ecology, environmental and vector conditions required for malaria transmission still exists. This requires careful monitoring of the receptivity of previously malarious areas through enhanced entomological surveillance and response.

The rising number of imported malaria cases coupled with the receptivity of traditional malarious areas provides fertile grounds for outbreak initiation and spread. This requires enhanced vigilance and outbreak preparedness and response.

A major thrust would focus on advocacy in ensuring political commitment and building partnerships with stakeholders. Political commitment has already been sought from the highest levels of government.

## **4.2 Health system strengthening and malaria elimination programme development**

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Although the country has achieved the goal of interrupting malaria transmission, it is important that capacity be built to retain this status and prevent re-introduction of malaria, which is envisaged in this NMSP. It is also important that the focus on malaria elimination and prevention of re-introduction not be diluted at this stage of progress as Sri Lanka has had the bitter experience of a similar situation in the 1960s. It is paramount that the present structure of having a separate campaign solely dedicated to malaria elimination and prevention of re-introduction be retained for at least the next five years. Gradually integrating some of the functions of the malaria control programme with general health services may be considered at a later date with careful monitoring.

## 5. Strategic plan framework

The broad aim of the health policy of Sri Lanka is to increase life expectancy and improve *quality of life*, by control of preventable diseases and by health promotion activities. The country boasts of a unique health care and education system where all healthcare and education including higher education can be obtained free of charge. This has resulted in some of the country's health & education indices becoming the best among developing nations having low per capita incomes.

Given below are the vision, mission and the objectives of the Ministry of Health.

### Ministry of Health

#### Vision

A Healthier Nation that contributes to its economic, social, mental and spiritual development

#### Mission

To contribute to social and economic development of Sri Lanka by achieving the highest attainable health status through promotive, preventive, curative and rehabilitative services of high quality made available and accessible to people of Sri Lanka.

#### Objectives

- To empower the community for maintaining and promoting their health
- To improve comprehensive health services delivery actions
- To strengthen stewardship management functions
- To improve the management of human resources in the health sector

The main objective of the Health Development Master Plan of improving health status and reducing inequalities will be achieved by implementing the following strategic objectives. These are:

#### Specific Objectives

1. To provide technical advice in policy formulation, planning and programming on promotion of health through Advocacy, Behaviour Change Communication (BCC), Social Marketing and Community Mobilisation.
2. To support various health programmes conducted by the Department of health services and other health related sectors through advocacy, behaviour change communication and social mobilization for health actions.
3. To promote, support and undertake planning, implementing, monitoring and evaluation of health promotion programmes in different settings.
4. To promote health care consciousness among the masses through mass media.
5. To assist and develop Information, Education and Communication (IEC) and BCC materials required for health promotion and behaviour change communication
6. To develop the capacities of manpower, both within and outside the department of health services in order to act as health promoters and change agents through advocacy, behaviour change communication and social mobilization.

7. To educate and empower the public on health issues, to enable them to increase control over and promote individual and community health.
8. To coordinate with health related governmental, non-governmental and international agencies and organization in promoting health of people.
9. To develop managerial capacities of health and health related sectors to manage health promotive programmes
10. To monitor and evaluate health promotive programmes and facilitate monitoring and evaluation of them at different levels.
11. To support and undertake research related to behaviour change of the community and social mobilisation.

### **Malaria Elimination and Prevention of re-introduction in Sri Lanka 2014 - 2018**

In the Sri Lankan health system, priority has been always given to the prevention, control and treatment of malaria. The vision, mission and the objectives of the Anti Malaria Campaign of the Ministry of Health, which is the principal organization responsible for malaria prevention and control in Sri Lanka, is given below.

#### **Vision**

A Malaria Free Sri Lanka

#### **Mission**

Plan and implement a comprehensive programme to sustain intensive surveillance and outbreak preparedness, prevention and rapid response for malaria elimination in Sri Lanka and to prevent re-introduction of malaria to Sri Lanka.

#### **Objectives of the Anti Malaria Campaign**

1. To sustain malaria free status by prevention of re-introduction of malaria to Sri Lanka
2. To be eligible for WHO certification of malaria elimination in Sri Lanka by the end of 2015
3. To maintain zero mortality due to malaria in Sri Lanka

## 5.1 The Projected Plan of Action

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The National Malaria Strategy (NMS) draws on the evolved consensus of stakeholders from the health and non-health sectors of government, private sector, NGOs, and International Organizations at central, provincial and district levels. It assembles an evidence-based plan of action derived from the Ministry of Health, and WHO Global Malaria Programme (GMP) and Southeast Asia Regional Malaria control guidelines and recommendations.

The NMS provides an institutional framework that will ensure a coordinated, multi-lateral national response that harnesses the WHO Global Malaria Programme and Southeast Asia Regional Malaria control strategy recommendations and reflects Sri Lanka's national development policies.

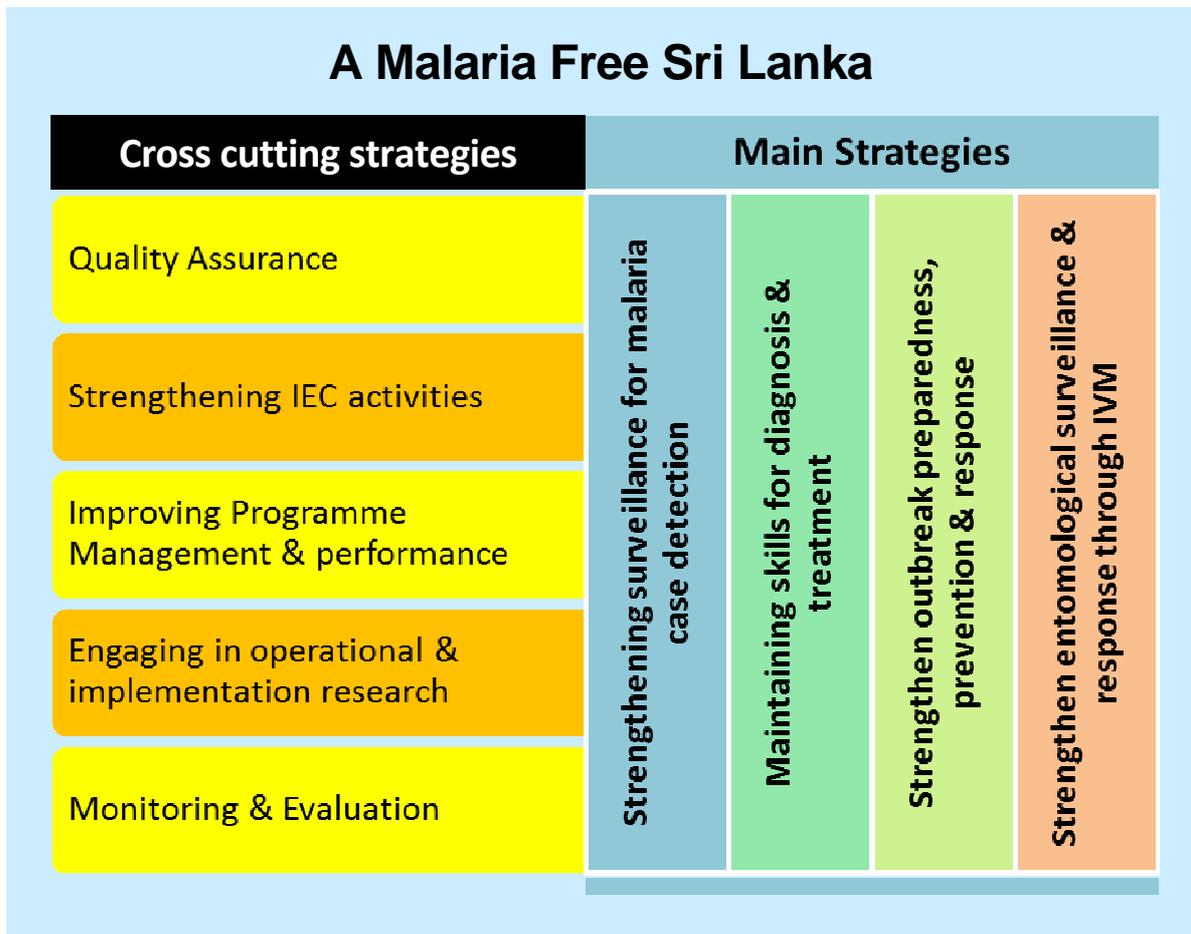
It provides four strategic approaches that will:

- 1) Guarantee all people have access to early case detection through reliable and accurate diagnostic services and prompt and effective treatment through strengthening of surveillance for malaria case detection;
- 2) Guarantee that health care staff are competent and maintain skills and quality diagnostic services to detect malaria cases early and to provide effective treatment to prevent deaths due to malaria;
- 3) Improve systems for outbreak forecasting, preparedness, prevention and response; and
- 4) Ensure the use of other appropriate and selective vector control methods with the aim of reducing local vector populations by strengthening of entomological surveillance and response through integrated vector control.

and five cross-cutting strategies on:

- 1) Establishing a rigorous Quality Assurance programme for malaria elimination to ensure that cases are not being missed and interventions are carried out as planned with a view to ensure that malaria is not re-introduced in to the country.
- 2) Strengthening Information, Education and Communication activities so as to strengthen intersectoral collaboration for malaria elimination and to strengthen the knowledge within communities.
- 3) Improving programme management and performance to build capacity to ensure prevention of re-introduction of malaria in the country.
- 4) Engaging in operational and implementation research so as to provide evidence based guidance for future modifications of malaria elimination policies/strategies.
- 5) Monitoring and evaluation to ensure optimal programme implementation, management and performance which is a key element in obtaining performance based funding.

**Figure 6. Schematic diagram of the strategic framework for malaria elimination and prevention of re-introduction in Sri Lanka**



## 5.2 Guiding principles

The National Malaria Strategy is based on the following guiding principles:

- Using locally appropriate evidence based strategies conforming to recommendations of WHO's Global Malaria Programme and the SEA Regional strategy for malaria control
- Equity
- Universal access to quality malaria diagnosis, treatment and prevention
- Emphasis on coverage of vulnerable populations
- Value for money
- Good governance
- Being gender responsive

### **5.3 Purpose of the National Malaria Strategy (NMS)**

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The NMS aims to set up an enabling environment for the creation and implementation of strategic approaches to malaria elimination by:

- Coordinating stakeholders and their respective programmes
- Strengthening partnerships
- Integrating health systems
- Advocating for resource priorities
- Focusing on national commitment
- Designing national guidelines for malaria elimination and prevention of re-introduction.

The National Malaria Strategy will provide:

***For regions, districts and provinces:***

A framework within the health sector strategic plan to implement local strategies at district, sub-district and community levels for malaria elimination and prevention of re-introduction

***For the Anti Malaria Campaign:***

An outline for the Government of Sri Lanka on targets and a tool in which detailed annual work plans for districts can be drafted.

***For the Ministry of Health:***

A framework for advocating greater public resource allocation (both financial and human) for malaria elimination and prevention of its re-introduction

***For implementing partners:***

A basis for strategic roles and consistent action towards a common goal along with consensus on service delivery modalities and geo-spatial mapping of operations to avoid duplicitous programme implementation

***For multi-lateral and bi-lateral agencies:***

A framework for considering and monitoring effective, coordinated support. It will also provide a bound timeline in which progress towards achieving the overall objective and associated international goals can be appraised.

## 5.4 Institutional Approach

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The proposed institutional framework for malaria elimination will be as follows:

The Anti Malaria Campaign will take the lead role in elimination of malaria and preventing its re-introduction with provision of support to districts. De-centralization of implementation to districts in alignment with the National Health Sector Strategy will ensure that they are directly responsible to provide funds and human resources for malaria elimination activities in the future.

The institutional framework for malaria control must be flexible so as to work effectively in the process of continuing development. A critical mass of people will be needed at the central level to build capacity for malaria elimination.

### Provincial and District level

Harmonisation between the NMS and the Health Sector Development process will empower Regional Malaria Officers (RMOs) to establish clear mechanisms for malaria elimination and prevention of re-introduction.

As far as possible, regions will build on existing structures and ensure a close relationship with other governmental structures that may have inter-relationships with malaria elimination and prevention of re-introduction, such as the Ministries of Agriculture, Mahaweli Development, Environment and Disaster Management. The stakeholders should be defined in each district, which will help to identify alliances for malaria elimination and prevention re-introduction. In the short- to mid-term of the NMS, the National Malaria Elimination and Prevention of Re-introduction Programme will work with the regions/districts to establish and maintain a critical mass of resource personnel to build capacity at lower levels, including communities. It is envisaged that Regional Malaria Officers will play a vital role in extending the capacity of community based volunteers and communities, and whilst working in an integrated manner with other health initiatives, will take the lead in malaria elimination and prevention of re-introduction.

The Anti Malaria Campaign will periodically define the training needs of national staff at different levels. The AMC has evolved over time into one of technical guidance, oversight of monitoring and evaluation, strengthening and updating skills of key workers, along with maintaining the quality control of malaria elimination programming and updating policies/strategies.

### National level

The AMC of the Ministry of Health will be the operational arm of malaria elimination and prevention of re-introduction efforts in the country. Its role will be to:

- Ensure support and commitment at the highest level.
- Develop and disseminate current policy and strategies for malaria elimination.
- Provide technical assistance to regions.
- Produce and disseminate national guidelines for all components of the strategy
- Monitor and evaluate implementation and impact of programme activities not only conducted by district and provincial government bodies but also by partner organizations.
- Build capacity at the central and regional levels.

- Advocate malaria elimination through inter-departmental and inter-agency IEC programmes.
- Foster partnerships for malaria elimination.

## **Partnerships**

Key to the success of the NMS is development of effective partnerships at all levels:

### **Within the Ministry of Health**

- |   |                                       |
|---|---------------------------------------|
| ▪ Epidemiology Unit                     | ▪ Family Health Bureau                |
| ▪ Director / Quarantine                 | ▪ Disaster Management Unit            |
| ▪ Directorate for Private Health Sector | ▪ Medical Research Institute          |
| ▪ Medical Supplies Division             | ▪ Environmental Health                |
| ▪ Health Education Bureau               | ▪ Education, Training & Research Unit |
| ▪ Planning Unit                         | ▪                                     |

### **Other Ministries and departments**

- |                                    |  |
|------------------------------------|--|
| ▪ Ministry of Finance and Planning | ▪ Ministry of Defense                      |
| ▪ Ministry of Foreign Affairs      | ▪ Controller of Immigration and Emigration |
| ▪ Ministry of Agriculture          | ▪ Registrar of Pesticides                  |
| ▪ Ministry of Education            | ▪ Central Environment Authority            |
| ▪ Information Department           | ▪ Ministry of Disaster Management          |
| ▪ Ministry of Home Affairs         | ▪ Foreign Employment Bureau                |
| ▪ Ministry of Tourism              | ▪ Department of Meteorology                |
| ▪ Department of Irrigation         |  |

### **Private Sector**

### **United Nations, Donors, NGO's, Research Institutions and Professional bodies**

- United Nations (UN) and development partners: For access to technical advice, resources and global initiatives
- NGOs: To assist in the coordinated delivery of services to communities and provision of technical input through stakeholder meetings on consensus of delivery, to ensure maximum coverage of activities along with optimal implementation.
- Academia and Research institutions: On identifying operational and implementation research needs, translating research results into an evidence base to improve existing policy and practice.
- Professional bodies: To ensure early diagnosis and treatment of patients and advocacy among its members.

## 6. Approach to malaria elimination and prevention of its re-introduction in Sri Lanka

### Strategic approach I: Strengthening surveillance for malaria case detection

In 2013, 95 cases of imported malaria were reported (Table 4). Most of the cases were acquired from neighbouring India and the majority were reported from the Western Province, a region which was not endemic for malaria in the past.

**Table 4. Details of malaria cases reported in 2013**

Country of origin	Nationality		Type of malaria			Total
	SL	Foreign	Pv	Pf	Po	
<b>SEA Region</b>	<b>28</b>	<b>30</b>				<b>58</b>
India	27	11	32	6		39
Myanmar	1	2	3			3
Pakistan		17	17			17
<b>African Region</b>	<b>30</b>	<b>5</b>				<b>35</b>
Angola		1		1		1
Cameroon	2			2		2
Equatorial Guinea	1			1		1
Ghana	3	1		4		4
Grande Comore	1			1		1
Guinea	1			1		1
Kenya	3			3		3
Liberia	2			2		2
Mali		1		1		1
Mozambique	2			1	1	2
Nigeria	1			1		1
Sierra Leone	11			11		11
Sudan	2			2		2
Tanzania	1			1		1
Uganda		2		2		2
<b>Other</b>	<b>2</b>					<b>2</b>
Haiti	2			2		2
<b>Total</b>	<b>60</b>	<b>35</b>	<b>52</b>	<b>42</b>	<b>1</b>	<b>95</b>

All malaria cases are treated based on a confirmed diagnosis either using malaria microscopy or Rapid Diagnostic Test kits (RDTs). Confirmed cases of *P. vivax* are treated with a combination of Chloroquine and a 14-day course of Primaquine. Uncomplicated *P.falciparum* cases are treated with Artemether 20mg/Lumefantrine 120mg and Primaquine 0.75 mg/kg BW as a stat dose as the first line treatment since 2008.

WHO prequalified ACT and other antimalarials and bivalent Rapid Diagnostic Test kits will be procured to ensure quality of the treatment and diagnosis of malaria.

## **Policy**

The AMC will ensure that all people at risk of malaria have access to malaria diagnosis and treatment according to the National Malaria Treatment Protocol, along with overall effective management of severe malaria.

The MoH will set policy and guidelines to ensure that;

- Foreign labour and refugees from malaria endemic countries to Sri Lanka are screened for malaria parasites.
- Persons traveling to malaria endemic countries will have access to prophylactic chemotherapy.
- Persons coming to the country are made aware of availability of malaria diagnostic services.
- All malaria cases are confirmed at point of care and treated as early and as close to the patient's home as possible, with acceptable quality and correct dosages of the first line antimalarial drugs along with supportive treatment.
- Confirmatory diagnostic services will be used within health facilities as standard practice to ensure correct treatment for all confirmed malaria cases. Bivalent Rapid Diagnostic Tests will be used where light microscopy is not available.
- First-line treatment failures will be appropriately referred and managed with recommended second-line treatment.
- All complications of malaria will be referred and managed according to national guidelines.

## **Implementation of the policy**

Fundamental to the success of this strategic approach is the issue of relevant circulars by the Ministry of Health to ensure compliance and to develop SOPs for all surveillance activities. Further, regular monitoring of compliance to procedures will be incorporated in to the programme. The AMC shall take the lead role in ensuring that the relevant circulars are issued and that SOPs are developed, distributed and adhered to.

All government health care institutions will be provided with malaria diagnostic facilities – either malaria microscopy or bivalent RDTs. A major effort will be required to train personnel in these procedures especially in traditionally non-malarious areas which are now reporting the highest number of cases. In the traditionally malarious areas, the implementation of the policy will be linked to Provincial Health Sector policies and the Health Systems Strengthening (HSS) component of the GFATM grant that is focusing on the Northern and Eastern provinces of the country that was ravaged by a separatist war spanning nearly 3 decades; the HSS component of

the GFATM project envisages to upgrade and equip laboratories in the Northern province. Training of relevant personnel shall be carried out by the AMC.

In addition to enhancing PCD, ACD and APCD will be strengthened. ACD will be strengthened through mobile malaria clinics (MMCs) in vulnerable populations and in receptive areas and among neighbourhoods of reported malaria cases as a means of containing potential outbreaks.

The AMC shall also ensure that diagnosis is performed as per the national guidelines. All suspicious cases will be confirmed using molecular diagnostic methods and blood samples of all cases shall be genotyped and preserved to ensure that no indigenous transmission of malaria is taking place in the country.

A major component of this strategy is the improvement of malaria surveillance through comprehensive case investigation, increased screening of persons using different methods and computerized surveillance methods that could generate comprehensive reports with forecasting capabilities. AMC will develop SOPs for case investigation and ensure that these are strictly adhered to.

Sentinel institutions will be identified to establish APCD sites in which all fever cases will be subject to malaria microscopy or RDT testing and all cases of pyrexia of unknown origin (PUO) will be investigated as per national guidelines. Grouped blood donor samples and blood samples of cases of PUO will be tested for malaria parasites using molecular methods such as Polymerase Chain Reaction (PCR).

The major limitation of disease surveillance not only confined to malaria but for all notifiable diseases, is the non-involvement/non-compliance of the private sector despite the existence of required legislature. This plan proposes engaging the private sector in malaria surveillance that would create an enabling environment for comprehensive expansion of disease surveillance in the country. Private sector health care institutions will be motivated to participate in the system using novel approaches that need to be identified through operations and implementation research.

Exploiting the technological advances in the Information Technology (IT) sector and its penetration within the country, an advanced comprehensive web based computerized surveillance system will be developed that will be capable of data capture and analysis, to identify trends, generate reports and risk mapping of receptive areas. The system will incorporate parasitological, entomological and other related data.

Imported malaria will be targeted using a two-pronged approach; first, travellers to malaria endemic countries will be provided prophylactic chemotherapy which will be made available at all ports and airports, in addition to current practice of making it available at the Centre and Regional Offices. Second, all ports of entry will be provided with voluntary malaria screening facilities for incoming passengers from malaria endemic countries. Special banners and messages will inform passengers of availability of chemoprophylactic drugs and screening services. In addition, in collaboration with International Organization for Migration (IOM) and United Nations High Commission for Refugees (UNHCR) all foreign labour and refugees from malaria endemic countries will be screened for malaria.

## **Key Activities**

- Issuing necessary circulars and developing SOPs for intensified surveillance, diagnosis and treatment.

- Detection and prevention of imported malaria cases will be done using a two-pronged strategy. First, malaria chemoprophylaxis will be made available to travelers at all ports of exit in addition to current practice of making it available at the Centre and Regional Offices. Second, malaria diagnostic facilities will be made available at ports of entry.
- Partner with other agencies such as the International Organization for Migration and the labour department to screen all refugees and labour from endemic countries for malaria.
- Provision of diagnostic facilities as per national guidelines at all government health care institutions. Malaria microscopy will be made available at all hospitals at level of District General Hospital type A and above. RDTs will be made available at all other hospitals.
- ACD and APCD will be strengthened through mobile malaria clinics in vulnerable populations and in malaria receptive areas and among neighbourhoods of reported malaria cases.
- Use of molecular diagnostic techniques to confirm suspicious cases. All diagnosed cases will be genotyped and preserved to identify sources of infection if transmission occurs.
- Sentinel institutions will be identified to establish APCD sites in which all fever cases will be subject to malaria diagnosis (microscopy or RDT). Grouped blood donor samples and blood samples of cases of pyrexia of unknown origin (PUO) will be tested for malaria parasites using molecular diagnostic methods.
- Develop partnerships with the private sector in malaria diagnosis and treatment. A focal point will be set up at the AMC to liaise with the private sector.
- The private sector will be proactively engaged by providing diagnostic services free of charge and through training of their staff. Novel approaches to engage the private sector will be pursued. This will include setting up focal points at large private hospitals.
- Development of a comprehensive web based computerized surveillance system that will be capable of data capture and analysis to identify trends, and generate reports and risk maps incorporating parasitological, entomological and other related data including historical data and climate data.
- Strengthening the GIS laboratory at the AMC for risk mapping using parasitological, entomological and other related data.

## **Strategic approach II: Maintaining skills and quality diagnostic services for diagnosis and treatment of malaria**

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Analysis of malaria cases has revealed that there is considerable delay in diagnosis since the onset of symptoms despite the availability of diagnostic services. This provides a window of opportunity for transmission to occur. The reason for the delay in diagnosis is malaria being considered a “forgotten disease” among practitioners who tend to forget malaria in the differential diagnosis of fever. This has resulted in patients being investigated for all other causes and malaria being considered only when other causes have been excluded.

### **Policy**

The AMC will ensure that all malaria patients shall have confirmatory malaria diagnosis and be effectively treated according to the National Malaria Treatment Protocol with zero deaths due to malaria.

The AMC and MoH will set policy and guidelines to ensure that;

- All malaria patients are treated according to the National Malaria Treatment Protocol based on recommendations of the WHO Global Malaria Programme and WHO Regional Strategy for malaria control.
- Medical practitioners and other health care personnel are provided with latest knowledge on malaria diagnosis and treatment.
- All malaria patients will be followed up for 42 days as per WHO protocol and thereafter at monthly intervals for up to 12 months to detect relapses and recrudescences.
- A drug regulatory process to prevent import and distribution of antimalarial drugs of questionable quality.
- Adequate stocks of antimalarial drugs of accepted quality (WHO prequalified) will be available for any eventuality.
- The setting up of an inventory control system, and an effective storage and distribution chain to ensure availability of antimalarial drugs throughout the country through the establishment of central and provincial distribution points.
- All persons will be tested for Glucose-6-Phosphate Dehydrogenase (G6PD) deficiency prior to administration of Primaquine for the radical cure of *P.vivax* infections by screening all vivax malaria patients at point of care.

### **Implementation of the policy**

The AMC shall take the lead role in ensuring that the relevant circulars are issued and that SOPs are developed, distributed and adhered to. The National Malaria Treatment Guidelines/Protocol was revised this year.

As reluctance of doctors to refer patients for investigation for malaria is a major impediment to the malaria elimination and prevention of re-introduction drive, the AMC will work with professional bodies and other organizations as sub recipients to raise awareness on malaria and the elimination and prevention of re-introduction drive to inform and motivate medical practitioners to refer fever cases for investigation for malaria parasites throughout the country. The Sri Lanka Medical Association (SLMA) which is the largest medical professional body in the country, an umbrella organization under which other medical professional bodies and colleges operate, conducts continuing professional development programmes throughout the country. The AMC and MoH will be liaising with the SLMA to keep the medical fraternity informed of latest development in malaria diagnosis and treatment and of malaria elimination and prevention of re-introduction status in the country.

All malaria cases will be followed for 42 days as per WHO guidelines and thereafter at monthly intervals up to 12 months to detect relapses and recrudescences by Regional Malaria Officers and AMC/HQ staff using local resources. This would enable the programme to prevent re-introduction of local transmission.

Due to the potentially fatal adverse events that may occur with administration of primaquine in persons with G6PD deficiency (G6PDd), *P.vivax* patients will be tested for G6PDd at point of care prior to primaquine administration. The diagnostic facility will be made available at any health care institution that would require primaquine administration through the RMOs and AMC/HQ. G6PDd testing kits will have to be procured and personnel trained in its application.

The government will be the sole importer of antimalarial drugs from WHO prequalified sources. All drugs will be quality checked as per WHO recommendations.

The AMC will establish a computerized inventory system complete with an efficient storage and distribution chain. This activity will be undertaken with the Medical Supplies Division of the MoH and would serve as a pilot project for its expansion to the entire government health care sector under the auspices of the health systems strengthening project.

## **Key Activities**

- Raising awareness among doctors and other health care personnel about the malaria elimination programme and educating doctors on the need to obtain a detailed travel history and referral for malaria diagnosis. This will be achieved through modules conducted during training programmes and through in-service training programmes and continuing professional development activities of professional medical associations such as the Sri Lanka Medical Association.
- All cases will be notified to the RMO and the AMC within 24 hours of detection and treated as per national guidelines. Instructions have been given to all health care institutions in both the public and private sectors. This will be strengthened as treatment for malaria is currently available only in the public sector as the private sector does not carry antimalarials as the demand is very low given the very low case load.
- All malaria cases will be followed for 42 days as per WHO guidelines and thereafter at monthly intervals up to 12 months to detect relapses and recrudescences by Regional Malaria Officers and AMC/HQ staff.
- Testing for G6PDd will be done at point of care in all *P.vivax* cases prior to administration of the 14-day primaquine regimen.
- The Department of Health Services will continue to be the sole importer of antimalarial drugs from WHO prequalified sources.
- The AMC will establish a computerized inventory system complete with an efficient storage and distribution chain. This is required as the distribution of antimalarials is not done by the routine drug distribution system of the Ministry of Health.

## **Strategic approach III: Strengthening outbreak preparedness, prevention and response**

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Given the fact that malaria vectors still exist in the country and that malaria cases are being reported in many parts of the country, the potential for malaria outbreaks is omnipresent. This coupled with a population having a waning immunity against malaria is likely to result in many cases of severe malaria and even many deaths. In such a situation, an effective surveillance system by itself will not protect vulnerable communities. Outbreak preparedness and response will form the mainstay of preventing and mitigating the impacts of potential outbreaks/epidemics.

## Policy

The AMC will ensure effective malaria outbreak preparedness and response to potential malaria outbreaks in vulnerable populations and receptive areas through establishing effective outbreak response teams having trained personnel that could be mobilized at short notice.

The AMC and MoH will set policy and guidelines to ensure that;

- Outbreak response teams are established, personnel trained and adequate equipment and supplies are procured.
- SOPs are developed for functioning of teams and investigation and control of outbreaks.
- Buffer stocks of antimalarial drugs, LLINs, insecticides and RDTs are readily available.
- All investigations are carried out as per national guidelines.
- Necessary data are collected and analyzed in a timely manner.

## Implementation of the policy

The AMC shall take the lead role in ensuring that the relevant circulars for the establishment of outbreak response teams are issued and that SOPs are developed, distributed and adhered to. New cadre positions, where required, will be provided.

The AMC and the RMOs will be in charge of the outbreak response teams. Suitable staff will be identified to establish multidisciplinary teams. The teams will be trained by AMC/HQ and the RMOs. The teams will be required to be available for mobilization at short notice.

Adequate buffer stocks of antimalarial drugs, LLINs, insecticides for IRS and RDTs will be estimated *a priori* the previous year as per the regulations of the Ministry of Health. The approval of the TSG will be obtained when procuring buffer stocks to minimize possible wastage.

The Geographical Information System (GIS) laboratory will be strengthened for risk mapping of vulnerable populations and receptive areas. Data from entomological surveys conducted by the AMC and additional data such as population data and climate data obtained from other government departments such as Census and Statistics, and the Meteorology department will be used. Risk maps will be generated at monthly to coincide with reporting frequencies. These risk maps will form the basis of identifying receptive and vulnerable areas for outbreak preparedness and response. Services of an expert in risk mapping will be obtained to train local staff and to generate risk models.

## Key Activities

- All cases will be notified to the RMO and the AMC within 24 hours of detection and treated as per national guidelines. Instructions have been given to all health care institutions in both the public and private sectors.
- All cases will be investigated within 72 hours of notification as per national guidelines that will be developed. Any apparent focus will also be investigated as per national guidelines and necessary measures taken to prevent any further transmission.
- Multidisciplinary outbreak response teams under the AMC and the RMOs will be revitalized and established where necessary and team members will be trained. They will be required to

be deployed within 24 hours of notice. The team will include microscopists, entomological assistants, spray machine operators and public health field staff.

- Ensure availability of buffer stocks of RDTs, antimalarials, LLINs and insecticides as outbreak preparedness and response.

## **Strategic approach IV: Strengthening entomological surveillance and response through integrated vector management**

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The AMC has a long history of conducting entomological surveillance. In the past, entomological surveillance was carried out as per the dictates of a control programme focusing on many aspects using different techniques. With the interruption of indigenous malaria transmission, an entomological surveillance system that can map malaria receptivity needs to be developed and implemented. This would require critical evaluation of current techniques used and requirements for response in different scenarios.

The AMC has drastically reduced IRS during the last 20 years focusing on integrated vector management (IVM). The widespread use of LLINs with emergence of long lasting nets at cheaper prices has also contributed to this policy and eased other logistic problems associated with IRS. The acceptance of these methods by the community also favours the continuation of this policy.

### **Policy**

The AMC will strengthen, facilitate, technically support and coordinate entomological surveillance and response to ensure vulnerable populations and receptive areas are protected by integrated vector management.

The AMC and MoH will set policy and guidelines to ensure that;

- Entomological surveillance and response guidelines are updated to suit a prevention of malaria re-introduction phase conforming to the WHO GMP and Regional malaria control strategies.
- Staff involved in entomological surveillance are well trained.
- A computerized entomological database is established and is linked to the surveillance system.
- Regional entomology laboratories are upgraded and made functional to carry out tasks required in the elimination and prevention of malaria re-introduction phase.
- A centre of excellence for entomology will be established in the country that could train personnel and assist in the control of other vector borne diseases in the future.
- An effective vector management programme is developed and implemented.

### **Implementation of the policy**

The AMC shall take the lead role in ensuring that the relevant circulars for the revision of entomological surveillance, re-orientation of staff and establishment of a national centre of

excellence are issued and that SOPs are developed, distributed and adhered to. New cadre positions, where required, will be provided.

Guidelines for entomological surveillance will be developed through consultative meetings of RMOs and AMC/HQ staff. The developed guidelines and SOPs will be distributed to all RMOs. AMC/HQ will provide technical assistance as and when required.

RMOs and entomological assistants will be trained on new techniques and surveillance methods. In addition, advanced training will be provided to selected personnel.

Sentinel surveillance will be carried out by at least one team in each region adhering to national guidelines. Selected regional entomology laboratories will be upgraded and made functional to carry out basic investigations.

The computerized entomological database will be linked to the web based surveillance system (described under strategy I) to generate risk maps (described under strategy III). Personnel at both the centre and in the regions will be trained on its use and interpretation of data.

A national centre of excellence for entomology will be established at the AMC. With assistance of academic and research institutions, this centre will provide technical assistance, train entomologists and assist in control of other vector borne diseases in the future as part of the health systems strengthening activity of the MoH.

Guidelines for IVM will be developed in consultation with senior RMOs, the academia and research institutions. A number of techniques will be used while IRS and LLINs will primarily be used where there is a higher potential for outbreaks of malaria. Environmental management, targeted biological control through use of larvivorous fish and insect growth regulators, and personal and community protection methods will be an integral part of the IVM policy.

All activities will be coordinated by AMC/HQ and RMOs and would be carried out with intersectoral collaboration involving other government departments such as Agriculture, Environment, local government authorities etc, Non-Governmental Organisations (NGOs), community leaders and community participation.

## **Key Activities**

- Identifying evidence based optimal mix of, and guidelines for, routine entomological surveillance techniques for elimination and prevention of malaria re-introduction through consultation.
- Establishing a national centre of excellence for entomology at AMC HQ for provision of guidelines for conducting routine entomological monitoring and work, training of personnel in entomology and conducting operational research in collaboration with academic and research institutions.
- Training of personnel on new techniques and surveillance methods.
- Carrying out sentinel surveillance at selected sites as per national guidelines.
- Upgrade selected entomological laboratories in the regions to carry out basic investigations.
- Establish guidelines for IVM with the assistance of field staff, academia and research scientists.

- Vector control methods will be used based on receptivity. Routine vector control measures as in a control programme will be discontinued. IRS and LLINs will be used when there is a likelihood of an impending outbreak. Environmental management, targeted biological control through use of larvivorous fish and insect growth regulators and personal and community protection methods will be used as and when necessary based on the guidelines that will be developed.
- Developing partnerships with government departments such as Agriculture, Environment, local government authorities etc, NGOs and community leaders.
- Develop partnerships at central, provincial, regional and community levels for empowerment of communities for IVM through education and skills building.

## **Cross-cutting strategic approach I: Establishing a rigorous quality control system for malaria elimination**

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The AMC has relied on malaria microscopy as the mainstay of malaria diagnosis. Public Health Laboratory Technicians perform this task; they are trained on malaria diagnosis by the AMC. In addition to malaria diagnosis, they perform diagnostic work for Tuberculosis, Sexually Transmitted Infections (STIs) and Filariasis. With interruption of indigenous malaria transmission, Public Health Laboratory Technicians (PHLTs) examine a large number of negative blood smears and are likely to miss rare low parasitaemia cases. For this purpose, it is essential to build in a rigorous quality control programme including the establishment of a fully functional national reference centre that would undertake training of personnel in the future as well as be a reference centre for the country and the region.

In addition, all malaria elimination activities require quality assurance. This includes parasitological and entomological surveillance. As outputs from surveillance will be used for risk mapping and potential outbreak response, the quality of surveillance needs to be monitored and ensured.

### **Policy**

The AMC will establish a national reference centre for quality assurance of malaria diagnostic services and facilitate, technically support, coordinate and ensure quality assurance of all malaria elimination and prevention of re-introduction activities.

The AMC and MoH will set policy and guidelines to;

- Establish a national reference centre for malaria diagnosis.
- Ensure that diagnostic services provided to the public are of international quality.
- Initiate and establish links with an internationally recognized accreditation system for certification of personnel engaged in malaria diagnosis in the country.
- Ensure quality assurance of all entomological surveillance and activities.
- Ensure quality assurance of surveillance data used for risk mapping and outbreak response.

## **Implementation of the policy**

The AMC shall take the lead role in issuing relevant circulars to ensure quality assurance of all malaria elimination and prevention of re-introduction activities. All SOPs will be developed in consultation with staff and other experts.

A national reference centre for malaria diagnosis will be established at the AMC/HQ. This centre under the Director/AMC shall ensure quality of diagnostic services through cross checking of a sample of slides, and would be a reference centre to regional quality assurance centres. In addition, it would undertake training (basic and in-service) and regular performance appraisal of PHLTs with the assistance of Asia Collaborative Training Network for Malaria (ACTMalaria) and Asia Pacific Malaria Elimination Network (APMEN) organizations. A slide bank for training purposes will be obtained and also locally developed. The first quality assurance and quality control training programme is scheduled to be conducted in 2014.

An accreditation programme for PHLTs will be initiated by linking with the WHO accreditation system. The first programme is scheduled to be conducted in 2014. Thereafter, programmes will be conducted every 3 years. The private sector will also be invited to join the accreditation scheme at no cost. Relevant circulars will be issued for this purpose.

An M&E toolkit for entomological surveillance will be developed. This would be used for quality assurance of entomological surveillance including monitoring of insecticide resistance and bioassay techniques. Data will be regularly uploaded in to the web based surveillance tool for risk mapping of receptive areas. Regular cross checking of all surveillance data will be done using a pre-defined format. This will ensure that the data used for risk mapping and modelling are valid and reliable.

All activities will be coordinated, managed and supervised by AMC/HQ and RMOs.

## **Key Activities**

- Developing a national reference centre for malaria diagnosis at AMC/HQ. This centre will cross check a sample of slides and would be a reference laboratory for the whole country. It would undertake training of and performance appraisal of Public Health Laboratory Technicians (PHLTs) with the assistance of ACTMalaria and APMEN. It will conduct quality assurance and quality control training programmes at regular intervals.
- Establish an accreditation programme for PHLTs and the private sector will be encouraged to participate in the programme which would be provided free.
- Developing an M&E tool kit for entomological surveillance

## **Cross-cutting strategic approach II: Strengthen IEC activities to raise awareness on the Malaria Elimination Programme**

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Malaria elimination is on the national development agenda of Sri Lanka. Despite enjoying highest levels of political commitment at present, this needs to be sustained during the next 3-5 years. The major impediments to this effort are the shift from a low income country to lower middle income country with a devolved system of governance. It is essential to inform policy makers at all levels

of the need at present to prevent a reversal of the malaria elimination process as experienced in the 1960s.

A strategic approach is to foster and develop partnerships and effective collaborations with all stakeholders at all levels. This needs to be done with the governmental, non-governmental and private sectors. As armed forces personnel constituted a large proportion of the last few indigenously transmitted malaria cases in the country, and are still considered a vulnerable population, a special rapport has to be developed with the sector. Partnerships will play a pivotal role in raising awareness of the malaria elimination and prevention of re-introduction programme with the general public as well.

Health promotion initiatives are intrinsic to malaria elimination. The NMS recognises that an effective awareness raising strategy forms the foundation of any efforts to effectively change service-provider skills and community behaviour in moving from a control to a disease elimination and prevention of re-introduction phase. A comprehensive effective strategy using many modes of communication similar to the successful one conducted for the leprosy control programme in the 1990s is required for the malaria elimination and prevention of re-introduction programme. This needs to be complemented with the establishment of a communications unit in the AMC with trained staff to ensure that correct messages are transmitted and misconceptions are nipped in the bud during this critical phase of this programme.

### **Policy Development and Support**

The NMS proposed awareness raising approach to malaria elimination and prevention of its re-introduction is to be developed within the broad framework of the National Health Promotion Strategy, but focusing on specific solutions is required to support sustainable behavioural change in relation to malaria elimination and prevention of its re-introduction.

The MoH will ensure that all stakeholders have access to appropriate and accurate information about malaria elimination and prevention of its re-introduction.

The MoH shall encourage partnerships among different stakeholders and sectors, so that a nationwide awareness strategy that is cohesive and non-duplicitous can be delivered.

### **Partnerships**

IEC policies and services will be implemented through innovative partnerships. Through these partnerships, resources (e.g., financial, human, technical) will be shared and maximised through organised activities. These partnerships will include the following:

- Partnerships at central, provincial, regional and community levels for empowerment of communities through education and skills building, which foster links, support and initiate local malaria elimination and prevention of re-introduction schemes based on “best practices”.
- Partnerships with the Ministry of Education to enhance malaria elimination and prevention of re-introduction using schools as channels for communication, service delivery and policy implementation.
- Partnerships with the Ministry of Agriculture to enhance malaria elimination and prevention of re-introduction by promoting farmers as experts in eco-friendly vector management by implementation of IVM.
- Partnerships with the private sector in malaria diagnosis and treatment.

- Partnerships with NGOs and other non-profit health care providers to coordinate and share malaria elimination and prevention of re-introduction expertise, resources, and tools and to play an active role in the dissemination of IEC messages via different media channels within communities.
- Partnerships with the Ministries of Defense, Immigration, Tourism and other organizations such as the Foreign Employment Bureau, travel agencies, etc.,
- Partnerships with UN agencies such as UNHCR and IOM.

## **Implementation framework**

The awareness raising activities will be coordinated and led by the proposed newly established Communications Unit of the AMC in liaison with the Health Education Bureau of the MoH and other partner institutions. The Communications Unit of the AMC with the assistance of RMOs will take the lead role in establishing, facilitating and coordinating intersectoral committees and collaboration for malaria elimination activities among stakeholders at central, provincial, regional and community levels. Raising awareness among policy makers, soliciting their continued support and ensuring adequate funding will be a major activity under this strategy.

The development of a sector-wide comprehensive strategy to raise awareness about the malaria elimination and prevention of re-introduction programme will be outsourced to a reputed organization with a proven track record, selected based on competitive bidding. The programme shall target all stakeholders and vulnerable populations. A multi-modal campaign that will be monitored and evaluated at each stage will be implemented primarily through the communications unit of the AMC jointly with the Health Education Bureau of the MoH.

All IEC materials will be reviewed by experts and tested in communities before making them available for public use. Effective IEC delivery channels will be explored and linkages between the health facilities and community members will be established.

The present school-aged population represents the parents of the future, and the development of effective life-skills in relation to malaria elimination and the prevention of its re-introduction. The AMC with the Ministry of Education will revise and periodically review the health education curriculum for primary and secondary school education to ensure that effective malaria elimination and prevention of re-introduction messages are incorporated.

Partnerships will be developed with the private sector through IEC to improve detection, treatment and notification of malaria cases. At present, a large number of cases are reported from the private sector. A focal point at AMC HQ will be established dedicated for the private sector. This link will provide advocacy to the private sector and ensure the implementation of a functional notification system.

The AMC will liaise with the Health Education Bureau to provide information for all stakeholders on the progress and success of the malaria elimination and prevention of re-introduction programme at regular intervals. This will include vulnerable communities and risk populations.

## **Key Activities**

- Develop partnerships at central, provincial, regional and community levels for empowerment of communities through education and skills building, which foster links, support and initiate local malaria elimination and prevention of re-introduction schemes based on “best practices”.

- Develop partnerships with NGOs and other non-profit health care providers to coordinate and share malaria elimination and prevention of re-introduction expertise, resources, and tools and to play an active role in the dissemination of IEC messages via different media channels within communities.
- Develop partnerships with UN agencies such as UNHCR and IOM.
- Establish a communications unit at AMC/HQ and train persons on BCC. The Communications Unit will take the lead role in establishing, facilitating and coordinating intersectoral committees and collaboration for malaria elimination activities among stakeholders at central, provincial, regional and community levels. Raising awareness among policy makers, soliciting their continued support and ensuring adequate funding will be a major activity under this strategy.
- Develop and implement a sector-wide comprehensive strategy to raise awareness about malaria elimination and prevention of re-introduction.
- Review and revise educational material that is included in the school curriculum at regular intervals.

### **Cross-cutting strategic approach III: Improving programme management and performance**

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Sri Lanka planned the malaria pre-elimination phase in 2008 when conditions were not at all conducive because of the separatist war but launched the phase in 2009 just after the separatist war. As the rapidity of the change was so sudden with cessation of the separatist war in May 2009, even though initial planning of the pre-elimination programme was done earlier, it was not possible to conduct a re-orientation of the malaria control programme to a new malaria elimination programme based on currently available evidence, as recommended by the WHO. A re-orientation and re-structuring programme for trainers is scheduled to be conducted in late June 2014 with the assistance of WHO, the technical partner of AMC, which is to be extended to the provinces and regions subsequently. The re-orientation and re-structuring programme will define the scope and function of the activities of the elimination programme focused on prevention of re-introduction of indigenous malaria to Sri Lanka.

The re-aligned malaria control programme of the 1990s had vestiges of the Sri Lankan malaria eradication programme of the 1950's and 1960s. As a programme which was not properly re-oriented appropriately, major limitations in capacity to sustain a malaria elimination and prevention of re-introduction programme as highlighted in the situational analysis exist. There are major gaps in capacity that need to be addressed in sustaining the goal of being "a malaria free Sri Lanka".

Limited resources including funding have impacted on Sri Lanka's malaria elimination and prevention of re-introduction programme. This has been due to a number of factors including competing national challenges, commitments to long term national developmental goals and limited funding opportunities from donor agencies, bilateral agencies and international organizations with the elevation of Sri Lanka from a low income country to a lower middle income country. Given the complexities of sustaining the malaria elimination and prevention of re-introduction programme, capacity needs to be developed, and resources, organization and management need to be strengthened to improve programme management and performance to ensure that the basic principles of equity, evidence based and value for money principles are enshrined in the implementation of the programme.

## **Policy**

The AMC will re-orient and re-structure the malaria elimination and prevention of re-introduction programme. This will entail re-orienting the control programme that focussed on case detection and implementation of malaria preventive measures in previously malarious areas to one focusing on intensified surveillance and outbreak response throughout the country. This will require establishing services in areas that had no services such as in the Western Province and a part of the Southern province, retraining personnel to meet the shift in scopes of work required by the new strategy, creation of new posts and recruitment of qualified personnel and building capacity in existing cadres to meet the challenges of the future including epidemic response.

The AMC and MoH will set policy and guidelines to;

- Re-orient and re-structure the malaria elimination and prevention of re-introduction programme with emphasis on re-defining the scope and function of the AMC/HQ and its regional offices.
- Ensure adequate capacity building in selected areas at the central and regional levels that will ensure improved programme management and performance for sustaining the malaria elimination and prevention of re-introduction programme.

## **Implementation of the policy**

The AMC shall take the lead role in issuing relevant circulars to ensure programme re-orientation and re-structuring to incorporate the change in scope and functionality of the malaria control programme to a malaria elimination and prevention of re-introduction programme that would ensure the optimum mix of interventions based on cost-effectiveness considerations. A training of trainers programme will be conducted in late June 2014 in collaboration with the WHO, the technical partner of the AMC, using the WHO developed and recommended short course to re-orient the malaria control programme to a malaria elimination and prevention of re-introduction programme. The trained trainers will conduct programmes in the regions to re-orient staff in the regions. Issue of relevant circulars, development of SOPs regarding re-assignment of scope of duties of staff to suit a malaria elimination and prevention of re-introduction programme will be the responsibility of the AMC.

Capacity will be built by AMC contracting local and international experts, guidance of WHO and approval by the TSG to conduct training programmes for local staff. Consultants will be selected using transparent methods as recommended by the MoH. Experts will be needed in areas such as molecular entomology, insecticide resistance, risk mapping, monitoring and evaluation (M & E), IVM, entomology, and malaria diagnosis. In addition, local scientists will be encouraged to enrol in local academic programmes and selected candidates will be sent to centres of excellence within the region to obtain specialized training.

GFATM funding in the past has contributed to the successful implementation of its projects. Continued funding in this plan, with gradual reduction of external funding over the next 5 years, based on the national development policies and priorities of the country which envisage an elevation of the country's development and economic status, is proposed to improve programme management and performance to sustain a successful malaria elimination and prevention of its re-introduction in the future with increased funding from the state towards the end of the plan in order to successfully sustain the malaria elimination and prevention of re-introduction programme.

## **Key Activities**

- Re-orient and re-structure the programme to incorporate the change in scope and functionality of the malaria control programme to a malaria elimination and prevention of re-introduction programme that would ensure the optimum mix of interventions based on cost-effectiveness considerations.
- Conduct a training of trainers programme in collaboration with the WHO, the technical partner of the AMC, using the WHO developed and recommended short course to re-orient the malaria control programme to a malaria elimination and prevention of re-introduction programme. The trained trainers will conduct programmes in the regions to re-orient staff in the regions.
- Capacity will be built by AMC contracting local and international experts, on the guidance of WHO and approval by the TSG by conducting training programmes for local staff (molecular entomology, insecticide resistance, risk mapping, monitoring and evaluation (M & E), IVM, entomology, and malaria diagnosis).
- Conduct regular review meetings.
- Conduct an external evaluation of the malaria elimination and prevention of re-introduction programme.
- Support AMC and RMO offices by providing technical and support staff.
- Ensure procurement of quality diagnostics and antimalarials from WHO prequalified sources.
- Ensure storage and distribution of diagnostics, antimalarial, LLINs, insecticides and other consumables.
- Increase awareness of the malaria elimination and prevention of re-orientation programme among health care providers.
- Develop partnerships at central, provincial, regional and community levels for empowerment of communities for malaria elimination and prevention of re-introduction.
- Conduct national stakeholder meeting and identify priority areas of operations and implementation research.
- Regularly inform all stakeholders on the progress of the malaria elimination and prevention of re-introduction programme.
- Organisation of high impact events related to malaria

## **Cross-cutting strategic approach IV: Operational and Implementation Research**

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Operational and Implementation Research is widely recognised as an important component of any health intervention package complementing M&E activities to provide an evidence base for future policy change. Accordingly, the AMC will have oversight of all operational and implementation research projects relating to malaria elimination in the country.

## **Policy**

The MoH and the AMC in collaboration with partners shall identify strategic approaches to promote, facilitate and conduct research and to translate research evidence in to policy and practice which supports further, the implementation of the NMSP over the mid- to long-term.

## **Implementation framework**

The primary strategy will be to develop a critical mass of researchers to engage in research on malaria elimination and prevention of re-introduction in collaboration with, and with assistance of, national and international academic and research institutions through promotion of operations and implementation research within the country and provision of funding to projects considered critical to the programme.

The AMC in collaboration with partners including the Ministry of Research and Technology and academic and research institutions will promote, facilitate and conduct operational and implementation research. Priority areas will be identified at national stakeholder meetings. One such meeting was held in December 2013 bringing together researchers from all parts of the country. The AMC with technical assistance of the TSG will identify sources of funding locally and internationally.

Research proposals development will be initiated on prioritized subjects related to malaria elimination by the AMC with technical support of the TSG. Periodic reviews of locally conducted research will be done and results disseminated.

## **Key Activities**

- Engage scientists and academia to assist the AMC in conducting research in priority areas.
- Train scientists on development of proposals for funding.

## **Cross-cutting strategic approach V: Monitoring and Evaluation**

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The MoH in Sri Lanka lays emphasis on a coordinated and Sector Wide Approach to health intervention packages. Monitoring and Evaluation is now recognised as a key component of any health intervention package through routine surveillance collected from health information systems, along with complementary surveys that can measure the impact of the malaria elimination and prevention of re-introduction programme and provide an evidence base for future policy change.

Accordingly, the AMC will have the responsibility to monitor the NMSP's success towards its stated targets and work in collaboration with national partners to identify ways to measure its intended achievement based on the M&E plan.

## **Policy**

The MoH shall ensure adequate monitoring and evaluation of the strategic approaches to malaria elimination and prevention of re-introduction as outlined in the NMSP to further support the implementation of the NMSP over the mid to long-term.

## **Implementation framework**

### **Measuring target indicators of the NMSP**

Assessments will be structured to measure outcomes and processes periodically. This data will be used to define targets. The AMC will undertake a series of reviews, facility level surveys and community-based surveys to assess the target set out as part of the NMSP 2014-2018. National surveys (Malaria indicator surveys) will be conducted every three years. These surveys and tools will be developed under the direction of the AMC and funding obtained through the AMC. At this critical phase of the malaria elimination and prevention of re-introduction programme, it is essential to establish data verification systems that will make possible to have confidence in, and utilize routinely collected data to monitor the progress of the programme. Strengthening of M&E at central and regional levels will be a key component of the strategy.

### **Key Activities**

- A M&E toolkit to be used for quality assurance of entomological surveillance will be developed.
- Train personnel in regions on M&E
- Regular cross checking of all surveillance data.
- Develop a M&E plan
- Conduct reviews, facility level surveys and community based surveys to monitor the progress of, and to evaluate the performance of, the implementation of the malaria elimination and prevention of re-introduction programme.
- Conduct a national malaria indicator survey in 2017.
- Conduct regular review meetings.
- Conduct an external evaluation of the malaria elimination and prevention of re-introduction programme.

## 7. Human Resources

The current human resources status and projections for the period 2014-2018 are given in Table 5. New positions have been created, scopes of work of a few positions have been streamlined and a few others have been withdrawn in keeping with the re-structuring of the AMC to meet the challenges of prevention of re-introduction. New positions such as Surveillance Medical Officer (Malaria) to oversee surveillance work in the Western Province which was previously malaria free, and a Programme Manager and Deputy Programme Manager have been created. All existing cadre vacancies will be advertised and filled. Steps will be taken to create cadre positions that are currently supported by external sources within the government health services in the AMC to ensure sustainability of a “malaria free Sri Lanka”.

**Table 5. Current human resources status and projections for 2014-2018**

Staff category	Current cadre	Current vacancies	Proposed cadre 2014-2018	Vacancies to be filled 2014-2018
<b>AMC Headquarters</b>				
Medical Administrator Senior Grade	1	1	1	1
Medical Administrator Deputy Grade	1	0	1	0
Medical Consultant	3	2	3	2
Medical Officer	5	2	5	2
Surveillance Medical Officer (Malaria)	0	0	1	1
Accountant	1	0	1	0
Entomologist	4	1	3	1
Parasitologist	1	0	2	1
Registered Medical Officer	1	0	1	0
Special Grade Entomological Assistant	1	0	1	0
Special Grade PHLT	2	0	2	0
Entomological Assistant	6	0	6	0
Medical Laboratory Technologist	3	3	3	3
Public Health Inspector	2	0	2	0
Public Health Laboratory Technician	22	10	22	10
Information and Communication Technology Assistant	2	1	2	1
Health Education Officer	1	1	1	1
Information and Communication Technology Officer	1	1	1	1
Development Assistant	4	1	4	1
Medical Records Assistant	1	1	1	1
Planning and Programme Assistant	1	1	1	1

<b>Staff category</b>	<b>Current cadre</b>	<b>Current vacancies</b>	<b>Proposed cadre 2014-2018</b>	<b>Vacancies to be filled 2014-2018</b>
Public Health Field Officer	10	6	10	6
Public Management Assistant	17	8	17	8
Medical Supplies Assistant	3	3	3	3
Telephone Operator	0	0	2	2
Cinema Operator	1	0	1	0
Health Driver	19	7	19	7
Lab Orderly	3	2	3	2
KKS	1	0	1	0
Lift Operator	2	0	2	0
Saukyaya Karyaya Sahakara (Junior)	20	8	20	8
Saukyaya Karyaya Sahakara (Ordinary)	25	19	25	19
Spray Machine Operator	19	11	19	11
Development officer	5	0	5	0
Coordinator Malaria Elimination/Project Coordinators	3	1	2	0
Deputy Manager	0	0	1	1
Project Officer	0	0	1	1
District Coordinator	12	0	15	3
Procurement Officer	0	0	1	1
Project accountant	1	1	1	1
Finance supervisor	1	0	1	0
Finance Assistant	2	0	2	0
Human Resources Officer	0	0	1	1
M and E Officer	1	0	1	0
Computer programmer	1	1	0	0
IT Specialist	0	0	1	1
Data Entry Operators HQ	5	0	4	0
Molecular Biologist	0	0	1	1
GIS specialist	1	0	0	0
GIS Officer	0	0	1	1
Management Assistant	9	0	8	0
Office Assistants	7	0	8	1
PHI	1	0	1	0
Microscopists	8	0	10	2
Project Director (25%)	1	0	1	0
Procurement Specialist (25%)	1	0	1	0
Procurement Assistant (25%)	0	0	1	1

Staff category	Current cadre	Current vacancies	Proposed cadre 2014-2018	Vacancies to be filled 2014-2018
M and E Officer (25%)	1	1	1	1
Finance Manager (25%)	1	0	1	0
Finance Assistant (25%)	2	0	2	0
Human Resources Manager (25%)	1	0	1	0
Human Resources Assistant (25%)	1	0	1	0
Management Assistant (25%)	1	0	2	1
Office Assistants (25%)	2	0	3	1
Drivers (25%)	2	1	2	1
<b>Regions</b>				
RMOs	22	5	22	5
PHLT	324	120	324	120
EA	110	45	110	45
PHFO	629	306	629	306
SMO/Labourer	1284	288	1284	288
Malaria Control Assistants (Vector Control Assistant/Vector Surveillance Assistant/Field Vector Surveillance Assistants)	55	18	45	8
Labourers	135	29	85	0
Health Assistants/Malaria microscopy assistant	35	9	75	49
Data Entry Operators Regions	22	1	21	0

\* Current cadre is based on the revision made in 2014 in accordance with programme reorientation for prevention of re-introduction of malaria

## Training needs

The training needs of personnel have been identified in the activity plan of the NMS that is given in Annex I.

## 8. Performance Framework

The performance framework to achieve the goal of a malaria free Sri Lanka is given in Table xx. The impact, outcome and output indicators have been developed based on achieving the key objectives of the programme, namely, to sustain malaria free status by prevention of re-introduction of malaria to Sri Lanka, to obtain WHO certification of malaria elimination in Sri Lanka by the end of 2015, and to maintain zero mortality due to malaria in Sri Lanka.

**Table 6. Performance framework of the National Malaria Programme**

No.	Indicator	Baseline			Year					Comment
		Value	Year	Source	2014	2015	2016	2017	2018	
<b>Impact indicators</b>										
1	Confirmed indigenous malaria cases (microscopy or RDT) per 1000 persons per year (disaggregated by age<5, 6+; species)	0	2013	HMIS	0	0	0	0	0	Imported malaria cases will be reported by age, sex and species
2.	Inpatient malaria deaths per 1000 persons per year (disaggregated by sex; age <5. 6+)	0	2013	HMIS	0	0	0	0	0	
<b>Outcome indicators</b>										
1.	Annual Blood Examination Rate	5%	2013	HMIS	5%	5%	5%	5%	5%	The entire Sri Lankan population is considered as the risk population
2.	Percent of laboratory facilities covered by QA and refresher training system	0	2013	Administrative records	25	50	75	100	100	Only laboratories of AMC are included
3.	Number of healthcare personnel who participated in the continuing education programme on malaria prevention case management and notification	4000	2013	Administrative records	10000	10000	10000	10000	10000	
4.	Percentage of medical schools that included a course on malaria prevention, case management and notification in the annual curriculum	100	2013	Key informants	100	100	100	100	100	
<b>Output indicators</b>										
1.	Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy at public sector health facilities (disaggregated by age <5 and 5+, sex and type of treatment - ACT or non ACT)	100	2013	HMIS	100	100	100	100	100	
2.	Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy at private sector sites (disaggregated by age <5 and 5+, sex and type of treatment – ACT or non-ACT)	100	2013	HMIS	100	100	100	100	100	

No.	Indicator	Baseline			Year					Comment
		Value	Year	Source	2014	2015	2016	2017	2018	
3.	Percentage of health facilities without stock-outs of key commodities during the reporting period	0	2013	Administrative Records	0	0	0	0	0	
4.	Percentage of confirmed cases fully investigated (malaria elimination phase)	100	2013	HMIS	100	100	100	100	100	
5.	Percentage of foci fully investigated (malaria elimination phase)	100	2013	HMIS	100	100	100	100	100	
6.	Percentage of HMIS or other routine reporting units submitting timely reports according to national guidelines	100	2013	HMIS	100	100	100	100	100	
7	Number of entomological surveillance activities (in days) conducted	4000	2013	HMIS	4000	4000	4000	4000	4000	
8	Percentage of sites where insecticide susceptibility was monitored	50	2013	HMIS	50	50	50	50	50	

## 9. Activity Plan

The activity plan of the NMS and the estimated budget of the malaria elimination and prevention of re-introduction programme 2014-2018 are given in Annex I.

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## Annex I. Activity Plan of the National Malaria Strategy for Elimination and Prevention of Re-introduction

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
<b>Strategy 1. Strengthen services for surveillance for malaria case detection and protection of vulnerable population</b>							
<b>1.1</b>	<b>Develop action plan/guidelines for malaria case surveillance</b>						
1.1.1	Preparation of an action plan based on the National Strategic Plan		425	0	0	0	0
1.1.2	Develop SOPs and guidelines for malaria case surveillance		0	47,791	377	0	0
<b>1.2</b>	<b>Ensure malaria diagnostic facilities are made available in government hospitals throughout the country</b>						
1.2.1	Establish, equip and upgrade laboratories for malaria microscopy at least in all hospitals at level of divisional hospital type A and above		77,130	258,846	10,544	11,071	20,000
1.2.2	Ensure all districts to have an established referral point with adequate expertise and facilities to detect/verify malaria		90,000	41,096	37,473	39,347	41,314
1.2.3	Ensure availability of quality malaria diagnostic RDTs in government hospitals	covered in 1.2.2					
<b>1.3</b>	<b>Ensure all cases are diagnosed according to guidelines</b>						
1.3.1	Test microscopy negative and RDT positive suspected malaria cases by PCR		49,104	14,830	15,572	16,350	17,168
1.3.2	Genotype parasites of confirmed cases		1,520	1,544	1,622	1,703	1,788
1.3.3	Maintain a parasite bank for reported malaria cases.	covered in 1.3.1					
<b>1.4</b>	<b>Improve malaria surveillance</b>						
1.4.1	Ensure proper procedures are followed when a malaria case is diagnosed		9,000	9,027	9,478	9,952	10,450

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
1.4.2	Strengthen the notification, recording and feedback system for malaria by Medical Officers of Health/ Medical officers in addition to the direct reporting through RMOO to AMC		5,120	5,220	5,481	5,755	6,043
1.4.3	Investigate cases of pyrexia of unknown origin (PUO) in a sentinel institution in each district (PCD, ACD, special investigation).	Refer Note 1					
1.4.4	Establish APCD in a sentinel institution in each district.	Refer Note 1					
1.4.5	Strengthen malaria surveillance among major private sector hospitals and general practitioners (including laboratory surveillance)		24,000	19,068	20,021	21,022	22,074
1.4.6	Introduce a comprehensive web based malaria surveillance system		27,500	0	0	0	0
1.4.7	Training of persons on comprehensive web based systems		180	2,827	0	0	0
1.4.8	Strengthening of malaria surveillance in the population through MMCs and other surveillance mechanisms such as blood donor screening, antenatal clinics		136,800	192,722	202,358	212,476	223,100
1.4.9	Screen 1% of samples of blood for transfusions for malaria by PCR	covered in 1.3.1					
1.4.10	Carry out annual field survey in 2 localities that had high malaria transmission to detect asymptomatic parasite carriers		0	5,670	5,954	6,251	6,564
<b>1.5</b>	<b>Prevent malaria in overseas travelers to malaria endemic countries</b>						
1.5.1	Ensure availability of adequate stocks of chemoprophylaxis drugs at AMC-HQ and regional offices in districts		20,000	24,780	26,019	27,320	28,686
1.5.2	Training of health care staff at points of entry and exit		0	1,530	1,607	1,687	1,771
1.5.3	Raising awareness on malaria prevention amongst persons/organizations closely associated with travelers to malaria endemic countries		0	7,653	8,036	8,437	8,859
1.5.4	Enhance the number of people receiving prophylaxis prior to travelling to malaria endemic countries	covered by 1.5.1					

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
1.5.5	Display messages at ports of entry/exit informing travelers of the availability of chemoprophylaxis		0	43,452	0	26,989	0
<b>1.6</b>	<b>Early detection of imported malaria cases and prevention of re-introduction of malaria</b>						
1.6.1	Establish malaria diagnostic facilities at ports of entry to the country	covered by 1.2.1					
1.6.2	Update/formulate policies to prevent re-introduction of malaria through immigrants		0	1,792	0	0	0
1.6.3	Provide screening facilities for foreign workers in Sri Lanka		0	2,253	2,366	2,484	2,608
1.6.4	Provide malaria screening for travelers/high risk groups from malaria endemic countries		33,000	9,211	1,639	1,721	1,807
1.6.5	Provide radical cure to resident population subgroups identified as being infected with malaria	Refer Note 1					
<b>Strategy 2. Maintain clinical skills, capacity and services for management of malaria cases</b>							
<b>2.1</b>	<b>Ensure all cases are diagnosed, treated and followed up according to national malaria treatment guidelines</b>						
2.1.1	Issue circular on management of malaria	Refer Note 1					
2.1.2	Develop SOPs for diagnosis, treatment and follow up of malaria patients	covered in 1.1.2					
2.1.3	Strengthen antimalaria drug regulatory mechanisms		0	465	0	0	0
2.1.4	Establish and maintain a system to ensure effective malaria treatment (as stipulated in the national malaria treatment guidelines) is available in government hospitals (above BH), RMO offices and is made available to all private sector hospitals or practitioners on request to AMC		5,800	78,764	0	0	0
2.1.5	Ensure all malaria cases are treated according to national treatment		10,500	21,533	22,610	23,740	24,927

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)					
			2014	2015	2016	2017	2018	
	guidelines							
2.1.6	Follow up of all malaria cases for 42 days as per WHO recommendations and then monthly up to 12 months (for patients diagnosed with Pv) for parasitaemia, symptoms of malaria and severe adverse events following treatment		45,000	47,250	49,613	52,093	54,698	
2.1.7	Establishment of an electronic inventory system for anti-malarial drugs and other supplies		0	17,778	2,720	2,856	3,000	
2.1.8	Make facilities available for screening G6PD deficiency in hospitals above base hospital level		4,700	4,751	4,989	5,238	5,500	
2.1.9	Train at least one laboratory technical officer per medical institution (where facilities are available) on screening for G6PD deficiency.	No budget required						
2.1.10	Screen all Pv patients for G6PD deficiency	No budget required						
2.1.11	Increase awareness among nursing officers, pharmacists and dispensers		18,700	11,020	11,571	12,150	12,757	
2.1.12	Increase awareness amongst pre-intern Medical Officers		2,270	1,865	1,958	2,056	2,159	
2.1.13	Increase awareness amongst medical officers and Consultants		20,000	14,110	15,030	15,782	16,571	
2.1.14	Increase awareness amongst General Practitioners		20,000	30,675	32,209	33,819	35,510	
2.1.15	Maintain designated storage points for buffer stocks of anti malarials within the supply chain management plan	covered in 2.1.4						
<b>Strategy 3. Strengthen outbreak preparedness, prevention and response to malaria outbreaks</b>								
<b>3.1</b>	<b>Strengthen outbreak preparedness at central and regional levels</b>							
3.1.1	Re-activation of established units by recruiting new staff where needed, modus operandi, re-training etc.		2,000	0	0	0	0	

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
3.1.2	Ensure availability of buffer stocks of antimalarials at identified centres with sufficient stocks maintained at AMC HQ	Refer Note 1					
3.1.3	Ensure availability of buffer stocks of insecticides (IRS, larviciding, fogging) in RMO offices with sufficient stocks maintained at AMC HQ		750,000	787,500	826,875	868,219	911,630
3.1.4	Ensure availability of buffer stocks of RDTs	Refer Note 1					
3.1.5	Strengthen the distribution and monitoring the availability of buffer stocks (drugs, RDTs, and Insecticides etc)		74,000	3,711	3,896	4,091	4,296
<b>3.2</b>	<b>Strengthen prevention of and response to malaria outbreaks</b>						
3.2.1	Develop SOPs on outbreak prevention and response		1,000	1,510	0	0	0
3.2.2	Ensure all cases are reported, investigated and appropriate response is initiated, according to the national guidelines	Refer Note 1					
3.2.3	Strengthen facilities to conduct rapid entomological investigations	Refer Note 1					
3.2.4	Collect data on environmental and meteorological risk factors, population dynamics for risk mapping		1,000	7,650	8,033	8,434	8,856
3.2.5	GIS mapping to identify receptive and vulnerable areas (including maintenance of GIS software& related equipment such as GPS)		0	15,352	5,442	5,714	6,000
<b>Strategy 4. Strengthen entomological surveillance and response through integrated vector management</b>							
<b>4.1</b>	<b>Strengthen entomological surveillance</b>						
4.1.1	Update guidelines on entomological surveillance (including vector identification keys)		0	4,211	0	0	0
4.1.2	Develop SOPs on surveillance and survey methods		0	576	0	0	0

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
4.1.3	Ensure one optimally staffed and fully equipped entomological team at AMC HQ and in each RMO Region for sentinel surveillance		54,118	225,000	16,942	17,789	18,678
4.1.4	Train and re-orient entomological staff on entomological surveillance in malaria elimination.		0	1,977	0	0	0
4.1.5	Ensure entomological surveillance is carried out according to the updated national guidelines		25,820	304,369	231,869	243,462	255,636
4.1.6	Establish provincial entomological laboratories for entomological investigations (including maintaining colonies, insecticide resistance monitoring etc)		0	151,520	0	0	0
4.1.7	Establish a computerised entomological surveillance system for vector and risk mapping and forecasting.		0	24,527	0	0	0
<b>4.2</b>	<b>Establish a national centre of excellence for entomological studies</b>						
4.2.1	Establish national laboratory for entomological studies		46,316	60,983	17,447	18,319	19,235
<b>4.3</b>	<b>Implement integrated vector management</b>						
4.3.1	Revise and update the integrated vector management policy & guidelines		0	576	0	0	0
4.3.2	Develop SOPs on vector control interventions		0	576	0	0	0
4.3.3	Establish an up-to-date functional vector control unit at the AMC HQ and in each RMO region with IRS/spray equipment, supplies and trained human resources		704,450	210,253	0	0	0
4.3.4	Implement integrated vector management according to guidelines		13,185	137,061	143,914	151,110	158,665
<b>Strategy 5. Establish a rigorous quality control system for malaria Elimination</b>							

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
<b>5.1</b>	<b>Establish a fully functional national reference centre to undertake quality assurance of malaria microscopy and RDT use</b>						
5.1.1	Ensure SOPs for malaria microscopy and RDTs are implemented		28,500	0	0	0	0
5.1.2	Establish QA&QC centres with a trained PHLT for QA in the Centre and regional centres in each district		131,000	0	0	0	0
5.1.3	Establish accreditation system for malaria microscopy		13,900	0	0	17,595	0
5.1.4	Establish links to External quality assurance system	Refer Note 1					
5.1.5	Develop a slide bank for training purposes		7,500	0	0	0	0
<b>5.2</b>	<b>Ensure quality of malaria diagnostic services</b>						
5.2.1	In-service training of microscopists in the government sector		11,736	29,979	31,478	33,052	34,704
5.2.2	Train microscopists working in the private sector		2,695	3,355	3,523	3,699	3,884
5.2.3	Proficiency testing of microscopists including external competency assessment and accreditation according to WHO standards		0	5,021	5,273	5,536	5,788
5.2.4	Quality assurance and quality control at central and region level	Refer Note 1					
5.2.5	Testing of RDTs for quality assurance (field and lot)	Refer Note 1					
5.2.6	Train required staff for national reference centre and regional level		0	0	24,334	0	0
5.2.7	Engage private sector in AMC QA/QC programme and accreditation scheme for malaria microscopy and RDT		0	0	0	0	0
<b>5.3</b>	<b>Ensure quality of entomological services</b>						
5.3.1	Develop a M and E tool kit for quality assurance of entomological surveillance and response		0	1,636	0	0	0

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
5.3.2	Implement a M&E programme for quality assurance of entomological surveillance and response		0	1,719	1,805	1,895	1,990
5.3.3	Preparation of reports for dissemination of entomological data		0	1,625	1,706	1,792	1,881
5.3.4	Establish a reference specimen bank at AMC		0	3,819	0	0	0
5.3.5	Establish a quality assurance system to monitor entomological laboratories and field sites		0	14,979	15,728	16,514	17,340
5.3.6	Monitoring residual efficacy of insecticides used in IRS and LLINs		0	2,140	2,249	2,360	2,478
5.3.7	Monitoring insecticide resistance in malaria vectors		6,887	21,093	16,740	17,577	18,456
<b>5.4</b>	<b>Ensure surveillance data quality</b>						
5.4.1	Monitor data quality at regional and central levels.		6,750	15,048	15,800	16,590	17,420
<b>5.5</b>	<b>Ensure quality assurance of anti malarial drugs</b>						
5.5.1	Ensure quality assurance of anti malarial drugs		0	765	803	843	886
<b>Strategy 6. Strengthen IEC activities to raise awareness on the malaria elimination programme</b>							
<b>6.1</b>	<b>Establish and sustain high level national provincial and district intersectoral working groups for malaria elimination</b>						
6.1.1	Establish intersectoral working groups at national, provincial, district and MOH level by AMC		14,982	38,418	40,339	42,356	44,474
6.1.2	Training programme for Medical Officers of Health (MOH) on elimination of malaria		881	2,483	2,607	2,738	2,874
6.1.3	Strengthen effective coordination and collaboration with the Armed Forces and other sectors and conduct joint programmes(central and regional level		1,575	11,628	12,209	12,820	13,461

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
<b>6.2</b>	<b>Raise awareness on malaria elimination through advocacy</b>						
6.2.1	Develop a cabinet paper for malaria elimination						
6.2.2	Issue of circulars to relevant authorities to get their corporation for malaria elimination		0	2,352	0	0	0
6.2.3	Identifying and mobilizing local stakeholders at regional level	Covered by 6.1.1					
<b>6.3</b>	<b>Facilitate and develop an effective social marketing campaign for malaria elimination</b>						
6.3.1	Develop an effective social marketing campaign for malaria elimination		210,000	0	0	0	0
6.3.2	Appoint a brand ambassador for malaria elimination.	Refer Note 1					
6.3.3	Advertising in mass media		0	158,188	271,097	284,652	298,884
6.3.4	Procurement of promotional materials (briefing memos, desk top calanders, writing pads for doctors, appreciation certificates, ball point pens, etc.)		0	25,000	24,098	25,303	26,568
6.3.5	Review and revise current IEC material		0	29,925	0	0	0
6.3.6	Development of press kits		750	918	964	1,012	1,063
6.3.7	Development of information package for travelers		0	4,246	4,458	4,681	4,915
6.3.8	Monitor and evaluate the social marketing programme	Refer Note 1					
<b>6.4</b>	<b>Raise awareness on malaria elimination among general population and risk population</b>						
6.4.1	Increase awareness in public health staff		210	9,130	9,587	10,066	10,569
6.4.2	Increase awareness in high risk communities		8,213	22,491	7,442	7,793	8,205
6.4.3	Raise awareness among school children		2,375	14,087	14,791	15,531	16,307
6.4.4	Carry out programmes of media briefing at central and regional levels		8,310	12,714	13,349	14,016	14,717

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
6.4.5	Press releases and regular publications of malaria related articles in mass media		8,000	18,934	19,881	20,875	21,918
6.4.6	Organization of high impact public events related to malaria (e.g. Malaria Day)		33,072	15,396	16,166	16,974	17,823
<b>6.5</b>	<b>Strengthen IEC and BCC capacity of AMC HQ and in regions</b>						
6.5.1	Establish a communications unit in AMC		0	5,593	5,062	5,315	5,581
6.5.2	Train 2 persons in COMBI at AMC HQ		0	9,953	0	10,948	0
6.5.3	Train persons in behavior change communication in regions		0	413	0	0	0
<b>Strategy 7. Improve programme management and performance</b>							
<b>7.1</b>	<b>Re-structure and re-orient malaria control programme for malaria elimination</b>						
7.1.1	Re-structure and reorient malaria control programme including goals and objectives.		0	11,976	0	0	0
7.1.2	Revise staff categories and cadres, functions and activities of staff to meet the requirements of the revised programme including a communications unit.		0	1,634	0	0	0
7.1.3	Conduct "WHO training programme on malaria elimination" for training of trainers		0	0	0	0	0
7.1.4	Conduct reorientation programmes on malaria elimination for regional staff		9,500	5,018	0	0	0
<b>7.2</b>	<b>Capacity Building</b>						
7.2.1	In-service training for PHI on malaria elimination		9,000	14,000	14,700	15,435	16,207
7.2.2	In-service training for PHFOs on malaria elimination		9,000	14,000	14,700	15,435	16,207

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
7.2.3	In-service training for SMO on malaria elimination		3,500	4,898	5,143	5,400	5,670
7.2.4	Train Entomologists in advanced techniques in entomology		0	11,276	0	0	0
7.2.5	Train RMOs on entomology and recent advances in malaria		0	6,642	0	7,323	0
7.2.6	Conduct training programmes for entomology assistants		2,832	19,677	20,661	21,694	22,779
7.2.7	Train required staff for national centre of excellence in Entomology by experts in the field		0	13,555	14,233	0	0
7.2.8	Training of medical officers on surveillance and clinical management of malaria including recent advances as ToTs		0	19,990	0	22,038	0
7.2.9	Provide in-service training on GIS to AMC staff		0	0	288	0	0
7.2.10	Certificate course in molecular biology conducted by University of Colombo		600	0	0	0	0
7.2.11	Participate in international forum for surveillance and control of mosquitoes and mosquito borne diseases		0	12,133	0	0	0
7.2.12	Workshop on management of GFATM advance payemnts for staff invoved in handling such advances		60	0	0	0	0
7.2.13	Obtain technical assistance from experts		0	1,913	0	0	0
7.2.14	Conduct training on molecular entomology		0	1,496	0	0	0
7.2.15	Conduct training on insecticide resistance		0	16,628	0	0	0
7.2.16	Conduct training on risk mapping		0	31,695	0	0	0
7.2.17	Conduct training on IVM		0	31,419	0	0	0
7.2.18	Capacity building for supportive staff		0	2,221	2,332	2,449	2,571
<b>7.3</b>	<b>Strengthen resources, organization and management to sustain elimination and prevent re-introduction of malaria</b>						
7.3.1	Support RMO offices and NMCP		5,893,385	6,273,206	6,723,727	7,069,807	7,516,322

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
7.3.2	Refurbishment of central and regional malaria offices		15,769	77,249	0	0	0
7.3.3	Improve drug stores at AMC headquarters		5,800	0	0	0	0
7.3.4	Adopting quality concepts and upgrade AMC head office to a "center of excellence"		20,000	10,000	10,500	11,025	11,576
7.3.5	Printing of manuals,reports,guidelines and registers		48,684	4,973	5,222	5,483	5,757
<b>Strategy 8. Engage in operations and implementation research</b>							
<b>8.1</b>	<b>Promote operations and implementation research in malaria elimination</b>						
8.1.1	Conduct consultative meeting to update evolving research needs and prioritize topics for research		0	1,049	1,101	1,157	1,214
8.1.2	Develop research proposals for funding	Refer Note 1					
8.1.3	Implement operations and implementation research to ensure maintenance of malaria elimination status	Refer Note 1					
8.1.4	Train persons in operational and implementation research		0	1,987	0	2,191	0
8.1.5	Conduct periodic reviews of research projects		0	463	486	510	536
<b>Strategy 9. Monitor and evaluate programme performance</b>							
<b>9.1</b>	<b>Reinforce mechanisms for supervision, monitoring &amp; evaluation</b>						
9.1.1	Develop M&E plan for 2014-2018	Refer Note 1					
9.1.2	Appoint a M&E officer	covered under					
9.1.3	Develop/revise tools for supervision, monitoring & evaluation		0	1,921	0	0	2,000

Activity No.	Activity / Sub-activities	Comment	Budget estimates by year (in USD)				
			2014	2015	2016	2017	2018
9.1.4	Training of trainers on M&E		0	822	0	0	900
9.1.5	Train personnel in regions on M&E		0	4,693	0	5,163	0
9.1.6	Conduct monthly consultative 2-day review workshop with all RMOO, technical staff at AMC HQ and stakeholders		6,450	10,863	11,406	11,976	12,575
9.1.7	Conduct two review workshops per year		761	4,315	4,531	4,757	4,995
9.1.8	Conduct external evaluation of NMCP		0	0	0	65,000	0
9.1.9	Conduct regular TSG meetings		6,300	6,611	6,910	7,256	7,618
9.1.10	Conduct a malaria indicator sample survey (MIS)		0	0	0	17,164	0
9.1.11	Conduct regular supervision in the field		18,000	60,337	64,808	68,048	71,451
<b>9.2</b>	<b>Ensure certification of malaria elimination</b>						
9.2.1	Establish processes & policies and document evidence that will ensure certification of malaria elimination	covered in 9.1.1					
<b>Total</b>			<b>8,819,615</b>	<b>10,016,583</b>	<b>9,205,899</b>	<b>9,809,282</b>	<b>10,220,913</b>

Note 1: These activities will be done together with other activities; therefore, a separate budget has not been allocated.