National Strategic Plan for Prevention of Re-establishment of malaria in Sri Lanka

2023 - 2027

Anti Malaria Campaign
Ministry of Health Sri Lanka

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List of Abbreviations

ACD	-	Active Case Detection
AMC	-	Anti Malaria Campaign
AMC HQ	-	Anti Malaria Campaign Head Quarters
BCC	-	Behavioural Change Communication
COVID	-	Coronavirus Disease
CRC	-	Case Review Committee
DHIS2	-	District Health Information Software 2
DGHS	-	Director General of Health Services
ELISA	-	Enzyme-linked immunoassay
GF	-	Global Fund
GFATM	-	Global Fund to fight against AIDS, Tuberculosis and Malaria
GMP	-	Global Malaria Programme
GNP	-	Gross national product
G6PDd	-	Glucose-6-Phosphate Dehydrogenase deficiency
HEO	-	Health Entomology Officer
HIV	-	Human Immunodeficiency Virus
HR	-	Human Resources
IEC	-	Information, Education and Communication
IRS	-	Indoor Residual Spraying
IVM	-	Integrated Vector Management
LLIN	-	Long Lasting Insecticide treated Nets
MOH	-	Medical Officer of Health
MoH	-	Ministry of Health
M&E	-	Monitoring and Evaluation
NDCU	-	National Dengue Control Unit
NGO	-	Non-Governmental Organization
PACD	-	Proactive Case Detection
PCD	-	Passive Case Detection
PD	-	Provincial Director
PHFO	-	Public Health Field Officer
PHLT	-	Public Health Laboratory Technician
POR	-	Prevention of re-establishment
QA/QC	-	Quality Assurance (QA)/ Quality Control (QC)
RACD	-	Reactive Case Detection
RD	-	Regional Director

RDHS	-	Regional Director of Health Services
RDT	-	Rapid Diagnostic Test
RMO	-	Regional Malaria Officer
SEARO	-	South East Asia Regional Office
SMO	-	Surveillance Medical Officer
SOP	-	Standard Operating Procedures
TSG	-	Technical Support Group
UN	-	United Nations
VBDC	-	Vector Borne Disease Control
VBDCU	-	Vector Borne Disease Control Unit
WHO	-	World Health Organization

Executive Summary

The National Strategic Plan (NSP) for prevention of re-establishment of malaria 2023-2027 is primarily targeted at sustaining Sri Lanka as a malaria-free country after being certified by the World Health Organisation (WHO) in September 2016[1]. Sri Lanka has been able to maintain zero indigenous cases of malaria for over 10 years since 2012. There was one introduced case of malaria detected in 2018 but further spread was prevented with implementation of an intense response. No death due to malaria has been reported since 2007.

The Anti Malaria Campaign (AMC) has transitioned successfully from funding from the Global Fund (GF), the last grant ending in 2021, to mobilising adequate local funding to continue with the programme. Its strategies have also evolved over the years through control to elimination to prevention of re-establishment phases.

Today, the programme faces new challenges post-coronavirus disease (post-COVID) and in the midst of a serious economic crisis, the worst the country has faced since independence. The current economic crisis has also led to travel restrictions due to strict fuel quotas and budgetary cuts. Tourism, a major earner of foreign exchange and an industry that provides employment to a large segment of the workforce, is been revived post-COVID and the possibility of importation of malaria will definitely increase. In the light of these developments, this NSP is developed to meet any contingencies that may arise during the next five years. It builds on the achievements of the previous strategic plan by strengthening the strategies, such as intensified surveillance and response, outbreak preparedness, prevention, early diagnosis and treatment with radical cure, that were successfully implemented previously, and introduces new strategies as the health system evolves.

The NSP supports advocating for continued commitment against the disease and provides justification for sustained investment for the prevention of re-establishment of malaria in Sri Lanka. The NSP provides a framework for the programme to work within the existing structures and defines specific milestones towards preventing re-establishment of malaria in Sri Lanka.

Given that the AMC and that the programme has successfully prevented re-establishment of malaria for over 10 years, the same plan and activities should be continued with some tweaking necessary as and when needed. Political and financial commitment has to be ensured for prevention of re-establishment of malaria under whatever circumstances as the country is highly receptive for disease transmission. Vigilance has to be maintained at a very high level.

[1] Mendis, K., Premaratne, R. (2021). Sri Lanka: Long Battle to Eliminate Malaria. In: Singh, P.K. (eds) Elimination of Infectious Diseases from the South-East Asia Region. SpringerBriefs in Public Health. Springer, Singapore. https://doi.org/10.1007/978-981-16-5566-1_6.

Surveillance and response for malaria is the singular focus of the 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. The current approaches for surveillance should be continued.

Sustaining awareness of malaria among medical practitioners through in-service training, and continued collaboration with medical educators and professional medical associations and colleges is a priority. All modes of communication should be used to update medical practitioners. The high-quality malaria diagnostic service should be maintained by the AMC to ensure quality diagnostic services. Access to a hotline for queries regarding case management and procurement of quality assured antimalarials should be continued as at present.

The NSP is based on three strategic and seven cross-cutting strategic approaches.

Strategic approach I: Intensified surveillance

Intensified surveillance includes both parasitological and entomological surveillance.

The currently practised 1-2-5-day (1 for notification, 2 for investigation and 5 for response) schedule for parasitological surveillance should be carried out. Universal access to quality assured malaria diagnostic services should be provided by the AMC. All patients presenting with fever and a travel history, and those with fever over 7 days or without any other apparent aetiology should be tested for malaria both in the public and private sectors.

Case and foci investigation and case and foci classification will be conducted under the purview of the case review committee as outlined in the scope of work when a malaria case is detected. The case investigation form will be reviewed and modified if necessary. A death investigation form will be developed. Special investigations will be carried out for all severe malaria cases and malaria deaths.

It is also proposed that a community surveillance system will be established to assess importation risk.

The reduced entomological surveillance activities will be reviewed in the light of prevetion of re-establishment of malara and new guidelines that will incorporate entomological surveillance of other vector borne diseases will be developed. Guides to assess risk of importation and receptivity will be developed. These will be combined and risk maps of potential malariogenic areas in the country will be developed.

Strategic approach II: Case management

Universal access to malaria diagnosis and treatment for radical cure will be ensured. 100% of confirmed malaria patients will receive recommended quality assured treatment within 2 hours of diagnosis. Currently, the national treatment guidelines are being revised. A 24-hour hotline is available and will be continued. Advocacy programmes will be conducted for clinicians in all sectors regarding the importance of preventing re-establishment of malaria and the need to detect cases early to prevent further spread of the disease. In addition, updates on malaria diagnosis and

treatment will be provided through various channels (print and electronic media, social media, digital media, etc.). RDTs will be made available through the AMC in all hospitals, including private sector hospitals, that have intensive care units. All diagnosed cases will be treated in hospital under direct observation to ensure compliance to treatment. All cases will be followed up as part of integrated drug efficacy surveillance as per the scope of work when a malaria case is diagnosed.

Strategic approach III: Strengthening outbreak preparedness, prevention and response

Given the fact that malaria vectors still exist in the country and that a new vector of urban malaria has emerged, the potential for malaria outbreaks is high. This coupled with a population having a waning immunity against malaria and the expected importation risk is high given the envisaged tourism boost is likely to trigger outbreaks and even lead to malaria 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. The AMC will ensure effective malaria outbreak preparedness and response to potential malaria outbreaks in vulnerable populations and in receptive areas through establishing effective outbreak response teams having trained personnel that could be mobilized at short notice. Standard Operating Procedures for outbreak response outlinung all activities that need to be carried out pending a potential outbreak and during an outbreak will be developed.

Cross-cutting strategic approach I: Quality assurance for prevention of re-establishment of malaria

Performance appraisal of PHLTs will be conducted on an annual basis and international accreditation will be sought through the WHO SEARO. Level 1 PHLTs will be designated as expert PHLTs and will be used for cross checking of blood smears. QA/QC laboratories will be upgraded.

SOPs for entomological surveillance are currently been revised. An M&E toolkit will be introduced for quality assurance of entomological surveillance including monitoring of insecticide resistance and bioassay techniques.

Only WHO pre-qualified anti-malarial commodities will be procured wherever possible.

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

Monthly meetings and quarterly reviews will be conducted to identify gaps and to take necessary corrective actions.

Cross-cutting strategic approach II: Health system strengthening

Periodic refresher training for doctors, nurses, laboratory technicians and health personnel on when to suspect malaria, highlighting the need to seek travel histories to endemic countries in febrile patients are proposed.

Quality assurance in diagnosis will be sustained for malaria microscopy. The outbreak response capacity for malaria will be maintained by linking it to considering malaria as a component of International Health Regulations and as part of the country's health emergency response systems.

There are several instances where prevention of re-establishment activities have been integrated with other disease control programmes. With the emergence of *An. stephensi*, intensified entomological surveillance includes *Aedes* surveillance and the data are shared with the dengue control units. Larvivorous fish are used for both *An. stephensi* and *Aedes* control making integration feasible with sustainable funding. In some regions, especially those in which there were no RMOs, PoR activities have been entrusted with Medical Officer (Vector Borne Diseases) and even Medical Officer (Filariasis). Joint activities to be conducted with the National Dengue Control Unit are proposed.

Cross-cutting strategic approach III: Inter-sectoral collaboration and coordination

The AMC has established many links with other sectors to facilitate early detection and treatment of imported malaria cases such as the private sector, the Ministry of Defence and the Sri Lanka Police, the Port Health Office, the Ministry of Buddha Sasana, travel agents and religious leaders. These links will be further strengthened with regular stakeholder meeting conducted at least once in 6 months.

Cross-cutting strategic approach IV: Communication and advocacy strategy

Despite AMC conducting many advocacy programmess targeting different groups, no formal communication and advocacy strategy has been developed. A communications and advocacy strategy is an urgent need and it is proposed that such a strategy will developed in the first year and implemented commencing in the second year.

The key messages to be delivered and modalities for the delivery of messages will vary based on the targeted group. These should be identified and the strategy and plan for implementation including a monitoring and evaluation framework should be developed by a professional team, ideally involving the Health Promotion Bureau of the Ministry of Health.

Establishment of a communications unit is proposed to take the lead role in establishing, facilitating and coordinating intersectoral committees and collaboration for prevention of re-establishment of malaria among stakeholders at central, provincial, regional and community levels and re-designing the website to provide upto date information for travellers and be linked to advisories on travel health.

Cross-cutting strategic approach V: Monitoring and Evaluation Framework

The AMC will have the overall responsibility to monitor the NSP's success towards its stated targets. A dedicated officer at central level will be assigned for monitoring and evaluation. The TSG and the CRC will have oversight on all monitoring and evaluation activities. The officer designated for M&E will present monthly updates to the TSG.

Regular RMO review meetings will be conducted on a monthly basis. The TSG will meet once every 2 months to provide technical advice as given in its terms of reference. The CRC will meet every month to review all reported cases and to classify cases.

A mid-term internal review coordinated by the TSG will be conducted in the first quarter of 2026, or earlier, if needed.

Cross-cutting strategic approach VI: Improving programme management and performance

Improving programme management and performance will be essential when integration of services is considered. With integration of services, a re-orientation of staff will be conducted. This re-orientation will include potential task shifting and re-assignment of duties.

It is proposed that an inventory system be included in the revised web-based surveillance system to generate real time data which would be useful for procurement purposes.

Annual reports will be published within 3 months and displayed in the website.

High impact events related to malaria will be organized to raise awareness about the threat of re-establishment of malaria via imported malaria cases.

Cross-cutting strategic approach VII: Operations and Implementation Research

It is planned to assess the functioning of different management and implementation models that are currently existing in the regions in two years with a view to integrating some activities with other disease control programmes, where possible.

1. Introduction

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Today, the programme faces new challenges post-coronavirus disease (post-COVID) and in the midst of a serious economic crisis, the worst the country has faced since independence. During the COVID pandemic there were major restrictions in travel to deliver services but lockdowns and quarantine requirements made it easier to locate and screen incoming travellers from malaria endemic countries. The current economic crisis has also led to travel restrictions due to strict fuel quotas and budgetary cuts. In addition, there were many disruptions of work due to large scale public protests in 2022. Tourism, a major earner of foreign exchange and an industry that provides employment to large segment of the workforce, is been revived post-COVID and the possibility of importation of malaria will definitely increase. In the light of these developments, this NSP is developed to meet any contingencies that may arise during the next five years. It builds on the achievements of the previous strategic plan by strengthening the strategies, such as intensified surveillance and response, outbreak preparedness, prevention, early diagnosis and treatment with radical cure, that were successfully implemented previously, and introduces new strategies as the health system evolves.

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2. Planning and partnerships for joint strategic planning

The WHO Country Office recruited a consultant to assist the AMC in developing the National Strategic Plan for the prevention of re-establishment of malaria in Sri Lanka. The consultant held several meetings with AMC staff including Regional Malaria Officers. A situation analysis was conducted wherein all AMC staff and the Technical Support Group (TSG) members contributed during several meetings and online discussions. Further, meetings were held with key staff of the Anti Malaria Campaign Headquarters (AMC HQ),

Regional Malaria Officers (RMOs) and retired RMOs to identify strategic approaches for the next five years. Based on these discussions, a draft strategic plan and an action plan was developed. The preliminary draft was circulated and discussed among AMC staff. Their comments were incorporated and the revised draft NSP was presented at a multi-stakeholder meeting. The NSP 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

The National Malaria Strategic Plan 2018-2022 outlined the prevention of re-establishment of malaria in the country which has been successfully achieved despite having to transition from GF funding to mobilising local funds. Due to the COVID pandemic and subsequent public protests and the economic crisis, some of the activities outlined in the previous NSP have not been addressed[2].

The AMC has maintained intensified case and entomological surveillance and has ensured universal access to quality assured malaria diagnostic and treatment services free of charge. Over the years, a good rapport has been established with the private sector. All infections are detected early, notified immediately and treated with quality assured antimalarial medicines in hospital based on national treatment guidelines to ensure radical cure and to prevent secondary transmission. All cases are investigated, and response is initiated within 5 days[3]. Entomological surveillance is conducted routinely as recommended by the Entomological Surveillance guideline 2019 to monitor receptivity and vector control carried out based on the vector control guidelines[4]. Quality assurance of diagnosis is done routinely. Chemoprophylaxis is given to travellers visiting malaria endemic countries. All malaria cases are classified by the Case Review Committee (CRC) and followed up. Adequate stocks of antimalarial commodities (RDTs, medicines, LLINs, insecticides) are in stock but supply chain management system needs to include antimalarial commodities.

Standard Operating Procedures and guidelines for different activities are available but they need to be updated regularly.

Although an online web-based real-time surveillance system is in place it is not fully operational. The AMC also lacks a communication strategy. Provision of regular information to healthcare workers needs to be further strengthened.

[2] Anti Malaria Campaign – National Strategice Plan for prevention of re-establishment of Malaria in Sri Lanka 2018-2022.

[3] Anti Malaria Campaign Ministry of Health Sri Lanka (2016) SCOPE OF WORK TO BE PERFORMED WHEN A MALARIA PATIENT IS REPORTED

[4] Anti Malaria Campaign (2017) Revised guidelines for malaria entomological surveillance in POR phase

On-site supervision and review were hampered during the COVID pandemic and currently due to the economic crisis and budget cuts; this needs to be further strengthened.

3.2 Country profile

Sri Lanka is a tropical country having a land area of approximately 65,610 square kilometres, and a population of approximately 22 million[5]. It has a central mountainous region surrounded by plains stretching to coastal areas. The mean temperature varies between 26ºC–28ºC in the low country, and between 14ºC-24ºC in the central hill country. For administrative purposes, the country is divided into 9 provinces, 26 districts and 277 Divisional Secretariat areas. The Ministry of Health (MoH) usually considers a Divisional Secretariat 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[6].

Approximately 23% of the country's population inhabits urban areas. The country has a high population density of 341 persons per km^2. Life expectancy is around 75 years and the literacy rate is 96.9%. Sri Lanka's economy has contracted by about 12% in the third quarter of 2022 and inflation at the beginning of 2023 was around 60%. The Sri Lankan rupee depreciated by about 45% in 2002[5].

The road network in the country is reasonably well developed and organized with all areas being largely accessible.

3.3 Burden of disease

Sri Lanka has one of the fastest ageing populations in South Asia and Asia. With the control of infectious diseases, morbidity and mortality due to non-communicable diseases is now the major burden of disease. The immunization coverage is over 98%; the maternal mortality ratio was 25.7 per 100,000 live births (2014 data) and the infant mortality rate was 8.5 per 1000 live births (2014 data)[6].

The country has successfully eliminated polio and malaria; it has successfully eliminated filariasis, leprosy, rubella, measles and leprosy as public health problems. No mother-to-child transmission of HIV has occurred since 2017; two cases of congenital syphilis per 100,000 live births have been reported for many years, much less than the 50 per 100,000 live births required for WHO certification[6].

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 2-3 years. Often AMC staff are called upon for dengue control work.

[5] Department of Census & Statistics Sri Lanka, 2022. Statistical Pocket Book 2022.
[6] Ministry of Health, Sri Lanka. Annual Health Bulletin 2019.

Although the burden of malaria is extremely low or non-existent at present (less than 100 imported cases per year since elimination), the potential for malaria outbreaks and a resurgence of malaria is enormous with the presence of vectors in traditionally malarious areas as well as the increasing number of travellers to and from malaria endemic countries. A new vector, *An.stephensi*, not previously reported in Sri Lanka was first detected in the Mannar district in December 2016; Since then regular monitoring has been carried out, the vector was also found in Jaffna, Vavuniya, Kilinochchi, Mullaitive districts and Kalmunai region[7]. This vector is a serious threat to prevention of re-establishment of malaria as it is a known vector of urban malaria which was not seen in the country before. It is also resistant to insecticides. A focused intensive control programme was carried out using larvivorous fish which has been successful in eliminating the vector in four districts (Mannar, Vavuniya, Kilinochchi and Mullative).

Since 2013, less than 100 imported malaria cases have been reported annually, with one introduced case in 2018. Doctors are constantly being reminded of the need to ask for a travel history, and to test for malaria in those with a travel history to a malarious country or region.

3.4 Health sector profile

Government health expenditure as a percent of GNP was 1.8% in 2019. Government health expenditure as a percent of total government expenditure in 2019 was 6.44% giving a per capita health expenditure of SLR 12,037[6].

Healthcare 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 the central, provincial and local government healthcare 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 1069.8 persons[6].

50% of national health expenditure in 2016 was financed by out-of-pocket-expenditure while the government sector contributed 44% (including central, provincial and local government agencies); 6% was financed by voluntary health insurance schemes[8]. The

[7] A. G. Gayan Dharmasiri, A. Yashan Perera, Jeevanie Harishchandra, Hemantha Herath, Kandasamy Aravindan, H. T. R. Jayasooriya, Gaya R. Ranawaka and Mihirini Hewavitharane (2017). First record of Anopheles stephensi in Sri Lanka: a potential challenge for prevention of malaria reintroduction. Malaria Journal 16:326.

[8] WHO 2021. Sri Lanka Health System Review. World Health Organization Regional Office for South East Asia New Delhi. ISBN: 9789290228530.

private sector is mainly responsible for the provision of outpatient curative care services. In addition to western medicine, traditional medicine is widely practised in the country.

Currently, there are about 362 health units in the country, referred to as Medical Officer of Health areas that provide grassroots 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 the 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, the Anti Malaria Campaign being one of them.

3.5 Malaria profile

3.5.1 Malaria situation in the country

3.5.1.1 Burden of malaria

Malaria was 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. 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. No indigenous case of malaria has been reported since November 2012. Sri Lanka was certified as malaria-free in September 2016 by the WHO.

In the past when malaria was endemic in Sri Lanka, *P.vivax* infections predominated *P.falciparum* infections the only two species reported in Sri Lanka since the 1970s. Since elimination of indigenous transmission in the country, about 50-100 imported malaria cases, the majority in adult males, are reported each year except for a single introduced case of *P.vivax* in 2018 and a transfusion induced malaria infection reported in 2021 through a blood donor who was a serviceman who had served in Africa; this infection was missed during routine examination of blood donors (Table 1).

Currently, infections of all parasite species are reported in Sri Lanka (Table 1). This has required conducting regular in-service training programmes for Public Health Laboratory Technicians (PHLT). Most infections are reported among Sri Lankans who have visited malaria endemic countries. The counties of origin of infections are given in Table 2. Identified risk groups include persons traveling to malaria endemic countries, security forces personnel who serve in UN peace keeping forces in Africa and other endemic countries, pilgrims, fishermen, leisure travellers, gem merchants, tourists, migrant workers and labourers, immigrants from neighbouring countries and refugees from malaria endemic countries.

Figure 1: Milestones in malaria control in Sri Lanka

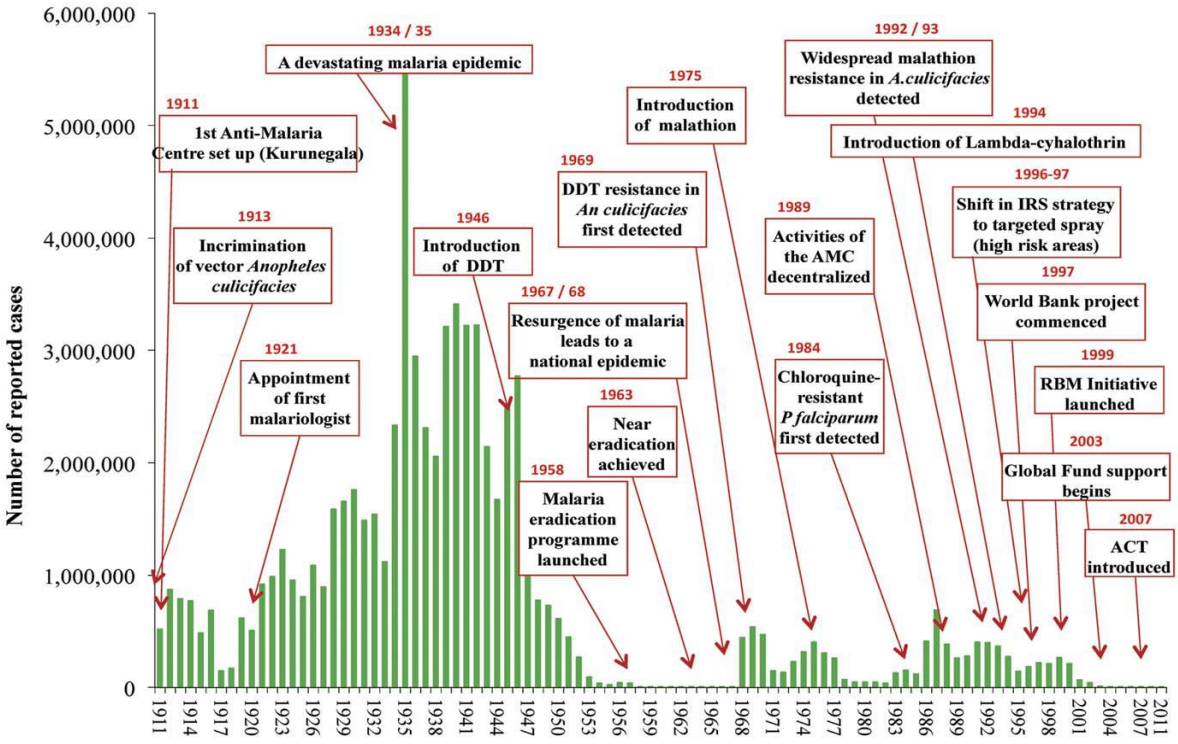


Table 1: Malaria incidence in Sri Lanka 2013-2022

Year	***P.vivax***	***P.falciparum***	***P.malariae***	***P.ovale***	***P.knowlesi***	**Mixed infections**	**Total**
2013	52	42	00	01	00	00	95
2014	28	20	01	00	00	00	49
2015	17	17	00	02	00	00	36
2016	16	18	01	05	01	00	41
2017	27	26	01	03	00	00	57
2018	30[1]	15	00	03	00	00	48
2019	24	24	02	03	00	00	53
2020	11	08	02	08	00	01 (Pf+Po)	30
2021	04	14[2]	00	08	00	00	26
2022	03	25	01	08	00	00	37

[1] Includes one (01) introduced case
[2] Includes one (01) transfusion induced malaria case

Table 2: Country of origin of malaria infections reported in Sri Lanka 2013-2022

Country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Afghanistan						1				
Angola	1									1
Benin										2
Burkina Faso		1								
Burundi										
Cameroon	2					1				2
Central Africa			4	3		1	2		2	
Central African Republic						5	3	4		5
China				2						
Congo		1		1			1			
Djibouti Island						1			1	
Equatorial Guinea	1							1		
Ethiopia						4	1	4	1	
Gabon		1								
Ghana	4	1	1			1	2		2	1
Grande Comoren	1									
Guinea	1									2
Haiti	2									
India	38	23	14	14		17	17	5	1	2
Indonesia		1		1			1			
Ivory Coast			1							2
Kenya	3			1		1	1	2		

Country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Liberia	2		2	1			1		2	1
Madagascar		1	1	1		5	1	3	2	4
Mali							1			
Malawi		1		1						
Malawi/Bangladesh					1					
Malaysia				1						
Mali	1									
Mozambique	2	1	2	6		1	3		1	4
Myanmar	3	1					1			
Nigeria	1	4	2				1			1
Pakistan	17	6	3				2	1		
Saudi Arabia			1					1		
Sierra Leone	11	3				1	3		1	2
Solomon Island				1		1	1			
South Africa			1							
South Sudan							3		7	2
South Sudan/Uganda					1					
Sri Lanka						1			1	
Sudan	2	3	3	1		7				
Tanzania	1		1	1						2
Togo							1			
Uganda	2	1		6		2	4	8	5	1
West Africa						1		1		2

3.5.1.2 Receptivity

Ongoing routine entomological surveys indicate that incriminated vectors, both the principal and secondary vectors, are still abundant in previously malaria endemic regions of the country, thus, the country having a high risk for re-establishment of malaria. In addition, the reporting of *An. stephensi*, a known vector of urban malaria which is resistant to chemical insecticides which probably originated from neighbouring India, for the first time in Mannar in December 2016, has added to the risk of re-establishment of malaria in the country[7]. Subsequently, this vector was reported from the Vavuniya, Jaffna, Kilinochchi, Mullaitive and Kalmunai regions. With intensified surveillance and use of larvivorous fish the vector has not been reported from Mannar, Vavuniya, Kilinochchi and Mullative districts in 2022. Efforts are currently being carried out in all the districts to prevent its further spread and re-establishment in districts that have eliminated the species.

3.5.1.3 Prevention of re-establishment strategies/activities

Sri Lanka has an impressive over 10-year record of preventing the re-establishment of malaria despite having an introduced case in 2018, and the emergence of a new vector species in already receptive areas. The main strategy adopted is intensified surveillance in the form of PCD, PACD and RACD followed by prompt quality assured treatment and rapid response with other interventions based on findings of case investigations. A 1-2-5-day strategy is adopted for immediate notification on day 1, case investigation by day 2 and response by day 5 of detection of a case[3]. All procedures are clearly spelled out in well documented SOPs that are accessible to all staff. Quality assurance mechanisms are in place. Routine and extended entomological surveys and spot surveys are carried out in all regions as per the guidelines for entomological surveillance. Vector control is based on guidelines for vector control.

A major thrust is laid on keeping clinicians updated and reminding them of the risk of re-establishment of malaria in the country. With decreasing number of cases being reported and focus more on dengue, clinicians tend not to consider malaria in the differential diagnosis of persons presenting with fever.

All cases are investigated supported by RACD and entomological surveillance to rule out the possibility of local transmission; response including vector control is initiated within 5 days. A Case Review Committee appointed by the Director-General of Health Services reviews all cases and classifies them.

3.5.1.4 Malaria during the COVID pandemic

The COVID pandemic provided some relief in terms of reducing the importation risk due to an embargo on international travel, and brought in fresh challenges in terms of conducting routine prevention of re-establishment of malaria activities due to lockdowns and fuel and internal travel restrictions which continued even beyond the pandemic into the economic crisis that followed. The controlled international travel during the initial stages of the pandemic and the quarantine regulations made it possible for the AMC to identify travellers

from malaria endemic countries and screen them while in quarantine centres[9]. All travellers from malaria endemic countries were followed up later. Despite the difficulties in investigating cases, entomological surveillance and vector control activities were carried out around quarantine centres located in receptive areas.

3.5.1.5 Anti Malaria Campaign

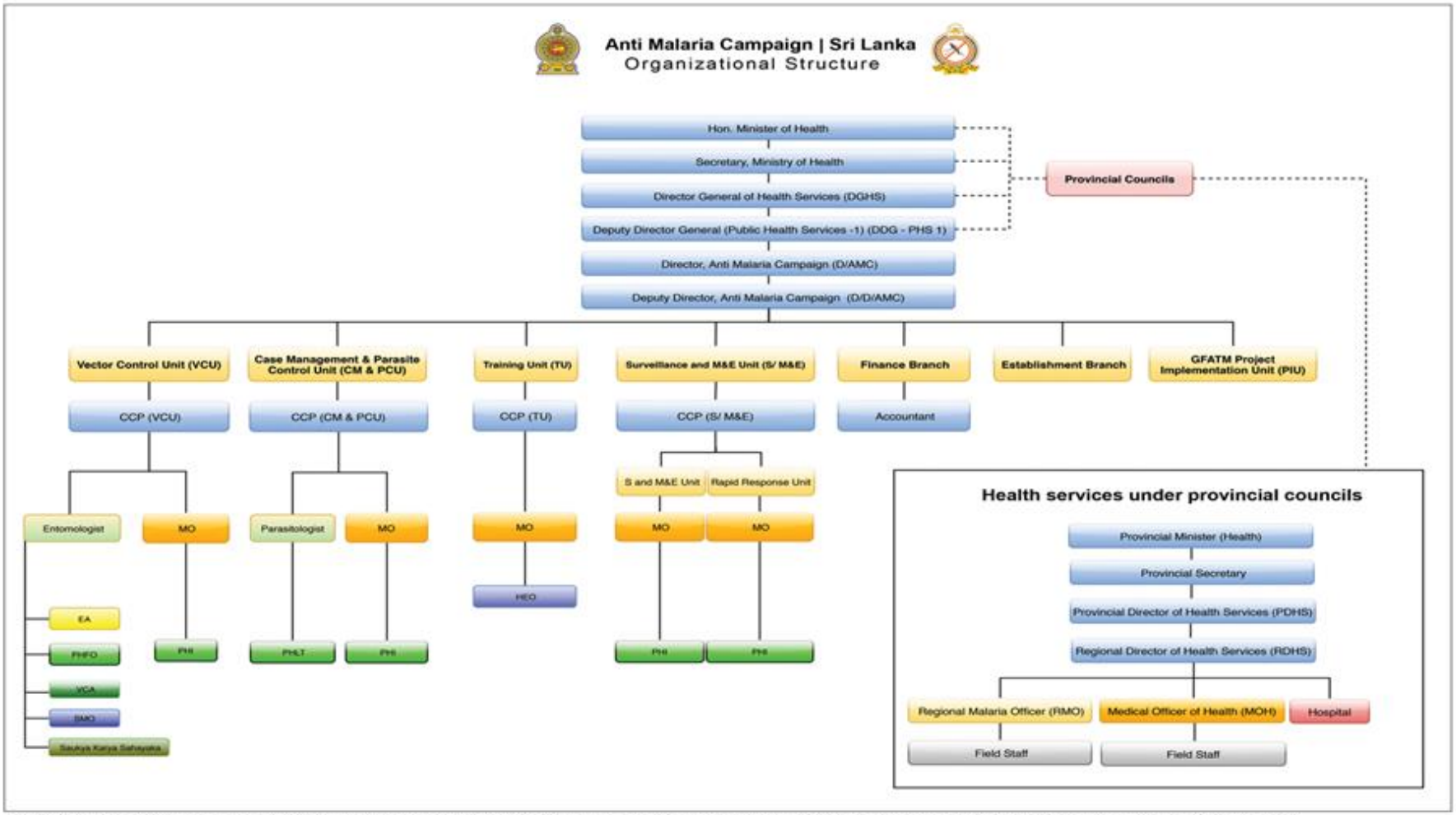
Prevention of re-establishment of malaria comes under the purview of the Anti Malaria Campaign. The Anti Malaria Campaign (AMC) is a directorate of the Ministry of Health under the Director General of Health services (DGHS) and the Deputy Director General of Public Health Services I. In the past, the Anti Malaria Campaign conducted activities as a vertical programme through Regional Malaria Officers (RMOs) attached to the AMC. With devolution of powers in 1987, Regional Malaria Officers were incorporated into the Provincial Health Authority and anti malaria activities were decentralised to the respective Medical Officers of Health (MOHs) under the guidance of the RMOs; however, links were maintained with the AMC HQ which provided technical guidance and financial assistance as and when required. This administrative structure has been in place for over 35 years and malaria elimination was achieved during this period.

In the past the RMOs were appointed only to malaria endemic regions and were solely responsible for anti malaria work. With the emergence of Dengue as a major public health problem in the country, RMOs were designated to carry out Dengue control activities with the responsibility of case surveillance being retained by the Epidemiology Unit of the Ministry of Health. Recently, the AMC was also designated as the focal point for Leishmaniasis with the increase in the number of cutaneous leishmaniasis cases being reported in the country; however, there is no organised surveillance or programme for leishmaniasis control in the country. The organogram of the Anti Malaria Campaign Headquarters in Colombo is given in Figure 2. The organogram of Regional Malaria Offices is shown in Figure 3.

During the last 5 years or about, medical officers were appointed to regions which had no RMOs previously. In the Galle and Matara Regional Director of Health Services (RDHS) areas, medical officers were appointed to oversee prevention of re-establishment of malaria given the importation risk and the reporting of imported malaria cases in these areas; these officers are designated as Medical Officers (Vector Borne Diseases) and are responsible for malaria, dengue, filariasis and leishmaniasis control activities. Additional portfolios have been entrusted on appointed RMOs over time with the emergence of dengue, filariasis and leishmaniasis. In Colombo and Gampaha regions, the Medical Officer for Filariasis overlooks anti malaria activities as well. Some of these newly created offices and positions are poorly equipped and lack staff to conduct effective control activities.

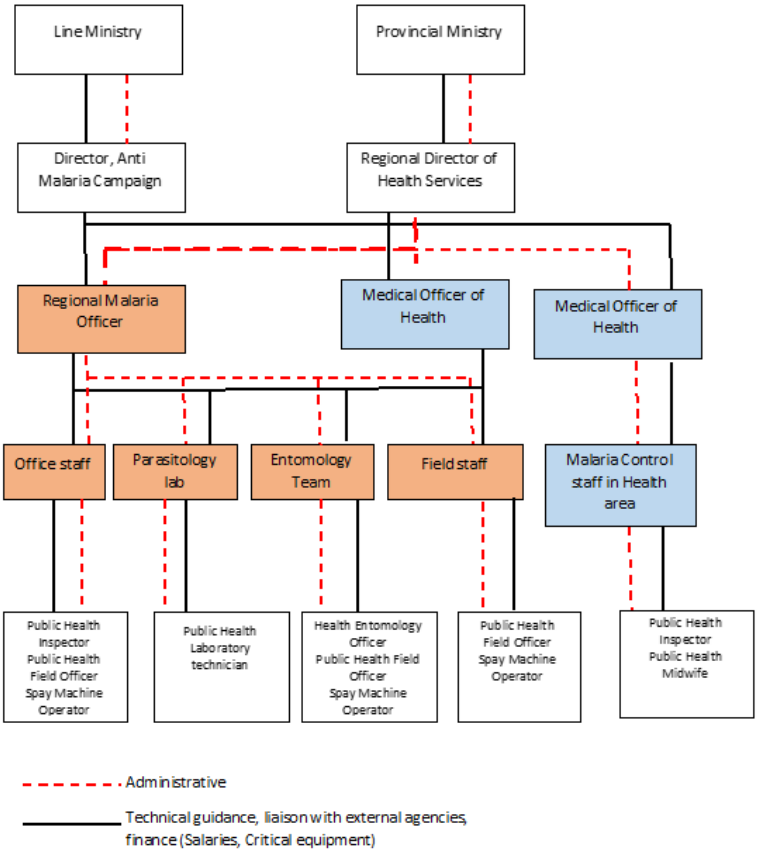
[9] Ranaweera, P., Wickremasinghe, R. & Mendis, K. Preventing the re-establishment of malaria in Sri Lanka amidst the COVID-19 pandemic. Malar J 19, 386 (2020). https://doi.org/10.1186/s12936-020-03465-5.

Figure 2: Organogram of the Anti Malaria Campaign Headquarters



Key - CCP: Consultant Community Physician; **DA**:Development Assistance; **DEO**: Data Entry Operator; **HEO**: Health Education Officer; **MA**: Management Assistance; **MO**: Medical officer; **PHFO**: Public Health Field Officer; **PHI**: Public Health Inspector; **PHLT**: Public Health Laboratory Technician; **SMO**: Spray Machine Operator; **VCA**: Vector Control Assistant.

Figure 3: Organogram of Regional Malaria Offices



4. Situation and gap analyses

The situation analysis compiled by all technical staff of the AMC including Regional Malaria Officers is given in Table 3. Based on the discussions and comments sent by all technical staff of the AMC, the gap analysis given in Table 4 was compiled.

Table 3: Situation Analysis

Domain	Strengths	Weaknesses	Opportunities	Threats
Diagnosis **Diagnostic network** (distribution, SOPs, diagnostic aids, trained staff, consumables and reagents) **Quality assurance** (focal point, reference laboratory, training, external quality assurance, microscopy and RDT quality assurance, etc)	Trained Staff	Doctors not referring patients with a travel history for malaria screening. Delayed diagnosis.	Engage the private sector	Fuel Crisis
	PHLTs available in District hospital and above and Regional Lab	Blood film taken from ACD station by PHFO not delivered to PHLT on time	Get support from NGOs or other organization to provide support (for screening and motor bikes etc)	Patients can be misdiagnosed by private health sector
	Trained QA/QC PHLT available at RMO office and Local (Region) QA/QC done by QA/QC PHLT	QC/Sample return back to Regional Lab and no facilities to return back to AMC/HQ.		Lack of experienced resource persons
	Well Organized private laboratory network.	PHFO and PHLT vacancies		Lack of funds
	SOPs exists	Maldistribution of staff		Inadequate supply, poor quality products.
	Diagnostic network is available	Difficulty in sending blood films to nearest lab in some rural areas.		Lack of routine coordination
	Diagnostic aids available	SMO vacancies for field programmes		Mal distribution / supply
	RDT freely available at government and private sector	Lack of awareness on malaria in community level		QA/QC trained PHLTs will be retiring soon
	Crosschecking system of malaria blood films at national level	Consumable and reagents are not adequate		
	Giving direct guidance to regional level from AMC HQ staff when a patient is diagnosed	New PHFOs are not provided with motor bikes.		
	Availability of refresher training for PHLTs. Circulars issued	Guidelines are not accessible to all medical officers.		

Domain	Strengths	Weaknesses	Opportunities	Threats
	Availability of standard formats & diagnosis cards			
	Maintenance of registers for details of positive cases	Lack of private sector participation for both diagnosis and treatment.		
	Availability of good monitoring system at RMO office level & national level.	Evasion and refusal of screening tri-forces personnel during follow-up		
	Having a TSG and CRC for advice			
Case management (guidelines, training, referral system, severe and uncomplicated patient management, patient follow up, Integrated Drug Efficacy Surveillance, drug supply, private sector, etc)	Availability of a hotline for advice on case management.	Treatment guidelines need to be updated	Coordination between AMC and the private sector.	Lack of HR can lead to delays in reporting
	Extensive partnerships with institutions	Guidelines are not available for all medical officers		Malaria is becoming a forgotten disease
	Guidance and Support provided by the AMC HQ	Poor participation of medical officers for training programme		Lack of transport facilities
	Continuous drug supply through AMC	Lack of training on Integrated Drug Efficacy Surveillance		
	Guidelines-available	Difficulty in getting G6PDd testing		
	Regular training programmes for clinicians being conducted	All vehicles are not in good running condition		
	Presence of a referral system	Treatment delay giving rise to complications.		
	Follow up of patients			
	Treatment guidelines available.			
	Conducting Integrated Drug Efficacy Surveillance			
	Involvement of the private sector			
	Having a good coordination & communication			

Domain	Strengths	Weaknesses	Opportunities	Threats
	system between RMO office staff &AMC HQ staff when a patient is diagnosed			
	Only inward treatment is allowed for patients			
	Having a TSG and CRC for advice			
Surveillance (guidelines, training (including private sector), PCD, ACD, PACD, RACD, private sector, coverage, case and foci investigation, case classification, monitoring and evaluation, feedback, stratification, response plans, etc)	Immediate reporting of cases	Lack of resources and lack of training	Using resources from both Central & provincial facilities and other health partners	Budget cuts
	Surveillance guidelines available.	Delays in detection and sending blood smears for examination.	Can strengthen parasitological screening surveillance in private sector with better networking	Lack of staff and suspension of recruitment.
	Availability of trained PHFOs, PHLTs & SMOs	Lack of SMOs for field programmes	Establish a data flow from private sector to government sector	
	Transport is provided by RMO office for parasitological survey staff	Lack of PHFOs in hospitals		
	Availability of consumable items for parasitological screening	No established system to get information on risk individuals & risk groups from the community or relevant authorities		
	Screening of high-risk groups (pilgrims, foreign workers, gem traders, returnees from malaria endemic countries)	No proper monitoring system for hospital level PHFOs		
	Issuing a high-risk screening card for every person	Monthly returns (to enter all activities done by PHFOs) are not available except P formats		
	Availability of good monitoring & evaluation system	Web based surveillance system		

Domain	Strengths	Weaknesses	Opportunities	Threats
	for parasitological screening at RMO office level, District level & national level	is not updated in a timely manner.		
	Availability of Response plan and a response team	Shortage of fuel supply hinders the mobile clinics		
	Conducting case investigation and case classification	Lack of consumables in some institutions		
	Having a TSG and CRC for advice	Staff should be trained on surveillance		
		Lack of support from the community		
		Communication gaps or weak communication between peripheral / private hospitals and regional office		
Entomology (frequency of surveillance, vector species and behaviours, training and availability of staff, surveillance as part of response, insecticide susceptibility and resistance monitoring, etc)	Availability of trained skilled staff.	Insecticide susceptibility tests not done adequately in some regions	Can improve receptivity maps.	Fuel crisis
	Availability of entomology laboratories in some regions	Shortage of printed formats	Regional laboratories can be used for mosquito rearing for susceptibility tests.	Emergence of new vector species.
	Availability of entomology teams	Lack of fuel for vehicles	Getting support from NGOs	Emergence of insecticide resistant vector strains.
	Availability of some functional vehicles	Difficult to find accommodation for Night out Ento Surveys	Availability of entomologists can be used for routine training and providing technical support to the regions.	
	Carrying out routine surveillance and as part of case investigation.	Vehicles are not in good condition to travel in remote areas.		
	Monitoring insecticide susceptibility & resistance	Lack of supply of personal protective equipment for field level proramme		

Domain	Strengths	Weaknesses	Opportunities	Threats
		(Boots, bags, raincoats, torch		
	Availability of SOP for entomological surveillance	No funds allocated for cattle baited cadjan hut maintenance		
	Availability of trained HEO's and SMOs even though limited.	No laptops or computers for HEOs though they are supposed to enter data in to google system		
	Availability of some equipment for species identification.	District Health Information Software2 (DHIS2) platform does not include entomological surveillance. Data not sent in a timely manner		
	Availability of standard formats for entomological surveillance	Difficulties in finding cattle for cattle baited trap & cattle baited cadjan hut collections.		
	Availability of national level data base system (Google sheets & dash board)	Difficulties in finding cadjan for cattle baited hut collections.		
	Availability of good monitoring system at RMO office level & national level	Some communities reluctant to allow temples & praja shala for night out entomological surveys		
	Availability of emergency plan at district level	Entomology Laboratories are in poor condition. In some regions entomological laboratories are not available.		
	Good support and guidance given by the RDHS office	In some regions, functioning as VBDCU doing ento surveys for filariasis & dengue		
	Having a TSG and CRC for advice	Insufficient coverage of *An. stephensi* surveillance and fish		

Domain	Strengths	Weaknesses	Opportunities	Threats
		introduction programme		
		Logistic and accommodation facilities are not satisfactory for entomological teams.		
		RMOs need training on entomological surveillance.		
Vector control (guidelines and SOPs, methods used, insecticides used, training and availability of staff, outbreak vector control strategy, vector control coverage	Breeding of larvivorous fish in some regions	Limited stocks of insecticides and LLINs	Equipment and staff from the Dengue Units	Budget cuts and fuel crisis
	Having a well-organized for vector control strategy	Many SMOs are retiring. New SMOss are not being recruited. available	Integrated vector management system	
	Availability of necessary equipment but some need maintenance and replacement/			
	Support from the external institution such as harbour and airport.			
	Availability of a LLIN stock.			
	Guidelines, SOP available			
IEC, Advocacy and Community participation (community and advocacy plans, development of materials, methods of dissemination, programmes conducted and coverage, etc)	Availability IEC material in all 3 languages	Limited IEC material.	Good support from other institutions	Budget cuts and fuel crisis
	Availability of malaria PHI	Poor grasp of advocacy and community mobilization strategies and techniques among regional staff.		
	Good multisectoral collaboration	Clinician and GP programmes not sufficient.		
		Community is ignorant of malaria risk. Poor involvement of community in		

Domain	Strengths	Weaknesses	Opportunities	Threats
		vector control programmes including fish introduction programmes.		
		Poor engagement of high-risk groups		
		Poor political advocacy		
		Lack of equipment for advocacy		
Coordination, policy and governance (strategic and action plans, advisory committees, inter-sectoral coordination, capabilities of programme, human resources, political commitment, financial resources etc)	The organization has a well-functioning plan for the coming year	Lack of all grades of staff especially the lower grades. No recruitments and funding for staff.	Integration with other disease control programmes – VBDCU in some regions which may be expanded to other regions.	Lack of funds and resources
	Having a good functioning team	Lack of training of technical personal on implementation of plans	Using available technical experts for training	Trade union actions
	Maintaining good intersectoral coordination	Insufficient in-service training programmes for all grades of staff		
	Guidance and supervision from AMC/HQ	Some staff not provided with basic equipment to carry out work (PHFOs not provided with motor bikes)		
	Good rapport between HQ and regions.	Budget cuts and other funding restrictions at both HQ and regions. Budget restrictions hinder the implementation of all plans and activities.		
	Having a TSG and CRC for advice	Difficulty getting fuel for vehicles		
		No proper Regional Malaria Offices. Those that exist are not properly maintained.		
		Most vehicles are old and need constant repairs.		

Domain	Strengths	Weaknesses	Opportunities	Threats
		Some cannot be repaired due to lack of funds.		
		Shortage of essential supplies (chemicals, slides, personal protective equipment etc)		
		Claim payments delayed and restricted.		
		No allocation for accommodation of entomological teams and maintenance of facilities required for entomological surveillance.		
		No allocation for training and awareness programmes at provincial level.		

Table 4: Gap analysis, proposed activities and recommendations

Domain	Identified gap	Proposed activities
Diagnosis and treatment	Delayed diagnosis of malaria	Raise awareness of doctors to obtain a travel history from fever patients. Increase advocacy and awareness on both public private sector staff to use RDTs. Increase fever surveillance
	Lack of human resources (doctors, technical staff)	Fill all vacancies.
	Shortage of supplies and consumables.	Ensure no stockouts.
	Some laboratories not functional	Provide resources to make the laboratories functional.
	Delay in sending blood films to parasitological laboratories	Proper system should be established to send blood films.
	Guidelines are not accessible to all medical officers.	Upload all guidelines on to the web.
	Lack of private sector participation for both diagnosis and treatment.	Need training and awareness programme.
	Evasion and refusal of screening tri-forces personnel during follow-up	Collaborate with tri-forces HQ

Domain	Identified gap	Proposed activities
	QA/QC slides from peripheral centres not received in timely to the regional centre	QA/QC PHLT will be visit peripheral centres to select and collect required slides
Quality assurance	QA/QC trained PHLTs will be retiring soon	Need to train more PHLTs on QA/QC.
	QA/QC slides from peripheral centres not received by the regional centre in a timely manner.	QA/QC PHLT need to visit peripheral centres to select and collect required slides
Case Management	All vehicles are not good in running condition	Maintain all vehicles properly. New vehicles may be needed in some regions.
	Treatment delay giving rise to complications.	Increase use of RDTs
Surveillance	Delayed detection and notification.	Increased surveillance ACD PACD.
	Malaria risk group tracking mechanism-poor	Establish appropriate tracking system to identify risk groups.
	Web based surveillance system is not updated in a timely manner.	Assign a dedicated web master.
	High risk persons – the visitors to the malaria endemic countries not fully identified	PHFOs to be mobilised to field to identify the persons Separate team to be setup
	Shortage of fuel supply hinders the mobile clinics	Ensure adequate fuel supply
	Lack of consumables in some institutions	Ensure adequate supplies to all institutions.
	Staff should be trained on surveillance	Regular training on surveillance should be carried out for relevant staff (both parasitology & entomology surveillance)
	No proper monitoring system for hospital level PHFOs. Need to develop a monthly return for hospital-based PHFO.	Improve monitoring and supervision of PHFOs. Develop new monthly return for this purpose.
	Lack of field level staff.	Fill field level vacancies.
	Lack of support from the community	Increase the awareness of the community regarding malaria field activities
	Communication gaps or weak communication between peripheral / private hospitals and regional office	Online system to disseminate case data
Entomology and vector control	Entomology Laboratories are in poor condition. In some regions entomological laboratories are not available.	Renovate and equip the existing labs and establish new ento labs in the regions where labs are absent.
	Limited stocks of insecticides and LLINs.	Have adequate buffer stocks of insecticides and LLINs at provincial level.
	Functioning as VBDCU doing ento surveys for filariasis & dengue	Need permanent HEO & staff for the lab
	Staff vacancies of HEOs and SMOs	To be recruited

Domain	Identified gap	Proposed activities
	Insufficient coverage of An. stephensi surveillance and fish introduction programme	Get assistance from neighbouring regions. Establish fish breeding facilities in all regions.
	Logistic and accommodation facilities are not satisfactory for entomological teams.	Provide Logistic and accommodation facilities for the entomological teams and laboratory. Provide accommodation fee for the service provider.
	No regular training for entomological surveillance.	Conduct training programmes to update knowledge.
	Lack of computer facilities for HEOs	Provide computer facilities
	No funds allocated for maintenance of cattle baited traps.	Allocate necessary funds.
	Inadequate standard insecticide susceptibility and bioassay tests	Regional laboratories can be used for mosquito rearing for susceptibility tests.
	Lack of fuel	Need enough vehicles and fuel
IEC, advocacy and community mobilisation	Poor grasp of advocacy and community mobilization strategies and techniques among regional staff.	Conduct training programmes for each category of staff. Use novel ways to engage communities.
	Clinician and GP programmes not sufficient.	Conduct more awareness programmes.
	Community is ignorant of malaria risk. Poor involvement of community in vector control programmes including fish introduction programmes.	Community awareness programmes should be organised with MOH collaboration. Engage communities and schools in vector control programmes.
	IEC materials are short in supply	More IEC materials should be developed and distributed.
	Poor engagement of high-risk groups	Target programmes to high-risk groups or personnel engaging with high-risk groups such as travel agents, etc.
	Poor political advocacy	Need to target politicians and policy makers to impress on them the importance of prevention of re-establishment of malaria.
	Lack of equipment for advocacy	Engage with other prevention programmes.
Human resources	Lack of all grades of staff especially the lower grades. No recruitments and funding for staff.	Fill vacancies. Collaborate and link with other programmes. Follow HR manual.
	Lack of training of technical personal on implementation of plans	Conduct relevant training programmes.
	Insufficient in-service training programmes for all grades of staff	Conduct relevant training programmes for different categories of staff. Regular updates should be provided – online platforms may be used for this purpose.
	Some staff not provided with basic equipment to carry out work (PHFOs not provided with motor bikes)	Provide all staff with basic equipment to carry out their duties.
Funding and resourcing	Budget cuts and other funding restrictions at both HQ and regions. Budget restrictions hinder the	Need to make programmes more efficient and cost effective. May need to conduct joint programmes with other control programmes. Need to look for additional sources of funding.

Domain	Identified gap	Proposed activities
	implementation of all plans and activities.	
	Difficulty getting fuel for vehicles	Need to conduct joint programmes with other control programmes.
	No proper Regional Malaria Offices. Those that exist are not properly maintained.	Allocate space for Regional Malaria Offices and renovate existing buildings.
	Most vehicles are old and need constant repairs. Some cannot be repaired due to lack of funds.	Need to upgrade vehicle fleet. Vehicles should be repaired as when needed.
	Shortage of essential supplies (chemicals, slides, personal protective equipment etc)	Ensure adequate supplies are available.
	Claim payments delayed and restricted.	Need financial support from the RD or PD level on a regular basis to make necessary payments that have been identified as essential.
	No allocation for accommodation of entomological teams and maintenance of facilities required for entomological surveillance.	Obtain approval from provincial authority to make these payments.
	No allocation for training and awareness programmes at provincial level.	Need to include these programmes in annual budget estimates and get them approved at provincial level.

4.1 Summary of situation analysis and gap analysis

Sri Lanka has maintained malaria-free status for over 10 years successfully transitioning from the financial dependence on donor funds from the Global Fund despite the introduction of a new urban vector species in 2016 and the reporting of one introduced case in 2018. 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. These strengths coupled with restricted overseas travel were paramount in preventing re-establishment of malaria in Sri Lanka even during the COVID-19 pandemic.

The existence of a wide range of technical experts at the central level, a work force throughout the country and established guidelines and standard operating procedures ensures a quality-assured service. Following recommendations of the WHO and SEARO, AMC has been able to achieve global and regional goals for malaria elimination.

The programme has a system to notify all suspected cases immediately, to investigate the cases within 2 days and to respond within 5 days. This strategy proved critical in preventing further transmission when the introduced case of malaria was detected in 2018. A functional TSG chaired by the DGHS and a CRC, that oversees all aspects of diagnosis, case management, case investigation and response, classifies all cases.

Despite the many strengths of the programme, a few weaknesses still exist. Notably, the web-based online surveillance system needs to be updated to provide real-time information

that can be accessed by all staff. Receptivity assessment has been initiated and is progressing well. There are many vacancies that need to be filled but a re-assessment of the work force need is a priority. Due to the embargo on recruitment of government officers, filling all vacancies will probably not materialise.

One of the major issues that hampers routine programmatic activities is the lack of funds and resources for prevention of re-establishment activities which has been aggravated by the economic crisis the country is currently facing. Many vehicles that are used for anti malaria activities are old and need frequent repairs.

The decreasing interest, commitment, dedication and motivation of administrators, health care personnel and the general public and the emergence of competing public health priorities such as dengue, makes ensuring a high level of surveillance, and outbreak preparedness and response for malaria a major challenge. However, the AMC has successfully established links with the private sector and other sectors such as the armed forces and police department to ensure that personnel arriving after duty in UN peace keeping forces in malaria endemic countries are screened for malaria on arrival, and Buddha Sassana Ministry to advice travellers on malaria prevention and chemoprophyxis during pilgrimages. At the local level, AMC hass also established links with communities that engage in the gem industry and in occupational settings that hire foreign labour from or who have visited malaria endemic countries.

There lies a significant opportunity in integrating some activities with other disease control programmes. Recently, the AMC has been designated the focal point for Leishmaniasis. With the detection of *An.stephensi* in some regions, intensified entomological surveillance is carried out which can be coupled with dengue control activities. In two regions that did not have a Regional Malaria Officer previously, a Medical Officer (Vector Borne Diseases) has been appointed in the newly established Vector Borne Disease Control (VBDC) unit; this officer is responsible for malaria, filariasis, dengue and leishmaniasis. In some regions, a single medical officer covers all or some aspects of other vector borne diseases as well.

A major threat to the programme is the emergence of *An.stephensi* in the country which is a known vector of urban malaria, a phenomenon not seen in the past. Intensified surveillance and use of larvivorous fish has restricted the species to two regions currently despite it being reported from 6 regions earlier.

Further budget restrictions limiting prevention of re-establishment of malaria is likely to increase the risk of re-establishment given the re-energized thrust in tourism following the COVID pandemic. Tourism is an integral part of the plan to resurrect the country from the economic crisis.

4.2 The way forward

The Way Forward

- Surveillance and Response
  - Detect and provide effective treatment for all malaria cases early
  - Investigate cases
  - Respond to potential threats
- Raise awareness of medical practitioners regarding their role in keeping Sri Lanka malaria-free
- Ensure a quality diagnostic service
- Empower the general public including risk groups on seeking services related to malaria
- Ensure political commitment and adequate funding
- Foster and build partnerships
- Invest in research for prevention of re-establishment of malaria

Given that the AMC and that the programme has successfully prevented re-establishment of malaria for over 10 years, the same plan and activities should be continued with some tweaking necessary as and when needed. Political and financial commitment has to be ensured for prevention of re-establishment of malaria under whatever circumstances as the country is highly receptive for disease transmission. Vigilance has to be maintained at a very high level.

Surveillance and response for malaria should be the singular focus of the 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. The current approaches for surveillance should be continued.

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. All modes of communication should be used to update medical practitioners. The high-quality malaria diagnostic service should be maintained by the AMC to ensure quality diagnostic services. Access to a hotline for queries regarding case management and procurement of quality-assured antimalarials should be continued as at present.

The focus on prevention of re-establishment at the highest levels of government is needed to keep malaria on the radar and to ensure adequate finances and resources are provided.

Prevention of re-establishment of malaria requires a strong a disease specific approach and significant human and financial resource inputs. But, as the malaria burden decreases and when malaria has been eliminated, the prevention of re-establishment phase of malaria will witness a marked drop in expenditure on commodities and supplies such as insecticides and medicines, and a shift of operations and services away from healthcare delivery and vector control to one of increased surveillance and response. Financial resource requirements will correspondingly decrease during the POR phase, and priorities in functions and roles of malaria personnel will change. Therefore, after malaria has been eliminated, maintaining the same organizational framework and functional systems of a malaria control and elimination programme as a vertical programme, and on the same scale as before will not be justifiable nor sustainable for preventing the re-establishment of malaria in the long-term. It follows, therefore, that integrating some of the roles and functions of a malaria POR programme with other health services and/or broader disease control programmes is justified.

The opportunity of integrating some activities with those of other disease control programmes should be sought not only to improve efficiency of the control programmes but also to harmonise control operations. Although some efforts have already been taken in this regard with appointment of medical officers for vector borne diseases in some regions, this effort needs to evaluated as part of operations research prior to continuing with integration. Even though such initiatives have been taken, disease control programmes continue to function in silos. The important issue is that the focus on prevention of re-establishment of malaria should not be lost and accountability for malaria should remain high.

The AMC post-elimination, in collaboration with members of its technical support group, has conducted very important operations research which have contributed to the global literature on prevention of re-establishment of malaria. Such efforts should be continued starting with the evaluation of the different models of administration. A local mid-term review is suggested to review the progress of prevention of re-establishment of malaria programme in the economic recovery period.

5. Evidence based strategic planning

5.1 Strategic priorities

With no reports of indigenous transmission of malaria in Sri Lanka since October 2012 except for an introduced case reported in the country in December 2018 and a transfusion induced malaria case in 2021, and as the vectors responsible for malaria transmission are present in the country, the strategic priority is to prevent re-establishment of malaria in the country through reducing the risk of importation. Based on this principle, five strategic approaches are proposed:

1) Maintaining vigilance through enhanced surveillance for early detection and effective treatment of malaria cases, travellers into and out of the country, risk groups, and receptivity through entomological surveillance;

2) Maintaining skills and diagnostic facilities to diagnose and treat malaria cases;
3) Maintaining outbreak preparedness, prevention and response to focal malaria outbreaks;
4) Advocacy for policy makers, administrators and clinicians; and
5) Integrating and linking implementation with other related disease control programmes.

Detecting malaria cases early and their effective treatment and management through intensified surveillance are of paramount importance. After the elimination of indigenous malaria transmission in the country, most reported cases have been diagnosed by passive case detection on presentation to clinical care settings. Provision of quality diagnostic facilities should be made available at 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 order to ensure a timely diagnosis and effective treatment, the quality diagnostic service that already exists will be maintained and WHO prequalified diagnostics and antimalarials will be procured. Microscopy services will be maintained in all areas and the current accreditation system will be continued.

Vigilance and outbreak response will be key to prevention of re-establishment of malaria as was seen when the introduced case was reported in 2018. Specially trained teams under the AMC HQ and the RMOs will be deployed for this activity as and when required.

Although there is no indigenous transmission of malaria at present, the ecology, environmental and vector conditions required for malaria transmission still exists. The detection of *An.stephensi* for the first time in the country in December 2016 is a major threat to malaria-free status that the country enjoys at presnet. This requires careful monitoring of the receptivity through enhanced entomological surveillance and response.

The high risk of importation of malaria with the ease of travel restrictions after the COVID-19 pandemic, coupled with the receptivity in many 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 been forthcoming upto now.

Given the current economic crisis the country is facing, fuel restrictions and budget cuts, integrating POR activities with activities carried out by other related disease control programmes is envisaged. There is evidence that in some regions this has already been

initiated by the establishment of a vector borne disease control unit under the Provincial Health Authority.

5.2 Health system strengthening and prevention of re-establishment of malaria programme

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-establishment of malaria. Upto now, a separate campaign solely dedicated to prevention of re-establishment has been retained; As stated in the previous Nationl Malaria Strategic Plan 2018-2022, a gradual integration of some functions of the POR programme with other disease control programmes may be possible after careful study and monitoring without increasing the risk the re-establishment of malaria in the country.

Changes to the malaria programme structure and functions after elimination and the scope for integration would depend on, among others, the form of the existing malaria control programme. Strictly vertical programmes such as those that were established during the Global Malaria Eradication Programme, though a rarity now, will have dedicated malaria staff both at the central and district implementation levels, with all staff reporting and accountable to the Director of the malaria programme. However, most malaria programmes of today operate with a central core of malaria expertise at the national level providing technical guidance, policy and strategy on malaria control, but with implementation assigned to the Provincial/State Ministries of Health through district level staff who may work on the control of several other diseases and report to the local authorities. Examples of even further integrated malaria control programmes which have achieved elimination are those in which malaria expertise even at the central level are contained within a broader communicable disease or vector-borne disease control Unit, with malaria functions being implemented at Province/State/district levels by similarly integrated programmes. In general, the more vertical and autonomous a malaria control programme had been prior to elimination the more effort and time it will take to integrate successfully when transitioning into a POR programme.

The degree to which malaria is integrated and the rate at which integration is achieved will depend on, among other factors, the risk of re-establishment of malaria and the resources available in the country. They will also depend on the opportunities available to integrate the malaria POR functions into other related and ongoing programmes.

Successful integration will require thoughtful consideration, careful planning, stakeholder consultations, coordination and possibly even piloting on a small scale in some parts of the country. Integration will need to be supported by a stringent monitoring and evaluation system and a quality assurance mechanism. Integration of malaria POR must be intentional and well planned, and not left as a default option. Sudden disbanding of malaria control programmes, and too rapid efforts at integration may be fraught with a high risk of re-establishing malaria, and should be avoided.

5.3 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 are provided free of charge. This has resulted in some of the country's health & education indices being the best among developing nations having low per capita incomes.

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

5.3.1 Ministry of Health

5.3.1.1 Vision

A healthier nation that contributes to its economic, social, mental and spiritual development

5.3.1.2 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.

5.3.1.3 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:

5.3.1.4 Strategic 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 promotiveprogrammes
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.

5.3.2 Prevention of re-establishment of malaria in Sri Lanka 2023 - 2027

The vision, mission and the objectives of the Anti Malaria Campaign of the Ministry of Health, which is the principal organization responsible for prevention of re-establishment of malaria in Sri Lanka, are given below.

5.3.2.1 Vision

A malaria-free Sri Lanka.

5.3.2.2 Mission

Plan and implement a comprehensive programme to sustain intensive surveillance, comprehensive case management, outbreak preparedness, providing information to travellers and high-risk groups, and rapid response for prevention of re-establishment of malaria in Sri Lanka.

5.3.2.3 Objectives

1. To prevent re-establishment of malaria in Sri Lanka.
2. To maintain zero mortality due to malaria in Sri Lanka.

6. The projected plan of action

The National Strategic Plan (NSP) for Prevention of Re-establishment of Malaria 2023-2027 in Sri Lanka 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 guidelines and recommendations of the Ministry of Health, and the WHO Global Malaria Programme (GMP) and Southeast Asia Regional Malaria Programme.

The NSP 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 three strategic and seven crosscutting 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 enhanced 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.
5) Improving programme efficiency by prioritising activities etc.

6.1 Guiding principles

The National Strategic Plan for prevention of re-establishment of Malaria 2023-2027 is based on the following guiding principles:

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

Strategic actions

Objective 1: To prevent re-establishment of malaria in Sri Lanka.

1. Maintain intensified case and entomological surveillance.
2. Ensure universal access to quality assured malaria diagnostic and treatment services free of charge.

3. Liaise with the private sector to provide regulated quality diagnostic and treatment services.
4. Detect all infections early and treat all patients with quality assured antimalarial medicines based on national treatment guidelines to ensure radical cure and to prevent secondary transmission.
5. Ensure all suspected cases are tested for malaria (microscopy/RDT).
6. Enhance operability of web-based real time surveillance system.
7. Provide regular information to healthcare providers on early detection of imported malaria cases.
8. Immediate notification of all patients strongly suspected of having malaria.
9. Commence investigation of all cases and foci (including reactive parasitological surveillance and entomological surveillance) within 48 hours of notification.
10. Respond to all cases within 5 days of notification according to the approved scope of work.
11. Conduct entomological surveillance in accordance with national guidelines.
12. Implement vector control measures as required.
13. Ensure quality assurance in malaria diagnostic services.
14. Re-orient public and private health sector staff towards PoR.
15. Maintain functional rapid response teams for quick and effective response to a secondary case or focus.
16. Maintain adequate buffer stocks of quality LLINs, insecticides, diagnostics and antimalarial medicines.
17. Monitor receptivity and risk of importation.
18. ACD among vulnerable populations based on surveillance guidelines.
19. Protect vulnerable populations/risk groups.
20. Foster and maintain relevant partnerships (health sector, private sector, other sectors, international agencies, etc)
21. Harness political and financial support for PoR.
22. Formulate a communications strategy for PoR to increase awareness among stakeholders (community, travelers, health care providers, migrant populations).
23. Educate the community, especially travelers, on the importance of sustaining malaria-free status.
24. Provide chemoprophylaxis to travelers.
25. Regular review and re-orientation of the national malaria programme for PoR
26. Review and update national guidelines and SOPs for PoR.
27. Develop manuals and guidelines for RMOs and other staff.
28. Maintain a well-trained and competent human resources at the centre and the regional level.
29. Provide guidelines on PoR for inclusion in all medical and relevant allied health sciences undergraduate and appropriate postgraduate training programmes.
30. Follow up of malaria cases.
31. Investigate all cases and foci and classify cases and foci.
32. Review all cases and inform policy changes.
33. Establish real time supply chain management system for malaria commodities.

Objective 2: To maintain zero mortality due to malaria.

1. Provide universal access to malaria diagnostic and treatment services free of charge.

2. Detect all infections early and to treat all patients with quality assured antimalarials based on national treatment guidelines to prevent complications in both public and private health sectors.
3. Ensure all suspected cases are tested for malaria (microscopy or RDT).
4. Ensure all malaria cases are admitted to hospitals and managed.
5. Make available antimalarial medicines (including second line and injectable medicines) to diagnostic and treatment facilities when needed in a timely manner.
6. Inform clinicians on management of malaria (both uncomplicated and severe).
7. Carry out a medical audit of cases when recommended by the Case Review Committee.

6.2 Purpose of the National Strategic Plan (NSP)

The NSP aims to set up an enabling environment for the creation and implementation of strategic approaches to prevention of re-establishment of malaria 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 geospatial mapping of operations to avoid duplicitous programme implementation.

For multilateral and bilateral 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.

6.3 Institutional Approach

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

The Anti Malaria Campaign will take the lead role in preventing re-establishment of malaria providing technical and other logistic support whenever possible to districts. The Anti Malaria Campaign will ensure prevention of re-establishment of malaria with gradual integration of the programme into the general public health services of the country. The institutional framework for prevention of re-establishment of malaria must be flexible so as to work effectively in the process of continuing development. A critical mass of people will be maintained to provide technical guidance for PoR.

6.3.1 Provincial and District level

Harmonisation between the prevention of re-establishment of malaria programme and the Health Sector Development process including possible integration is required. This will entail regions, as well as the centre, working closely with other disease control programmes building on existing structures. Unlike during the control phase, the stakeholders have chaged in PoR phase; today the travel trade, business community including those in the gem industry, Buddha sassana ministry, the armed forces and the police department and industries hiring labour need to to included.

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 assurance of the PoR activities.

6.3.2 National level

The AMC of the Ministry of Health alongwith the decentralised provincial health authority will be the operational arm of the prevention of re-establishment of malaria activities. Its role will be to:

- Ensure support and commitment at the highest level.
- Develop and disseminate current policy and strategies for prevention of re-establishment of malaria in the country.
- 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 prevention of re-establishment of malaria through inter-departmental and inter-agency IEC programmes.
- Foster partnerships for PoR.
- Liaise with WHO and other international organisations.

6.4 Partnerships

Key to the success of the PoR activitie will be development of effective partnerships at all levels:

Within the Ministry of Health

- Epidemiology Unit
- Director / Quarantine
- Directorate for Private Health Sector
- Medical Supplies Division
- Health Promotion Bureau
- Planning Unit
- Provincial health authorities
- Family Health Bureau
- Disaster Management Unit
- Medical Research Institute
- Environmental and Occupational Health
- Education, Training & Research Unit
- Other vector borne disease control programmes

Other Ministries and departments

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

Private Sector

- Private health sector
- Business community
- Travel trade

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.

7. Approach to prevention of re-establishment of malaria in Sri Lanka

7.1 Strategic approach I: Intensified surveillance

Surveillance is the continuous and systematic collection, analysis and interpretation of disease specific data and the use of that data in the planning, implementation and evaluation of public health practice. For malaria, both parasitiological and entomological surveillance are important.

The currently practiced 1-2-5-day (1 for notification, 2 for investigation and 5 for response) schedule should be carried out as the current manual for parasitological surveillance in the country. The system should include the private sector as well which currently reports the majority of imported malaria cases.

7.1.1 Parasitological surveillance

Universal access to quality assured malaria diagnostic services should be provided by the AMC. All patients presenting with fever and a travel history, and those with fever over 7 days or without any other apparent aetiology should be tested for malaria.

All suspected cases should be tested for malaria. All infections should be detected early and treated promptly according to National Treatment guidelines. Parasitological surveillance will be carried out using microscopy, RDTs and PCR. Passive case detection (PCD), proactive case detection (PACD) and reactive case detection (RACD) will be carried out as given in the manual for parasitological surveillance.

The Ministry will issue relevant circulars and gidelines.

Engaging the private sector

The private sector plays a considerable role in ensuring the prevention of re-establishment of malaria in the country. At present, many cases are reported from the private sector, some even by chance when investigated for another cause. The private sector comprises two important components to deal with; a) hospitals and laboratories, and b) private practitioners.

Engaging hospitals and laboratories

The AMC has been successful in engaging private hospitals and laboratories in surveillance activities which is critical as only the AMC procures antimalarial medicines. AMC has to be notified of suspected or detected cases to ensure effective treatment is provided after confirmation of the diagnosis. The following activities will be conducted to further enhance the private hospital and laboratory cooperation.

1. Liaise with the management of private hospitals and laboratories by conducting regular meetings and providing updates on the malaria situation in the country and possible gaps encountered and how they can be addressed.
2. Provide regular updates to laboratory managers and consultants in charge of the laboratories and establish procedures that would improve the communication between the laboratories and the AMC.

3. Provide regular training, including competency accreditation medical laboratory technologists on a regular basis.
4. Establish a focal point at the AMC to liaise with private hospitals and laboratories.
5. Establish a system to obtain the number of tests done for detection of malaria parasites.

Engaging medical practitioners practicing in the private sector

Very often, the primary contact of a malaria case with the health system is a medical practitioner in the private sector. The medical practitioners in the private sector play a critical role in preventing the re-establishment of malaria in the country. Delays in diagnosis of malaria is due to practitioners not taking a travel history, giving preference to a diagnosis of dengue and patients not revealing a travel history. For this, medical pratitioners have to be kept informed of the possibility of imported malaria and its potential spread given the presence of the vector. The following activities will be carried out:

1. Regular messages regarding the importance of taking a travel history and thinking of malaria should be sent targeting all medical practitioners. Any medium can be used including the print, television, social media etc. In doing so, the advocacy programme should be closely monitored and evaluated.
2. In areas where many imported malaria cases have been reported (Beruwala, Eheliyagoda, etc), the Regional Malaria Officers or AMC staff will individually visit doctor's offices and educate them.
3. The AMC will carry out advocacy meetings in different regions of the country in collaboration with clinical societies and professional organisations. At these meetings, leaflets giving important information will be distributed.
4. All medical practitioners who have detected malaria early will be commended as done at present. Likewise, medical practitioners who delayed diagnosis and may have led to complications will be notified of their error.

Web-based surveillance system

A web-based surveillance system using the DHIS2 platform is in place. Howver, its operability is not optimal. The system will be upgraded to provide real time information and access given to the private sector as well. The system will include both parasitological and entomological surveillance information and would generate timely reports as needed. Response to any situation will be based on evidence provided by the system.

Case and foci investigation

The AMC defines a single case as a focus. Investigation of all cases will commence within 2 days by the AMC and/or the respective RMO from where the case is detected and from where the case resides or travelled through. Case investigation will include obtaining a detailed history of travel and other relevant information, entomological surveillance and findings, contact tracing, PACD and RACD as given in the manual for parasitological surveillance. The information from the case investigation will be considered in the classification of the case.

The case investigation form will be reviewed and modified if necessary. A death investigation form will be developed.

Case and foci classification

The Case Review Committee will review all cases and certify the case classification.

Screening of blood donors

All blood donors are screened individually for malaria. This activity is done by the staff at the National Blood Transfusion Service and Public HealthLaboratory Technologists of the AMC.

As about 350,000 samples are processed annually, it is proposed that a batch processing procedure is introduced using ELISA which will be more cost-efficient. A protocol for such a procedure will be developed and trialled; if successful, it will be introduced in a phased manner.

Discussions will be initiated with the National Blood Transfusion Service to include a history of travel in the form that is filled by donors.

Community surveillance for importation risk

Currently the RMOs collect information on travellers to malaria endemic countries and from work sites that employ foreign labour. This will be further strengthened by

1. Maintaining a register of work places that regularly employ foreigners.
2. Liaising with the management to screen all workers that arrive at the site.
3. Maintaining regular communication with the management to ensure early detection of a malaria case in patients having fever.
4. Providing malaria diagnostic and management services to the staff.
5. Re-training existing staff such as PHFOs to engage in this activity.

In addition, the community surveillance system will be strengthened in collaboration with Grama Niladhari Officers, travel agents, local societies and other categories of public health staff to monitor travel in the community.

Investigation of severe malaria cases and malaria deaths

Special investigations will be carried out for all severe malaria cases and malaria deaths with a view to elucidating gaps in the current surveillance system and management of cases within two weeks of such an occurrence. Oversight for this activity will be provided by the TSG and CRC. The investigations formats will be reviewed and revised as necessary. A report should be submitted to the AMC within 4 weeks for onward transmission to the Ministry of Health.

7.1.2 Entomological surveillance and response through integrated vector management

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, a curtailed entomological surveillance system that can map malaria

receptivity has been developed and implemented. Entomological surveillance guidelines are available but needs to be reviewed and revised.

The AMC has drastically reduced vector control activities. The AMC has shown success with the use of larvivorous fish in the control of *An.stephensi* that was detected recently. IRS and LLINs are used sparingly as and when needed based on vector control guidelines.

The following activities will be carried out.

1. Revision of the entomological surveillance guidelines. The revision will integrate entomological surveillance for other vector borne diseases including dengue wherever possible.
2. RMOs and entomological assistants will be trained on new techniques and surveillance methods. In addition, advanced training will be provided to selected personnel.
3. Sentinel surveillance will be carried out as per the guidelines for entomological surveillance.
4. The computerized entomological database will be linked to the web-based surveillance system (described under strategy I) to generate risk maps. Personnel at both the centre and in the regions will be trained on its use and interpretation of data.
5. Developing a proposal for 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.
6. Upgrade selected entomological laboratories in the regions to carry out basic investigations.
7. Vector control methods will be used based on receptivity and vector control guidelines. IRS and LLINs will be used when there is a likelihood of an impending outbreak. Targeted biological control through use of larvivorous fish will be used for *An.stephensi* control. Other methods will be used as per vector control guidelines.
8. Developing partnerships with government departments such as Agriculture, Environment, local government authorities etc, NGOs and community leaders.
9. Develop partnerships at central, provincial, regional and community levels for empowerment of communities for IVM through education and skills building.
10. Maintain adequate buffer stocks of quality assured LLINs and insecticides (WHO prequalified) are available to be used if an ourbreak emerges.

7.1.3 National level risk maps

Guides to assess risk of importation and receptivity will be developed. These will be combined and risk maps of potential malariogenic areas in the country will be developed.

7.2 Strategic approach II: Case management

Universal access to malaria diagnosis and treatment for radical cure will be ensured. All confirmed malaria patients will receive recommended quality assured treatment within 2 hours of diagnosis. Currently the national treatment guidelines are being revised. A Consultant Community Physician is in charge of case management. A 24-hour hotline is available and will be continued.

Treatment for falciparum and non-falciparum malaria will be based on national treatment guidelines, which are in-line with WHO guidelines. Currently, ACTs (arthemeter/lumefantrine) is the recommended first line antimalarial drug for the treatment of uncomplicated falciparum malaria. Other infections will be treated with chloroquine; infections with *P.vivax* and *P.ovale* will be given a 14-day course of primaquine as per national treatment guidelines after G6PDd testing.

The following activities will be carried out.

1. Advocacy programmes will be conducted for clinicians in all sectors regarding the importance of re-establishing malaria. In addition, updates on malaria diagnosis and treatment will be provided through various channels (print and electronic media, social media, digital media, etc.).
2. Clinicians will be provided updates in management of uncomplicated and severe malaria at least once a year.
3. Circulars will be issued by the Ministry of Health on management of uncomplicated and severe malaria. These will be circulated to all heads of institutions including those in the private sector for onward transmission to relevant medical practitioners.
4. RDTs will be made available through the AMC in all hospitals, including private sector hospitals, that have intensive care units.
5. All diagnosed cases will be treated in hospital under direct observation to ensure compliance to treatment.
6. All cases will be followed up as part of integrated drug efficacy surveillance. The details of the follow up procedure is given in the scope of work when a malaria case is diagnosed.
7. Adequate stocks of oral and parenteral WHO prequalified antimalarial medicines (including first- and second-line treatment) will be procured and maintained at central and regional level to ensure that treatment can be provided to any hospital within 2 hours of detection of a case.
8. Malaria diagnostic and treatment services for the armed forces and the police will be provided free of charge. Clinicians in the armed forces and the police will be trained on diagnosis and treatment of malaria. Microscopy or RDT based screening will be carried out for all armed forces personnel after deployment in malaria endemic areas. In addition, personnel travelling to malaria endemic countries will be advised on chemoprophylaxis.
9. Ensure malaria diagnostic and treatment services, and chemophylaxis drugs are available at ports of entry.

10. Chemoprophylaxis will be provided to travllers visiting malaria endemic regions free-of-charge based on WHO recommendations.

7.3 Strategic approach III: Strengthening outbreak preparedness, prevention and response

Given the fact that malaria vectors still exist in the country and that a new vector of urbal malaria has emerged, the potential for malaria outbreaks is high. This coupled with a population having a waning immunity against malaria and the expected importation risk is high given the envisaged tourism boost, is likely to trigger outbreaks and even lead to malaria 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.

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

Outbreak response teams have been established, personnel trained and adequate equipment and supplies are available. SOPs have been developed for outbreak response. The following activities will be carried out:

1. Developing Standard Operating Procedures for outbreak response. The SOP will outline all activities that need to be carried out pending a potential outbreak and during an outbreak.
2. Multitasking multidisciplinary outbreak response teams under the AMC and the RMOs and Provincial Health Authorities will be revitalized and established and team members will be trained. The rapid response teams will be set up that they could respond to any health emergency. This is important as most of the SMOs are retiring and not no new recruitment is done. 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.
3. 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.
4. An annual simulation of a potential outbreak of malaria in a region will be carried out. Such an exercise was successfully carried out in 2019 with the collaboration of of the Disaster Management Centre. This simulation will involve AMC HQ and regional staff focusing on the assessment of outbreak and response preparedness.
5. As Malaria has been eliminated in Sri Lanka and that the country has been certified as a malaria-free country, malaria should now be considered as part of health security and included under International Health Regulations. Collaboration between the

AMC and the focal point for IHR will be sought and appropriate guidelines developed and implemented. The focal point for IHR will be invited to all review meetings conducted by the AMC.

7.4 Cross-cutting strategic approach I: Quality assurance for prevention of re-establishment of malaria

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), Leishmaniasis, Leprosy 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. A rigorous quality control programme and a fully functional national reference centre has been established. SOPs have been developed and circulated and detailed instructions are included.

An internal quality assurance programme and refresher training programmes for PHLTs are conducted by AMC/HQ. A performance appraisal of PHLTs is also conducted. These will be conducted on an annual basis. As previously, international accreditation will be sought through the WHO SEARO. Level 1 PHLTs will be designated as expert PHLTs and will be used for cross checking of blood smears. QA/QC laboratories will be upgraded.

SOPs for entomological surveillance are currently being revised. An M&E toolkit will be introduced for quality assurance of entomological surveillance including monitoring of insecticide resistance and bioassay techniques. The web-based surveillance system will be upgraded to include entomological surveillance and used as a tool for risk mapping. 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.

SOPs for prevention of re-establishment of malaria are in place. This will ensure quality of services provided.

Only WHO pre-qualified anti-malarial commodities will be procured wherever possible.

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

Monthly meetings and quarterly reviews will be conducted to identify gaps and to take necessary corrective actions.

7.5 Cross-cutting strategic approach II: Health system strengthening

7.5.1 Integration of services

The prevention of re-establishment activities need to gradually be integrated into the general public health services wherever possible.

Even during the malaria control phase when malaria was endemic, case detection and disease management of malaria was conducted in the context of the general health system. Yet, within that degree of integration the malaria control programme had a major role to play in avoiding delays in diagnosis and assuring the quality of diagnosis and treatment. These functions will be continued. As malaria has become a rare disease, physicians tend to not consider it in the differential diagnosis of fevers, leading to unacceptable delays in malaria diagnosis with the consequence of increasing the probability of malaria progressing to severe malaria, and also increasing the risk of onward transmission of the parasite. Periodic refresher training for doctors, nurses, laboratory technicians and health personnel on when to suspect malaria, highlighting the need to seek travel histories to endemic countries in febrile patients, will be included.

Quality assurance in diagnosis will be sustained for malaria microscopy as outlined previously.

Outbreak response is key to prevention of re-establishment of malaria when all other measures fail. The outbreak response capacity for malaria will be maintained by linking it to considering malaria as a component of International Health Regulations and as part of the country's health emergency response systems.

There are several instances where prevention of re-establishment activities have been integrated with other disease control programmes. With the emergence of *An. stephensi*, intensified entomological surveillance includes *Aedes* surveillance and the data are shared with the dengue control units. Larvivorous fish are used for both *An. stephensi* and *Aedes* control making integration feasible with sustainable funding. In some regions, especially those in which there were no RMOs, PoR activities have been entrusted with Medical Officer (Vector Borne Diseases) and even Medical Officer (Filariasis).

During the COVID pandemic, quarantining of travellers made prevention of re-establishment of malaria more efficient as all incoming travellers were screened for malaria at quarantine centres as part of health security. These examples provide evidence for opportunities for integration in a phased manner.

The following are proposed for joint work with the NDCU:

1. Formal joint meetings with the regional AMC staff and district dengue control units at district level be held on a monthly basis. Quarterly joint meetings to be conducted at central level with both AMC HQ and NDCU.
2. Formal arrangement made to share data.
3. Develop joint entomological surveillance data collection formats where possible.

As there is a mechanism already being implemented in some regions where the officer-in-charge of malaria is performing control activities for other vector borne diseases as well, to evaluate these programmes after two years as part of implementation research and suggest ways of integration in a phased manner. Based on the evaluation, a decision may be made on the level and scope of integration.

AMC staff and RMOs to follow WHO training course on elimination and prevention of re-establishment.

7.5.2 Maintaining expertise in different aspects of malariology

With few imported malaria cases reported in the country and experienced staff retiring from service, there is a need to maintain the expertise in malariology in the country. Regional Malaria Officers are transferred every four years creating a gap in expertise. Due to these reasons, it is mandatory that all newly recruited professional staff of AMC HQ and Regional Malaria Officers follow the online course on malaria elimination and prevention of re-establishment of malaria, developed by the WHO, within 1 month of recruitment with documentary evidence of completing the course.

7.6 Cross-cutting strategic approach III: Inter-sectoral collaboration and coordination

The AMC has established many links with other sectors to facilitate early detection and treatment of imported malaria cases. These links will be further strengthened with regular stakeholder meeting conducted at least once in 6 months. The following linkages and activities will be conducted.

Private healthcare sector
The private healthcare system plays a key role in maintaining Sri Lanka malaria-free. A significant proportion of imported malaria cases are reported from leading private hospitals.

Ministry of Defence and Sri Lanka Police
Personnel from the triforces and Sri Lanka Police who travel to malaria endemic countries on foreign missions are an identified high-risk group. The AMC has extablished close links with the triforces and Sri Lanka Police. These institutions inform the AMC of arrivals of their personnel who return from foreign missions to malaria endemic countries. The AMC inturn screens all returnees for malaria and follow them with the assistance of different medical corps. In addition, the AMC provides advice and chemoprophylaxis to personnel from these institutions who are travelling to malaria endemic countries. AMC provides treatment according to national treatment guidelines to all positive cases. These activities will be further strengthened including having regular meetings with medical officers of the medical corps.

Port and Airport Health Offices (airports and sea ports)
Facilities for malaria diagnosis (by RDTs) of incoming passengers and advice to outgoing travellers visiting malaria endemic countries is provided by the AMC through the Airport and Port Health offices. The AMC will regularly update the knowledge on malaria among the staff of the Port Health Authority and replenish anti malaria commodities as required.

Malaria will be included as part of health security under International Health Regulations. This will require developing guidelines for outbreak threats and response. The AMC will update all

guidelines related to outbreak preparedness and response and intergarte them with those of health security measures.

Ministry of Buddha Sassana and Religious Cultural Affairs

Returning pilgrims after visiting India have been identified as a major risk group for imported malaria in Sri Lanka. The AMC has established close links with the Buddha Sassana Ministry to inform registered travel agents that organize pilgrimages to India regarding the threat of contracting malaria in India, provision of chemoprophylaxis free of charge and the necessary advice that should be given to travellers. These activities will be further strengthened with regular updates.

Travel agents

The AMC has also engaged travel agents who organize pilgrimages to Buddhist places of worship and safari tours. The AMC conducts outreach programmes and seminars to raise their awareness regading contracting malaria when overseas, the necessary advice to be given to pilgrims and the availability of chemoprophylaxis which is given free of charge. These activities will be further strengthened through distribution of leaflets and other advocacy material as travel is likely to increase with the easing of restrictions following the COVID-19 pandemic and the stabilization of the economy.

Religious leaders

Another risk group that has been identified by the AMC are gemtraders who frequently visit African countries on business. A focus of imported malaria cases has emerged in Beruwala, a city in the western coast of the country that has a flourishing gem industry, among the Muslim community. The AMC has taken steps to address this community through muslim clerics and moulavis in mosques in this area via regular messages regarding malaria. These activities will be further strengthened by addressing this community at regular intervals to remind them of the risk of imported malaria, taking chemoprophylaxis, the need to inform the doctor of a travel history, and the need to see a medical practitioner and get tested for malaria if anyone develops fever on their return. In addition, information on how and when to contact the AMC will be prominenetly displayed at places where people frequent.

7.7 Cross-cutting strategic approach IV: Communication and advocacy strategy

Despite AMC conducting many advocacy programmess targeting different groups, no formal communication and advocacy strategy has been developed. A communications and advocacy strategy is an urgent need and it is proposed that such a strategy will developed in the first year and implemented commencing in the second year.

The communications and advocacy strategy will focus on the following:

1. Heealthcare providers (doctors, laboratory technicians, public health staff) for early diagnosis and effective treatment.
2. Policy makers to ensure political and financial commitment.
3. General public to raise awareness regarding imported malaria.

4. All stakeholders.

The key messages to be delivered modalities for the delivery of messages will vary based on the targeted group. These should be identified and the strategy and plan for implementation should be developed by a professional team, ideally involving the Health Promotion Bureau of the Ministry of Health. Funds will be sought for this activity. With the development of the strategy and the implementation plan, a monitoring and evaluation framework will be in place to evaluate the effectiveness of the intervention. This activity is likely to improve performance of other health promotion activities conducted by the Ministry of Health.

In the previous NSP, establishing a communications unit at AMC/HQ and training persons on BCC was a proposed activity. As it could not be achieved due to various reasons including the disruption of activities due to the COVID-19 pandemic, the establishment of such an unit is proposed. The Communications Unit will take the lead role in establishing, facilitating and coordinating intersectoral committees and collaboration for prevention of re-establishment of malaria 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 communications unit will be responsible for re-designing the website and its regular updating. An attractive website will include information for travellers and be linked to advisories on travel health.

7.8 Cross-cutting strategic approach V: Monitoring and Evaluation Framework

A key to success of the malaria elimination and the current prevention of re-establishment of malaria progarmmes in Sri Lanka was the incorporation of a monitoring and evaluation framework and a performance framework which was a key requirement of the Global Fund to fight against AIDS, Tuberculosis and Malaria (GFATM) which provided a large funding component to antimalarial activities during this period.

The AMC will have the overall responsibility to monitor the NSP's success towards its stated targets. A dedicated officer at central level will be assigned for monitoring and evaluation. The TSG and the CRC will have oversight on all monitoring and evaluation activities. The officer designated for M&E will present monthly updates to the TSG.

All newly appointed RMOs and professional staff to the AMC will be apprised of the monitoring, evaluation and performance framework.

Regular RMO review meetings will be conducted on a monthly basis. The TSG will meet once every 3 months to provide technical advice as given in its terms of reference. The CRC will meet every month to review all reported cases and to classify cases.

A mid-term internal review coordinated by the TSG will be conducted in the first quarter of 2026, or earlier, if needed.

The monitoring, evaluation and performance framework is given in Table 5.

Table 5: Monitoring, evaluation and performance framework

Number	Indicator	Source and frequency	Responsible parties	Baseline 2022	Targets	2023	2024	2025	2026	2027
1	Number of indigenous cases	AMC Records / monthly	AMC	0	0	0	0	0	0	0
2	Percentage of severe malaria infections of all reported malaria infections	AMC Records / monthly	AMC	5	<5%	<5%	<5%	<5%	<5%	<5%
3	Number of malaria deaths	AMC Records / monthly	AMC	0	0	0	0	0	0	0
4	Percentage of suspected malaria cases receiving a test for malaria	AMC Records / monthly	AMC	100%	100%	100%	100%	100%	100%	100%
5	Percentage of malaria cases notified within 24 hours	AMC Records / monthly	AMC	100%	100%	100%	100%	100%	100%	100%
6	Percentage of malaria cases treated with fisrt line antimalarial medicines accordding to national treatment guidelines	AMC Records / monthly	AMC	100%	100%	100%	100%	100%	100%	100%
7	Percentage of *P.vivax* and *P.ovale* cases received radical cure	AMC Records / monthly	AMC	100%	100%	100%	100%	100%	100%	100%

Number	Indicator	Source and frequency	Responsible parties	Baseline 2022	Targets	2023	2024	2025	2026	2027
8	Percentage of notified cases investigated within 2 days	AMC Records / monthly	AMC	100%	100%	100%	100%	100%	100%	100%
9	Percentage of cases responded to within 5 days when appropriate	AMC Records / monthly	AMC	100%	100%	100%	100%	100%	100%	100%
10	Percentage of cases classified within 1 month	AMC Records / monthly	AMC	100%	100%	100%	100%	100%	100%	100%
11	Percentage of malaria cases detected within 5 days of contact with the health system	AMC Records / monthly	AMC	90%	90%	90%	90%	90%	90%	90%
12	Percentage of RMO regions having at least one accredited PHLT	AMC Records / Annually	AMC	100%	100%	100%	100%	100%	100%	100%
13	Percentage of positive blood smears cross checked	AMC Records / Annually	AMC	100%	100%	100%	100%	100%	100%	100%
14	Percentage of negative blood smears cross checked	AMC Records / Annually	AMC	5%	5%	5%	5%	5%	5%	5%

Number	Indicator	Source and frequency	Responsible parties	Baseline 2022	Targets	2023	2024	2025	2026	2027
15	Percentage of malaria/health entomological officers who can identify 90% of Anopheline mosquitoes correctly	AMC Records / Annually	AMC	100%	100%	100%	100%	100%	100%	100%
16	Percentage of cases whose treating medical officers were informed of the correct/incorrect diagnosis	AMC Records / Annually	AMC	100%	100%	100%	100%	100%	100%	100%
17	Number of advocacy programmes conducted per region	AMC Records / Annually	AMC	2	2	2	2	2	2	2
18	Number of messages delivered (electronically) per month at national level	AMC Records / Monthly	AMC	1	1	1	1	1	1	1
19	Number of supervision visits conducted by AMC HQ staff	AMC Records / Quarterly	AMC	1	1	1	1	1	1	1
20	Number of mock exercises conducted	AMC Records / Annually	AMC	0	1	1	1	1	1	1

Number	Indicator	Source and frequency	Responsible parties	Baseline 2022	Targets	2023	2024	2025	2026	2027
21	Number of TSG meetings held	AMC Records / Annually	AMC		4	4	4	4	4	4
22	Number of CRC meetings held	AMC Records / Annually	AMC		12	12	12	12	12	12
23	Number of RMO review meetings held	AMC Records / Annually	AMC		12	12	12	12	12	12
24	Number of meetings with triforces	AMC records / Annually	AMC		12	12	12	12	12	12
25	Number of publications/presentations on operational research	AMC /Annually	AMC		2	2	2	2	2	2
26	Percentage of RMOs reporting in a timely manner	AMC records / monthly	AMC		100%	100%	100%	100%	100%	100%

Number	Indicator	Source and frequency	Responsible parties	Baseline 2022	Targets	2023	2024	2025	2026	2027
27	Updating website	AMC website / monthly	AMC		12	12	12	12	12	12

7.9 Cross-cutting strategic approach VI: Improving programme management and performance

Improving programme management and performance will be essential when integration of services is considered. With integration of services, a reorientation of staff will be conducted. This reorientation will include potential task shifting and reassignment of duties. It will also entail training staff on their new roles which will require funds. This activity is likely to occur after the proposed internal mid-term review in the first quarter of 2026. There will be financial benefits in the long term.

Despite the country successfully preventing the re-establishment of malaria over a 10-year period, the AMC lacks computerised inventory system that makes it difficult to track supplies. It is proposed that an inventory system be included in the revised web-based surveillance system to generate real time data which would be useful for procurement purposes.

Annual reports will be published within 3 months and displayed in the website.

High impact events related to malaria will be organized to raise awareness about the threat of re-establishment of malaria via imported malaria cases.

7.10 Cross-cutting strategic approach VII: Operations and Implementation Research

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. Dureing the last few years, the AMC has conducted important operations research studies that have greatly contributed to the existing literature on prevention of re-establishment of malaria globally in collaboration with members of the TSG. The AMC will have oversight of all operations and implementation research projects relating to prevention of re-establishment of malaria in the country. The choice and priorities of research topics will be guided by the TSG and the AMC.

It is planned to assess the functioning of different management and implementation models that are currently existing in the regions in two years with a view to integrating some activities with other disease control programmes, where possible.

Table 6. Estimated budget 2023-2027

RMO Region	Total Expenditure 2022		2023	2024	2025	2026	2027
	Capital	Recurrent					
Routine activities							
Jaffna	0	39,747,162	39,747,162	41,734,521	43,821,247	46,012,309	48,312,924
Vavunia	0	29,356,136	29,356,136	30,823,943	32,365,140	33,983,397	35,682,567
Mannar	0	21,622,924	21,622,924	22,704,070	23,839,274	25,031,237	26,282,799
Kilinochchi	0	35,882,487	35,882,487	37,676,611	39,560,442	41,538,464	43,615,387
Millativu	0	37,883,480	37,883,480	39,777,654	41,766,537	43,854,864	46,047,607
Badulla	101,745	28,381,627	28,483,372	29,907,540	31,402,917	32,973,063	34,621,716
Monaragala	1,360,283	68,114,246	69,474,529	72,948,255	76,595,668	80,425,451	84,446,724
Kandy	771,462	43,639,088	44,410,549	46,631,077	48,962,630	51,410,762	53,981,300
Mathale	2,080,500	26,832,776	28,913,276	30,358,940	31,876,887	33,470,731	35,144,268
Nuwara eliya	0	327,810	327,810	344,201	361,411	379,481	398,455
Kegalle	1,604,116	1,305,985	2,910,101	3,055,606	3,208,386	3,368,806	3,537,246
Rathnapura	499,455	24,399,885	24,899,339	26,144,306	27,451,522	28,824,098	30,265,303
Anuradhapura	277,610	53,194,448	53,472,058	56,145,661	58,952,944	61,900,591	64,995,621
Polonnaruwa	286,594	26,132,565	26,419,159	27,740,117	29,127,123	30,583,479	32,112,653
Kurunegala	0	29,656,010	29,656,010	31,138,810	32,695,751	34,330,538	36,047,065
Puttalam	62,350	37,757,422	37,819,772	39,710,761	41,696,299	43,781,114	45,970,169
Maho	0	8,670,236	8,670,236	9,103,748	9,558,935	10,036,882	10,538,726
Galle	1,000,000	9,308,500	10,308,500	10,823,925	11,365,121	11,933,377	12,530,046
Matara	0	0	0	0	0	0	0
Hambanthota	0	29,439,944	29,439,944	30,911,941	32,457,538	34,080,415	35,784,436
Batticoloa	0	73,618,372	73,618,372	77,299,291	81,164,255	85,222,468	89,483,592

RMO Region	Total Expenditure 2022		2023	2024	2025	2026	2027
	Capital	Recurrent					
Ampara	0	47,297,839	47,297,839	49,662,731	52,145,868	54,753,161	57,490,819
Trincomalee	200,134	51,885,273	52,085,407	54,689,677	57,424,161	60,295,369	63,310,138
Kalmunai	0	24,912,875	24,912,875	26,158,519	27,466,445	28,839,767	30,281,755
Colombo	0	0	0	0	0	0	0
Kalutara			0	0	0	0	0
Kalutara (NIHS)			0	0	0	0	0
Gampaha	200,000	8,880,000	9,080,000	9,534,000	10,010,700	10,511,235	11,036,797
AMC HQ	8,432,328	150,687,256	159,119,584	167,075,563	175,429,341	184,200,808	193,410,849
Sub-Total (routine activities)	16,876,576	908,934,345	925,810,921	972,101,468	1,020,706,541	1,071,741,868	1,125,328,961
Additional activities							
Case study (Southern province)			500,000	500,000	0	0	0
Supervision visits (24@70,000)			1,680,000	1,764,000	1,852,200	1,944,810	2,042,051
Emergency visits (10@70,000)			700,000	735,000	771,750	810,338	850,854
Entomological surveillance (7days * 7persons) = 200,000 per month			2,400,000	2,520,000	2,646,000	2,778,300	2,917,215
Reactive spot surveys (10*80,000 per year)			800,000	840,000	882,000	926,100	972,405
Insectory supplies (10,000 per month)			120,000	126,000	132,300	138,915	145,861
Insecticides (25 drum * 3 years)			3,200,000			3,520,000	
LLINs (30,000 every 3 years)				28,000,000			29,400,000

RMO Region	Total Expenditure 2022		2023	2024	2025	2026	2027
	Capital	Recurrent					
Temephos (200 litres for 3 years)				2,000,000			2,100,000
Temephos (SG*1000 kg)				5,500,000			5,775,000
Resistance monitoring (2,000,000 per year)			2,000,000	2,100,000	2,205,000	2,315,250	2,431,013
Ento supplies (1,000,000 per year)			1,000,000	1,050,000	1,102,500	1,157,625	1,215,506
Cadjan hut maintenance (400,000 per year)			400,000	420,000	441,000	463,050	486,203
Fish tank maintenance and repairs (15*150,000 per year)			2,250,000	2,362,500	2,480,625	2,604,656	2,734,889
Community awareness programmes (5*twice a year*9 regions * 30,000)			2,700,000	2,835,000	2,976,750	3,125,588	3,281,867
Operations research for ento (1,000,000 per year)			1,000,000	1,050,000	1,102,500	1,157,625	1,215,506
Semi-annual reviews (ento) (2*500,000 per year)			1,000,000	1,050,000	1,102,500	1,157,625	1,215,506
In-service training - RMO/HEO (4*700,000 per year)			2,800,000	2,940,000	3,087,000	3,241,350	3,403,418
Clinician training programmes (24*160,000 per year)			3,840,000	4,032,000	4,233,600	4,445,280	4,667,544
RMO training (1*3,000,000 per year)			3,000,000	3,150,000	3,307,500	3,472,875	3,646,519

RMO Region	Total Expenditure 2022		2023	2024	2025	2026	2027
	Capital	Recurrent					
Vector control training programmes (1*3,000,000) per year			3,000,000	3,150,000	3,307,500	3,472,875	3,646,519
Blood bank screening programme (26*75,000 every year)			1,950,000	2,047,500	2,149,875	2,257,369	2,370,237
Biannual meeting with disease control programme (2*1*day*1,000,000)			2,000,000	2,100,000	2,205,000	2,315,250	2,431,013
Annual Provincial level reviews (1*9*2 days*1,000,000)			18,000,000	18,900,000	19,845,000	20,837,250	21,879,113
Monthly and biannual Review meetings (4 physical meetings-2 days each* 2,000,000)			16,000,000	16,800,000	17,640,000	18,522,000	19,448,100
Monthly meetings (8 meetings * 15,000)			120,000	126,000	132,300	138,915	145,861
TSG (6*15000)			90,000	94,500	99,225	104,186	109,396
CRC (12*15000)			180,000	189,000	198,450	208,373	218,791
Advocacy (6*100,000) per year			600,000	630,000	661,500	694,575	729,304
Risk group awareness (10*25,000)			250,000	262,500	275,625	289,406	303,877
Mid-term review (local)						5,000,000	
Sub-Total (additional activities)			71,580,000	107,274,000	74,837,700	87,099,585	119,783,564
Total	16,876,576	908,934,345	997,390,921	1,079,375,468	1,095,544,241	1,158,841,453	1,245,112,526

Budget Assumptions

1. The estimated budget is based on the capital and recurrent expenditure incurred in 2022 as submitted by the Central Bank of Sri Lanka. 2022 was taken as the base year due to the economic crisis and the devaluation of LKR.
2. Both capital and recurrent budgets were taken to gether as unit costs were not available.
3. The estimated budget is divided into two sections: 1. Routine activities and 2. Additional activities.
4. The routine activities budget is based on the capital and recurrent expenditure incurred in 2022. The budget for routine activities is the same as that for 2022 as budget restrictions imposed as a result of the economic crisis was assumed to remain for 2023. For subsequent years 2024-2027, the budget was increased by 5% to account for inflation.
5. Additional activities were budgeted separately and included in the relevant years that the activities will be carried out with a 5% increase for each year.