



Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

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Ministry of Health

National Strategic Plan for Malaria Control and Elimination 2016-2020



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Ministry of Health

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FOREWORD

This *National Strategic Plan for Malaria Control and Elimination (2016-2020)* lays out the goals, objectives, strategies, parties responsible and coordination mechanisms, and costs to successfully reduce the burden of malaria in the Lao People's Democratic Republic (PDR) over the next five years to prepare the country for national elimination by 2030. The 2016-2020 Strategy is the first part of a three-phase approach to eliminate all forms of malaria in Lao PDR and includes strengthened interventions targeted to the southern part of the country to reduce the primary malaria burden while beginning efforts to eliminate malaria in the remaining focal areas in central and Northern Lao PDR.

An initial version of the national malaria strategic plan was developed in 2014, following an open and inclusive process that included a World Health Organization (WHO)-supported malaria program review in 2013. The 2014 Strategic Plan was reflective of the regional objectives and activities intended to control malaria and contain the spread of and prevent the growth of artemisinin resistance. Due to the rapidly changing dynamics of drug resistance, WHO published the *Strategy for Malaria Elimination in the Greater Mekong Sub region (2015-2030)*, which shifted regional objectives to national elimination rather than containment. The Ministry of Health (MOH), including the Department of Communicable Disease Control (DCDC) and the Centre for Malariology, Parasitology and Entomology (CMPE) with support from WHO and other technical partners, therefore revised the strategy between April and December 2015 to ensure the long-term goals of elimination are achieved.

- Beyond consultation with local stakeholders, this document is constructed based on guidance from the *Malaria Elimination in the Greater Mekong Subregion 2015–2030* and is aligned with the principles of the new *WHO Global Technical Strategy (GTS) for Malaria 2016–2030*, including:
- All countries can accelerate efforts towards elimination through combinations of interventions tailored to local contexts.
- Country ownership and leadership, with involvement and participation of communities, are essential to accelerating progress through a multi-sectoral approach.
- Improved surveillance, monitoring and evaluation, as well as stratification by malaria disease burden, are required to optimize the implementation of malaria interventions.
- Equity in access to services especially for the most vulnerable and hard-to-reach populations, is essential.
- Innovation in tools and implementation approaches will enable countries to maximize their progression along the path to elimination.

This National Strategic Plan for Malaria Control and Elimination (2016-2020) is a dynamic document to guide the country's long-term elimination efforts and will be updated as necessary based on lessons learnt during implementation, results produced and the availability of new evidence or tools.

Vientiane Capital

Ministry of Health

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Assoc. Prof. Bounkong SYHAVONG

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We would like to thank all the ministries, institutions and all involved sectors including national and international organizations as well as development partners and in particular the line Ministries and related departments of the Ministry of Health who have participated actively in the development of this National Malaria Strategic Plan.

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List of Acronyms and Abbreviations

ACD	Active Case Detection
An.	Anopheles
ACT	Artemisinin-based Combination Therapy
ADB	Asian Development Bank
API	Annual Parasite Incidence
BCC	Behaviour Change Communication
CIEH	Centre of Information and Education for Health
CMPE	Center for Malariology, Parasitology and Entomology
DAMN	District Anti-Malaria Nucleus
DCDC	Department of Communicable Diseases Control
DDT	Dichloro-Diphenyl-Trichloroethane
DPIC	Department of Planning and International Cooperation
DOT	Directly Observed Treatment
FDD	Food and Drug Department
GDP	Gross Domestic Product
GF	Global Fund
GoL	Government of Lao PDR
G6PD	Glucose 6 Phosphate Dehydrogenase
HC	Health centre
IRS	Indoor Residual Spraying
IEC	Information, Education and Communication
ITN	Insecticide Treated Net
LLINs	Long-Lasting Insecticidal Nets
LLIHNS	Long-Lasting Insecticidal Hammock Nets
LOMWRU	Lao-Oxford-Mahosot Hospital Wellcome Trust Research Unit
MBDS	Mekong Basin Disease Surveillance
MDA	Mass Drug Administration
M&E	Monitoring and Evaluation
MIS	Malaria Information System
MMIS	Malaria Multi-Indicator Survey
MMPs	Mobile and Migrant Populations
MMW	Mobile Malaria Worker
NMCP	National Malaria Control Program
NSP	National Strategic Plan
NTG	National Treatment Guidelines
PAMS	Provincial Anti-Malaria Station

PCD	Passive Case Detection
PCR	Polymerase Chain Reaction
PHO	Provincial Health Office
PMU	Project Management Unit
PPM	Public-Private Mix
PQ	Primaquine
PR	Principal Recipient, GF
PSM	Procurement & Supply Management
QA	Quality Assurance
RAI	Regional Artemisinin Initiative
RDT	Rapid Diagnostic Test
RRT	Rapid ResponseTeam (RRT)
SM&E	Surveillance, Monitoring and Evaluation
SOP	Standard Operating Procedure
TA	Technical Assistance
TES	Therapeutic Efficacy Studies
TWG	Technical Working Group
UHC	Universal Health Coverage
VHV	Village Health Volunteer
VMW	Village Malaria Worker
WHO	World Health Organization

I. INTRODUCTION

The Lao People's Democratic Republic has successfully decreased malaria to relatively low levels and is primed for elimination by 2030. From 2000 to 2010, reported malaria cases decreased 92%, from 279,903 to 23,047. A recent resurgence in the southern part of the country, leading to over 50,000 cases reported in 2014, threatens gains made in the previous decade. Lao PDR is well situated to accelerate control efforts in the South and pursue elimination in the North, including having high-level political commitment for this effort and evidence that available intervention tools applied appropriately can effectively reduce and eventually interrupt transmission. Additionally, recent evidence suggests that national elimination is likely to be the only method to halt the spread of multi-drug resistance and prevent the emergence of untreatable *P. falciparum* malaria.

The *National Strategic Plan for Malaria Control and Elimination (2016-2020)* represents the first phase of the 15-year strategy to eliminate malaria in Lao PDR. The first five years of the strategy sets out to reduce the burden of malaria in the southern provinces below 5 cases per 1000 population while eliminating *P. falciparum* malaria in primarily Northern provinces. By 2025, the country targets elimination of *P. falciparum* malaria and *P. vivax* from all Northern provinces and elimination of *P. falciparum* in the four southern-most provinces. By 2030, Lao PDR will have achieved national elimination. The timelines and geographic targets for elimination are depicted in Figure 1.

2020: Elimination of p.f. in all norther/central provinces, and reduction of API to < 5/1000 in the southern provinces

2025: Elimination of p.f. in the entire country, and elimination on fo P.v in norther / central provinces

2030: Elimination of p.v. in the entire country

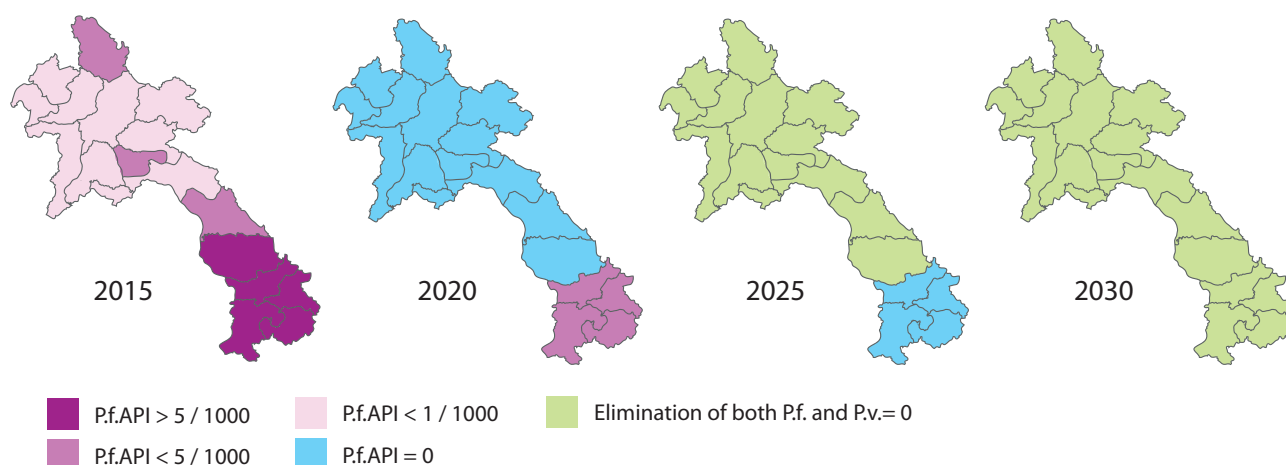


Figure 1. Timelines and Geographic Targets for Malaria Elimination in Lao PDR, 2015-2030

This strategy seeks to build on the national successes of CMPE while addressing current challenges to reduce the overall burden of malaria in southern Lao PDR and initiating elimination activities in remaining focal areas of transmission in Central and Northern areas. This document describes how the Ministry of Health, including DCDC and CMPE along with technical, implementation and community partners, will aggressively target southern areas and moderate burden areas in central and Northern Lao PDR to provide quality diagnosis and treatment services for malaria, effective vector control measures to protect at-risk populations, and educational messages on preventing malaria and treatment seeking behaviour. Broadly as part of general health systems strengthening initiatives led by the Ministry of Health, the national disease surveillance will be upgraded to facilitate information sharing and rapid response to the developing

dynamics of malaria transmission in Lao PDR. In remaining focal areas of transmission in Northern provinces, elimination activities intended to interrupt transmission will be deployed and will serve as a model for eventual elimination nationally.

To implement the strategies as described in this document, the enabling environment for elimination in the country must be strengthened. To achieve the objectives of this strategy, it will be necessary to continue to foster support from the highest level of government to ensure effective multi-sectoral engagement for malaria control and elimination since malaria control cannot be achieved by the health sector alone and to secure necessary resources to support full strategy implementation. The implementation of this strategy will also require the country to address human resources requirements for malaria at all levels to ensure effective management and implementation at all levels of the health system.

II. COUNTRY PROFILE

The Lao People's Democratic Republic is a land-linked country in Indochina bordering China, Vietnam, Cambodia, Thailand and Myanmar. The country is comprised of 18 provinces, which are further subdivided into 147 districts, as shown in Figure 2. The capital and largest city is Vientiane, which is situated on the Mekong River along the border with Thailand.

Figure 2. Administrative Provinces and Districts in Lao PDR



2.1 DEMOGRAPHY

Lao PDR has an estimated population of 6.8 million¹ and a population growth rate of 1.55%. Population density is low with an estimated 27 persons per sq. km in 2014 with an estimated average household size of 5.17. Lao PDR has the youngest population in Asia, and more than half of Lao PDR's population (55%) is below 24 years of age. Only 28% of the population lives in urban areas.

There are 45 ethnic groups inhabiting Lao PDR. The official national language is Lao, though other ethnic minority languages are spoken in different parts of the country. The main religion in the country is Buddhism, practiced by approximately 67% of the population².

2.2 ENVIRONMENT AND CLIMATE

Lao PDR is a highly mountainous, land-linked country, with elevations frequently above 500 meters. The Annamite Mountain Range forms the border with Vietnam in the east, while another mountain range forms the border with Thailand in the northwest. The Mekong River forms a long border with Thailand in the western part of the country.

¹ FAO, 2015. *The State of Food Insecurity in the World 2015*. Rome: Food and Agricultural Organization of the United Nations.

² Ministry of Health and Lao Statistics Bureau. *Lao Social Indicator Survey, 2011-2012*. 2012.

The tropical monsoon climate produces a significant rainy season which lasts from May until October. From November till February, there is a cooler, dry season, which is then followed by a hot dry season in March and April. There is a broad range of temperatures across the country, as areas along the Mekong River can reach 40° C during the hot season, or as low as 5° C during the cold season in the Northern parts of the country.³

2.3 SOCIO-ECONOMIC CONTEXT

The economy began decentralization in 1986⁴, and increased private enterprise has resulted in significant growth over the last 30 years. Lao PDR's strong economic growth led to an upgrade of the World Bank's classification from a "low-income" economy to a "lower middle-income" country. The gross national income (GNI) per capita was US\$ 1,660 in 2014⁵. Averaging annual 8% GDP growth over the last decade, Lao PDR has become one of Asia's fastest growing economies. Lao PDR achieved the MDG target of halving its national poverty rate from 46 percent in 1992/93 to 23 percent by 2012/13⁶. In 2015, national estimates show that the poverty rate has declined even further. The economy is heavily dependent on the natural resources available in country (copper, tin, gold, gypsum, timber, rubber, etc.) and the hydroelectric power generated through foreign direct investment along with counterpart funding in DAMN along the Mekong River and its tributaries. These are exported to neighboring countries such as Thailand, China and Vietnam⁷. Overall, approximately 73% of workers are employed in the farming/agriculture sector.

The economic growth is not equally distributed and is mainly concentrated in urban areas. Disparities between urban and rural areas are still pronounced. For example, 96% of urban households have access to electricity, compared with only 33% in rural areas without road access. Poverty is higher in remote and highland areas and inversely correlates with road or river access. As of 2015, about 76% of the population have access to improved sources of drinking water 71% are covered by improved sanitation. However, open defecation is still an estimated 23% in 2015⁸.

2.4 HEALTH SYSTEM

Historically, a total of 2% of the GDP has been allocated for health-related expenditures. There are 0.2 physicians and 1.0 nurse per 1,000 population⁹. The most significant diseases affecting the population include both communicable and non-communicable diseases. Lower respiratory infections such as pneumonia and bronchitis account for the largest number of years of life lost, while ischemic heart disease, diarrheal diseases and strokes were also significant causes of premature death.¹⁰ Lao PDR has reduced its maternal mortality ratio (MMR) by 75 percent, achieving MDG 5; however, MMR is still high (around 220 per 100,000 in 2013). Less than half the births are assisted by trained health personnel (42 percent in 2011/12) and the facility-based delivery rate remains low (38 percent)¹¹. At birth, the life expectancy is 67.5¹².

In December 2012, the National Assembly endorsed the *Health Sector Reform Framework 2013–2025* and increased the allocation for health to 9% of the GDP. The goals and phasing of the reform framework include: 1) Phase I [2013-2015]: achieve health related Millennium Development Goals by 2015 and lays out a solid foundation for universal access to essential health services, 2) Phase II [2016-2020]: ensure that essential health services with reasonable good quality are available and accessible, and 3) Phase III [2021-2025]:

³ Ministry of Natural Resource and Environment. *Lao Environment Outlook*. 2012.

⁴ Elgar E. *Decentralization in Developing Countries*. Cheltenham, UK: Edward Elgar Publishing, Inc; 2011

⁵ <http://data.worldbank.org/country/lao-pdr?display=graph>

⁶ Government of the Lao PDR and the United Nations, 2013. *The Millennium Development Goals: Progress Report for the Lao PDR 2013*. Vientiane: Ministry of Foreign Affairs and United Nations.

⁷ The World Bank. *Lao Environment Monitor*. 2005.

⁸ WHO/UNICEF *Joint Monitoring Programme*, 2015.

⁹ OECD/World Health Organization. *Health at a Glance: Asia/Pacific 2012*. OECD Publishing. 2012.

¹⁰ Institute for Health Metrics and Evaluation. *Global Burden of Disease Study (2010)*. 2012

¹¹ Government of the Lao PDR and the United Nations, 2015. *The Millennium Development Goals and Lessons Learnt for the Post-2015 Period: A Summary Review*. Vientiane: Ministry of Foreign Affairs and United Nations.

¹² Ministry of Health, Lao PDR and WHO Western Pacific Office. *Health Service Delivery Profile: Lao PDR*. 2012.

achieve universal health coverage with an adequate service benefits and appropriate financial protection to a vast majority of the population. The Government has committed to strengthening the health system through a focus on five priorities of the Health Sector Reform Framework¹³. These are (i) strengthening human resource capacity, (ii) improving health sector financing, (iii) improving the governance, organization and management of the health system, (iv) improving health service delivery and hospital management and (v) improving the overall monitoring and evaluation framework and the Health Information System. The quality and deployment of health staff requires significant attention, including prioritizing the deployment of skilled health workers in rural and remote areas, strengthening the capacity of health professions education and training, and addressing specific skill gaps remain due to mismatches between training programs and demand by provincial health services¹⁴.

There are three administrative levels in the public health system: central (Ministry of Health (MOH)), provincial (provincial health offices (PHOs)) and district (district health offices (DHOs)) and four levels of service delivery: (1) central-level providers (hospitals) managed directly by the MOH; (2) provincial-level providers, managed by the PHOs; (3) district-level providers, managed by the DHOs; and (4) community-level providers (health centres), also managed by the DHOs. At village level, there are a large number of village health volunteers (VHVs), members of community health committees, and traditional birth attendants (TBAs).

The main network for health care service provision remains the public sector with government-owned and operated health centres and district and provincial hospitals. However, public health facilities, particularly health centres and district level facilities are perceived as being sub-standard resulting in excessive patient load at central and provincial level and under-utilization of district- and community-level facilities. The number of Health Care Providers (HCPs) remained essentially unchanged in the two decades between 1988 and 2009. The total health workforce stagnated at 12,481 in 1998, dropping slightly to 12,422 in 2010 despite a 23% growth in population during the same period. This lack of growth in the health workforce could be attributed to inadequate quota of posts allocated to the MOH previously which has now been improved by the Ministry of Home Affairs (MHA) through an allocation of a quota of around 4,000 in 2014.

Private sector alternatives are increasing in response to patient demand for better quality health care. In 2010 there were 222 authorized private outpatient clinics in the country including 96 in Vientiane, 34 in Savannakhet, and 23 in Xiengkhuang and another 647 clinics have applied for authorization. The actual number of private outpatient clinics is likely to be larger than the reported figures, since doctors who work in the public sector are permitted to open and run private clinics after regular working hours and at weekends.

¹³ Ministry of Health, Lao PDR. 2012. Health Sector Reform Framework: 2013-2025. Lao PDR. 2012.

¹⁴ Government of the Lao PDR and the United Nations, 2015. The Millennium Development Goals and Lessons Learnt for the Post-2015 Period: A Summary Review. Vientiane: Ministry of Foreign Affairs and United Nations.

III MALARIA SITUATIONAL ANALYSIS

3.1 HISTORY OF MALARIA CONTROL IN LAO PDR

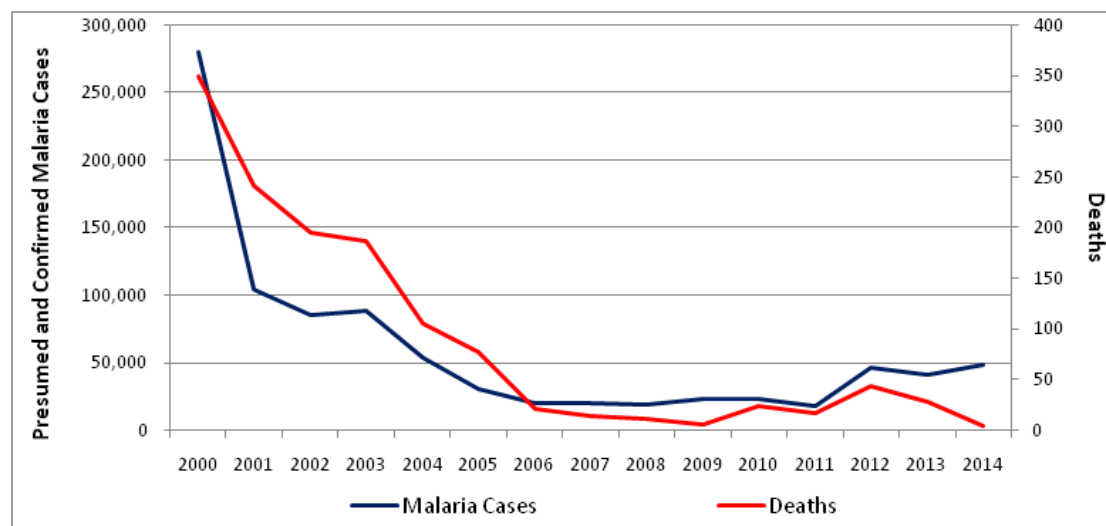
Malaria control began in Lao PDR in 1953, when the insecticide dichloro-diphenyl-trichloroethane (DDT) was first used. In 1954 a malaria control programme was established at central level and each of the then 12 provinces had a DDT spraying team. The National Malaria Service had protected 900,000 people through household indoor spraying and a case management program utilizing chloroquine. However, the intensification of the Laotian Civil War led to the cessation of spraying in 1961.¹⁵ From 1969 to 1975, some DDT spraying occurred in Vientiane Province along with campaigns of mass chloroquine administrations.

The current government was established in 1975, and the Institute of Malaria, Parasitology and Entomology was created in 1981 along with a country wide network of malaria units. This institute is now called the Centre of Malariology Parasitology and Entomology (CMPE). Insecticide treated nets (ITNs) were first introduced in 1988 as the primary activity. By the mid-1990s, ITNs were scaled-up nationally with support of the World Bank and Asian Development Bank. Additional support was provided by the Lao EU Malaria Control Program (1997-2001) and the government of Japan for targeted malaria control support in select provinces and districts. Also, bilateral Vietnamese government cooperation supported malaria activities in Nonghed district (Xiengkhouang province), Kamkheut district (Bolikhamsay province) and Ed district (Huaphan province) during this period.

By the early 2000s, the dynamics of malaria transmission was changing across Lao PDR, due largely to the beginning of several large malaria control projects with a focus on distribution of insecticide treated bed nets and utilization of artemisinin-based combination therapies (ACTs), resulting in more focalized transmission in the Northern and Central Provinces, a trend that has continued to this current day. The malaria burden remained high in Southern Provinces, with spikes in incidence occurring due to influx of migrant and mobile populations related to development projects and large scale industrial and agricultural projects.

Investments in malaria control over the past 15 years, including over \$50 million from the Global Fund to Fight AIDS, TB and Malaria, has led to a decrease in the overall malaria burden in Lao PDR. Increased coverage of ITNs, long-lasting insecticidal nets (LLINs), quality assured ACTs, and the roll-out of rapid diagnostics tests, have had a significant impact. Between, 2000 and 2010 the number of probable and confirmed cases fell by 92%, from 279,903 to 23,047 and the number of malaria related deaths decreased from 350 to 24. A recent epidemic in the South has led to an overall increase in cases (50,674 cases in 2014) as shown in Figure 3 on the following page and due to reasons explained in Section 3.3.2.

Figure 3. Malaria Cases and Deaths in Lao PDR, 2000-2014



¹⁵ World Health Organization. Fifty years: Working for health in the Lao People's Democratic Republic, 1962-2012. Geneva 2013.

3.2 EPIDEMIOLOGICAL PROFILE

3.2.1 Parasites

P. falciparum was the predominant parasite species in Lao PDR, accounting for about 99% of the annually reported cases until 2010. However, following the 2011 roll-out of combination rapid diagnostic tests that could detect multiple plasmodium species, the proportion of *P. vivax* cases detected increased and as of 2014 accounted for 47% of confirmed cases, as shown in Figure 4 below. In 2014, there were 25,317 *P. falciparum* cases and 23,763 *P. vivax* cases identified in the country.

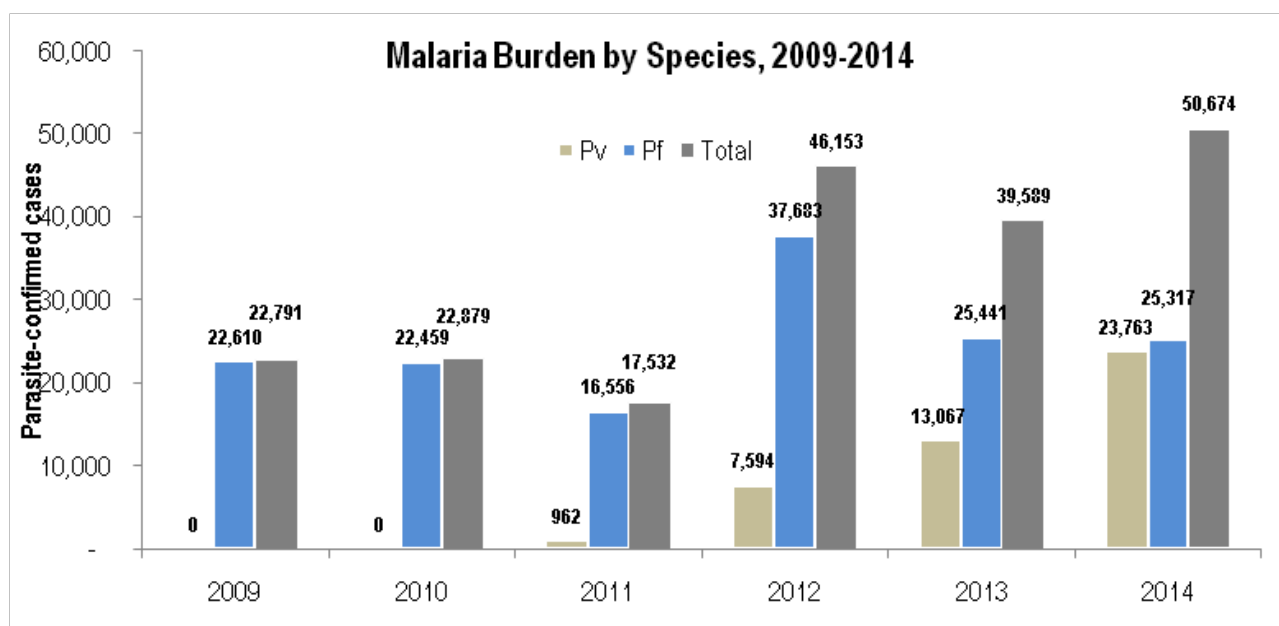


Figure 4. Plasmodium falciparum, Plasmodium vivax, and total positive cases, 2009-2014

3.2.2 Vectors

There are four recognized malaria vectors in Lao PDR: *Anopheles dirus*, *An. minimus*, *An. maculatus*, and *An. jeyporiensis*. Among these, *An. dirus* and *An. minimus* are considered primary vectors. While *An. minimus* is widespread and has been identified in all provinces, *An. dirus* which was formerly most common in the central and southern parts of the country has also recently been found in Phongsaly and Luang Prabang in the north in 2014-2015. According to recent entomological surveillance, *An. maculatus* is also found more broadly distributed than previously recorded.

Although *An. dirus* is generally observed to be very exophagic (outdoor biting) and exophilic (outdoor resting) in South-East Asia, populations in Attapeu Province have shown highly endophilic (indoor resting) and endophagic (indoor biting) trends, including 19% biting before 21:00 h.¹⁶ While this suggests that ITNs and IRS are effective in reducing their population density, the use of ITNs did not stop *An. dirus* from entering the houses in the province of Savannakhet.¹⁷ A high proportion of biting *An. Minimus* and *An. Maculatus* in early evening hours may limit the effectiveness of ITNs for malaria prevention in certain areas. Overall, while the use of LLINs in the malaria endemic areas has had a high protective value, however, malaria in Laos is mainly acquired due to transmission in the forest since the majority of those affected are males 15-45 years old (so called MMPs) with very few cases being recorded among children and women and in residential communities. Hence reducing human-vector contact is of great importance for the MMPs.

3.2.3 Transmission

Malaria is endemic in most parts of the country, but the intensity of transmission varies greatly between the different ecological zones, from low transmissions in the plains along the Mekong River and in areas of high altitude (greater than 1000m) to intense transmission in hilly forested areas. Urban zones and villages located at altitudes above 1200m are generally considered free from malaria; however very few studies have been performed in villages in high altitudes.

The tropical climate in Lao PDR with an average annual temperature of 25-30° C and average humidity of 55% is highly suitable for transmission of malaria. However, in some areas in the Northern part of the country, temperatures regularly drop below 18° C in the cold season. During which transmission of *P. falciparum* may be temporarily interrupted. However, with increasing proportions of *P. vivax* being recorded in the country including some specific Northern provinces like Phongsaly, transmission of *P. vivax* has continued uninterrupted even in the cold season.

There were clear, seasonal peaks of transmission coinciding with the rainy season from April to October, but with less stable and increased transmission observed from 2011 to 2014 due to large-scale outbreaks in southern parts of the country, where 95% of the total malaria burden in the country is located.

3.2.4 Key Risk Populations

The wide variety of mobile and static population groups at risk of malaria in endemic areas of Lao PDR are summarized in Table 1. The epidemiology of the disease varies considerably from one group to another and may require different malaria control strategies, adapted to risk group behaviour, local cultural and traditional practices, local health infrastructure, and environmental conditions. The level of malaria risk for each of these groups is dependent on a number of location-dependent factors including degree of endemicity, accessibility, health system strength and poverty. Traditional forest inhabitants in Laos belong to over 45 different ethnic minority groups. There are 240 distinct languages spoken in Laos making communication of health messages extremely challenging. Poverty in these communities is often extreme.

Table 1. Population groups at risk of malaria in endemic areas of Lao PDR

STATIC POPULATIONS	MOBILE POPULATIONS
<ul style="list-style-type: none"> ● At risk villages including ethnic minority villages ● Formal settlements associated with large scale construction projects (DAMN, bridges, mines) ● Plantations (rubber, oil palm, food) ● Army camps ● Informal settlements e.g. roadside economic migrants, settlements adjacent to construction projects 	<ul style="list-style-type: none"> ● Forest workers - formal sector (army patrols, police, border guards, forest/wildlife protection services) ● Forest workers - informal sector (hunters, small-scale gem/gold miners, people gathering forest products [timber, rattan, bamboo]) ● Traditional slash-and-burn and paddy field farming communities (commonly ethnic minority groups -EMGs) ● Seasonal agricultural labourers ● Camps associated with development and commercial projects (road/railway construction, large-scale logging)

At-Risk Static Populations

Most static populations reside in 'established villages' that have access to malaria prevention and treatment and are referred to as resident population. However, delivering malaria services to less conventional static population settlements at-risk of malaria is a challenge. These static populations may refer to people who live in formal settlements developed for large-scale development and construction projects, those who reside at work places including plantations or army camps, and ethnic majority villages that are less connected to public services. Ensuring that these populations can either access public health services or that employers can provide quality amenities and care is a necessity for malaria control and elimination

At-Risk Mobile and Migrant populations (MMPs)

Mobile and migrant populations are defined as any workers or their family members who migrate for economic or labour-related reasons within Lao PDR or across borders with neighbouring countries. Mobile workers are present in an area for less than 6 months, whereas migrant populations are present for more than 6 months and less than one year; people beyond one year are considered residents. MMPs include both foreign nationals as well as Lao nationals who may move within the country to other districts or provinces for employment. Mobile and migrant populations are a high-risk group for malaria infection in Lao PDR due to their heightened exposure in remote or forest-areas, the access they lack to quality public health services due to a variety of reasons, and the challenge of identifying and tracking them. Mobile and migrant populations are comprised of many different types of groups in Lao PDR, including:

- *Traditional farming communities* face particular challenges in accessing healthcare when they are away from their villages at their forest farms (Thieng Na), which is often the case for much of the year.
- Seasonal agricultural labourers who harvest coffee and fruit from orchards or cassava and rice close to the forest are at high risk of malaria. Workers may come from other regions, following seasonal demand for labour, with little knowledge of risk or public health services available.
- *Informal forest workers*, who may include hunters, small-scale miners, loggers and people gathering forest products are commonly unprotected. These populations can be difficult to identify as groups and movements are dynamic.
- *Migrants* coming across international borders as well as from other provinces for work may be found in most of the situations described above, working for large private companies, living in unauthorized housing developments, working as seasonal agricultural labourers or as informal forest workers. These groups are of particular concern because they could potentially contribute to the spread of drug resistant malaria and may be even more marginalized in a foreign country due to lack of language skills or appropriate documentation.
- *Police, military, border guards and forest/wildlife protection services* may receive some level of protection in the form of LLIN/LLIHN (hammock nets) and access to medicines/prophylaxis/standby treatment, but move around constantly in the country as part of their work.

Recently more information on the mobile and migrant workers has become available that challenges and improves understanding of these populations. A survey conducted by Health Poverty Action (HPA) in 2015 has provided more specific information on mobile and migrants in Lao PDR. Among 186 subjects fitting the criteria of mobile or migrant, two-thirds were identified as Lao while nearly another third identified as Vietnamese. Nearly one-third of subjects were women; and over three-fourths of those surveyed reported traveling with other family members. Nearly 75% of the respondents reported returning to their home village each year, while 15% reported returning home more than once a month.

¹⁶ Vythilingam I, et al. Epidemiology of malaria in Attapeu Province, Lao PDR in relation to entomological parameters. *Trans R Soc Trop Med Hyg.* 2005; 99(11):833-9.

¹⁷ Pongvongsa T, et al. Joint malaria surveys lead towards improved cross-border cooperation between Savannakhet province, Laos and Quang Tri province, Vietnam. *Malar J.* 2012; 3;11:262.

¹⁸ Jorgensen P, et al. High heterogeneity in *Plasmodium falciparum* risk illustrates the need for detailed mapping to guide resource allocation: a new malaria risk map of the Lao People's Democratic Republic. *Malar J.* 2010; 9; 59.

Regarding malaria-relevant behaviors, 26% of those interviewed had reported a fever in the past 3 months and 94% of those sought treatment. Of the 85% who reported receiving a malaria diagnostic test for their fever and tested positive (83%), only 73% took an antimalarial. For prevention, 95% of those interviewed said that they had slept under a mosquito net the night before they were interviewed, but the majority slept used a conventional untreated net while only 16% used long-lasting insecticidal nets.¹⁹ Hence LLIN distribution strategy from 2016 onwards will put more emphasis on mapping, tracking and distribution of LLINs to MMPs in addition to continuing distribution to the resident populations in endemic areas.

3.3 CURRENT SITUATION AND TRENDS

3.3.1 Malaria Morbidity and Mortality

Morbidity

While malaria continues to represent a significant public health problem, the number of confirmed malaria cases decreased from around 40,000 in 2000 (7.7 cases per 1,000) to as low as 18,472 (2.7 cases per 1,000) in 2011. However, starting from December 2011, malaria outbreaks in the south of the country led to a sharp rise of confirmed cases (46,202 in 2012) and in 2014, there were 50,674 cases reported nationally. The increase in cases is likely related to economic activities in the south, particularly in forest areas and large-scale development projects, which have attracted workers and families from less endemic areas of Lao PDR or neighboring countries, where people are less familiar with the threat of malaria and may be more susceptible to severe malaria or death due to lack of immunity.

The five southern provinces of Savannakhet, Saravane, Sekong, Attapeu and Champassak currently account for 97% of reported cases. Of the 147 districts in Lao PDR, more than half (53%) of all cases come from just 7 districts (all of which are either in Saravane or Champassak). The cases reported in the north may be introduced from or linked to workers returning home from the South or neighbouring countries, but this cannot be verified because case investigations yet to be introduced.

A breakdown of cases by age and sex shows that the majority of cases are among males older than 5 years (Figure 5). The proportion of males with a positive malaria diagnosis increased from 46% in 2009 to 86% in 2014, indicating a relationship between susceptibility of malaria infection and those most likely involved in the workforce, particularly forest workers and migrant laborers. This information underlies the need to target these groups in a much more pro-active manner particularly in the Southern provinces where transmission potential is greatest.

¹⁹ Health Poverty Action. Preliminary results of the "Formative Assessment to Identify Mobile and Migrant Population Networks in South Laos Considered at Risk of Malaria Infection." April 2015, unpublished.

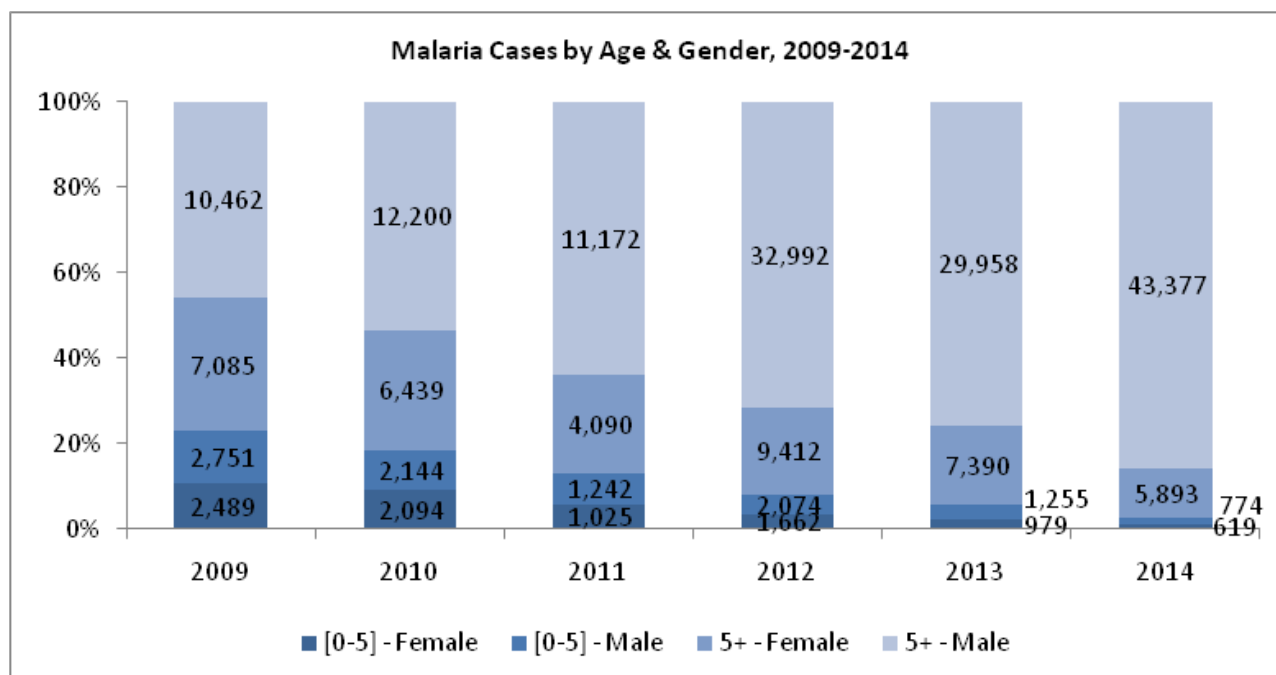


Figure 5. Breakdown of Malaria Cases by Age and Gender, 2009-2014

Mortality

Malaria related deaths have decreased from 350 in 2000 to just 17 in 2011. Although the number of recorded deaths due to malaria resurged to 44 due to outbreaks in southern provinces, deaths have again declined to 28 in 2013 and 4 in 2014. Malaria mortality is highest in the South, where malaria incidence is highest, as reflected in Figure 6.

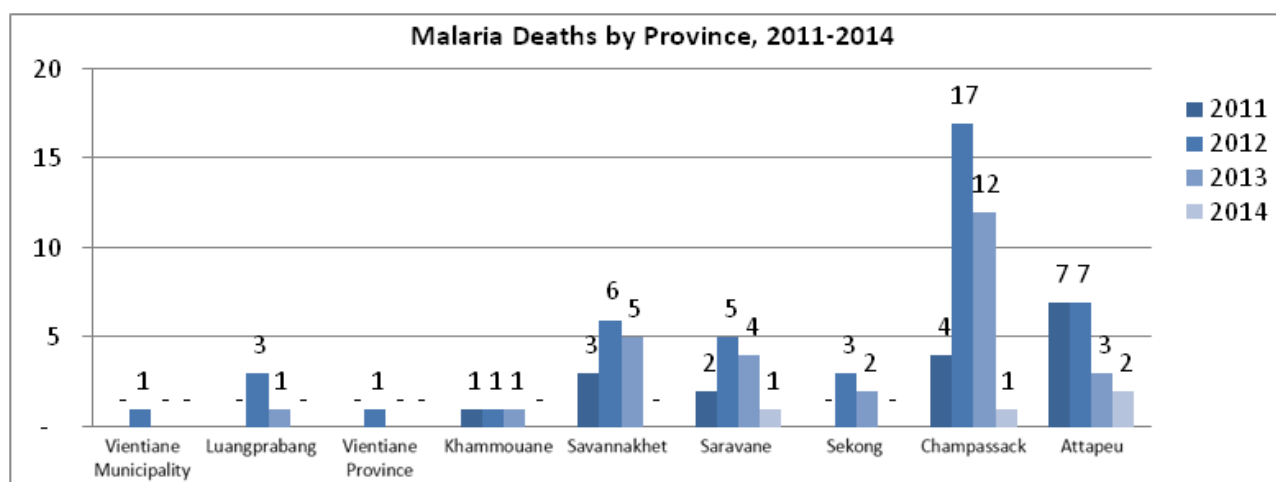


Figure 6: Number of Malaria Deaths Reported by Province, 2011-2014

3.3.2 Malaria Outbreak in the Southern Provinces

Beginning in 2011, a large malaria epidemic in southern provinces of Lao PDR led to an increase in malaria incidence that reached a peak in December 2012, and continued at high level through 2014. The outbreak has shifted through the south, starting in Attapeu from 2011 to 2013, and now in Champassak from 2013 to present day. It is difficult to determine which specific factors contributed to the outbreaks. The epidemic is likely associated with changes in population movements due to increased economic activity including unregulated deforestation and large-scale development projects (the construction of hydropower dams, mining, and plantations) as well as climatic conditions (rainfall patterns, temperature and humidity). Also,

the roll-out of combo RDTs that reliably detect both *P. vivax* and *P. falciparum* has led to an increase in the identification of *P. vivax* malaria cases.

An initial outbreak investigation undertaken by CMPE and DCDC as well as a detailed analysis of the outbreak conducted by the United States President's Malaria Initiative (PMI) in 2013 concluded that there had been a breakdown in the ability of the malaria program to detect and respond to the outbreak. The report found that the surveillance system failed to detect and report the outbreak; that the stratification was outdated and had effectively cut off supply of long-lasting nets, diagnosis and treatment to the outbreak villages; that then outbreak response methods were inadequate, including the inability of the system to shift commodities and supplies to the outbreak area; and that there was no effective system to provide protection to the highest risk groups, including forest workers and soldiers.²⁰

Despite this report, the outbreak response was limited due to a lack of flexible resources available under the Global Fund's transitional funding arrangement. Attapeu Province was the exception where nearly US\$500,000 was mobilized from numerous partners including EU-ECHO, GF, WHO, JICA and PMI for commodity support and IEC materials. To adequately respond to the outbreak, Lao PDR must prioritize the following actions:

- Increase understanding of mobile and migrant populations, particularly young males involved in forest-related malaria work, including their knowledge and behaviors related to malaria
- Upgrade malaria information system to improve timeliness to facilitate the detection and initiation of response mechanisms
- Incorporate all private sector facilities and outlets providing malaria diagnosis and treatment in national surveillance system to generate a more complete picture of the outbreak situation
- Establish electronic logistics management information system capable of tracking essential malaria commodities to prevent stock outs at health centres and with community level workers and facilitate shifting of surplus stock where necessary
- Establish emergency fund for outbreak response and improve disbursement mechanisms
- Finalize protocols for outbreak investigation and response and train all provincial, district, and health centre staff on protocols and roles/responsibilities.
- Regularly update stratification to ensure that areas most at-risk for malaria are effectively targeted
- Establish mechanisms for continuous distribution of LLINs/LLIHNS

3.3.3 Multi-Drug Resistance

From 2005-2012, several therapeutic efficacy studies in north, central and southern Lao PDR found over 97% efficacy using artemisinin-lumefantrine, the first-line anti-malarial for treatment of *P. falciparum*. In 2013, a study conducted in two districts (Khong and Pathoumpone) of Champasack province reported for the first time a 90% cure rate and 22.2% Day 3 positivity. K13 mutations were also present in 77% of the samples tested. Champasak is situated on the borders of Ubon Ratchathani of Thailand and Steung Treng of Cambodia, where a similar predominance of K13 mutations were recently reported in these provinces. *[Note: Samples tested in Ubon Ratchathani came from an outbreak surveillance in 2014 (not TES). Those from Steung Treng were from a 2014 TES].*

For 2014-2015, TES was conducted in 3 southern provinces, Sekong, Attapeu, and Champassak. Final results from Sekong showed 86% adequate clinical and parasitological response, 20% Day 3 positivity, and presence of K13 mutations in 52% of the Day 0 isolates tested. Therapeutic efficacy studies are still ongoing in Champassak and Attapeu. There is no evidence that artemisinin resistance has directly contributed to the outbreaks in the South, but it is a factor that should be considered and reviewed, and closely monitored.

²⁰ Briggs M, Fukuda M, Shafique M. Evaluation of Increases in Reported Malaria Cases in the Six Southern Provinces of Lao PDR. President's Malaria Initiative. 2013.

3.4 PROGRAM ORGANIZATION, MANAGEMENT AND PERFORMANCE

The Centre for Malariology, Parasitology and Entomology (CMPE), part of Department of Communicable Diseases Control (DCDC) of the Ministry of Health (MOH), provides technical and managerial support for malaria control as part of a highly decentralized health system that focuses much of the decision-making power at the provincial level. CMPE has no direct authority over the 18 provinces, each of which has a provincial anti-malaria station (PAMS). CMPE provides funds, key commodities, technical advice and support, but direct oversight from CMPE to the provinces is limited. Previously CMPE and the provinces used to meet once a year to prepare a budget and agree on a work plan as well as regular training programmes. However from 2015, the frequency of meetings on different technical aspects and training events has increased. CMPE staff conduct regular supervisory visits to provinces and districts with relatively greater frequency to the southern provinces and intends to improve the frequency and quality of supervision and mentoring including feedback over the NSP period of 2016-2020.

The DCDC plays an oversight role for the malaria programme at the macro level. Responsibilities include providing advocacy to the higher level of authorities within the government, fund raising, policy formulation, coordination with relevant ministries and departments, and convening high level meetings including with donors.

CMPE has a direct programmatic responsibility for malaria and other vector-borne and parasitic diseases at sub-national levels. There is a Director and two Deputy Directors. There are four technical units (Epidemiology, Vector Control, Laboratory and Treatment, and Training and Health Education) and one administrative unit. Of the 49 positions existing at present there are currently 13 vacant technical posts and 2 vacant administrative posts. The organizational structure of CMPE is shown in Figure 7.

There are 18 Provincial Anti-Malaria Stations (PAMS) each with an organizational structure modelled on CMPE. Depending on the size of the province, the number of staff varies from 5 to 25. Typically, the units under a PAMS are: administration, epidemiology, laboratory and treatment, entomology and information, education and communication (IEC). Data collected at district level are routinely submitted to the PAMS on a monthly basis. The heads of the different units at the PAMS are in charge of collecting, verifying, compiling and reporting different types of data and submitting reports to their corresponding units in CMPE.

The 147 district anti-malaria nuclei (DAMN) usually have 1-3 staff; they are divided into two units: the insecticide-treated net (ITN) unit and the laboratory and treatment unit. The DAMN is also responsible for a number of other functions such as compiling all the malaria information (LLIN, morbidity, mortality, training, IEC activities, etc.) received from the health centres and hospitals and reporting it to the PAMS and health education. Data quality assurance measures are performed through quarterly supervisory missions by the DAMN team to the health centre level. Some of the villages are also covered during the mission.

There are 879 health centres serving more than 11,000 villages. Each health centre (HC) is responsible for 5-12 villages in its service area and provides primary health care, basic training and health education, and referrals. There are usually 1 to 3 staff at each HC but, in the future, this may increase to 7. HC staff supervise village malaria workers (VMWs). VMWs carry out diagnosis using rapid diagnostic tests (RDTs) and give treatment using artemisinin-based combination therapy (ACT). Currently there are 649 VMWs and 5,176 multi-purpose village health volunteers (VHV) with malaria training operating in selected malaria endemic areas. They also organize distribution of bed nets and provide health education. In other villages where there is no malaria or where malaria cases are low there are VHVs. The HC staff and VMWs/VHVs collect village-level data and routinely report it to the HC where it is compiled (aggregated without village-specific data) and sent to the DAMN. The head of the DAMN makes regular visits to HCs to monitor and supervise program activities.

²⁰ Briggs M, Fukuda M, Shafique M. Evaluation of Increases in Reported Malaria Cases in the Six Southern Provinces of Lao PDR. President's Malaria Initiative. 2013.

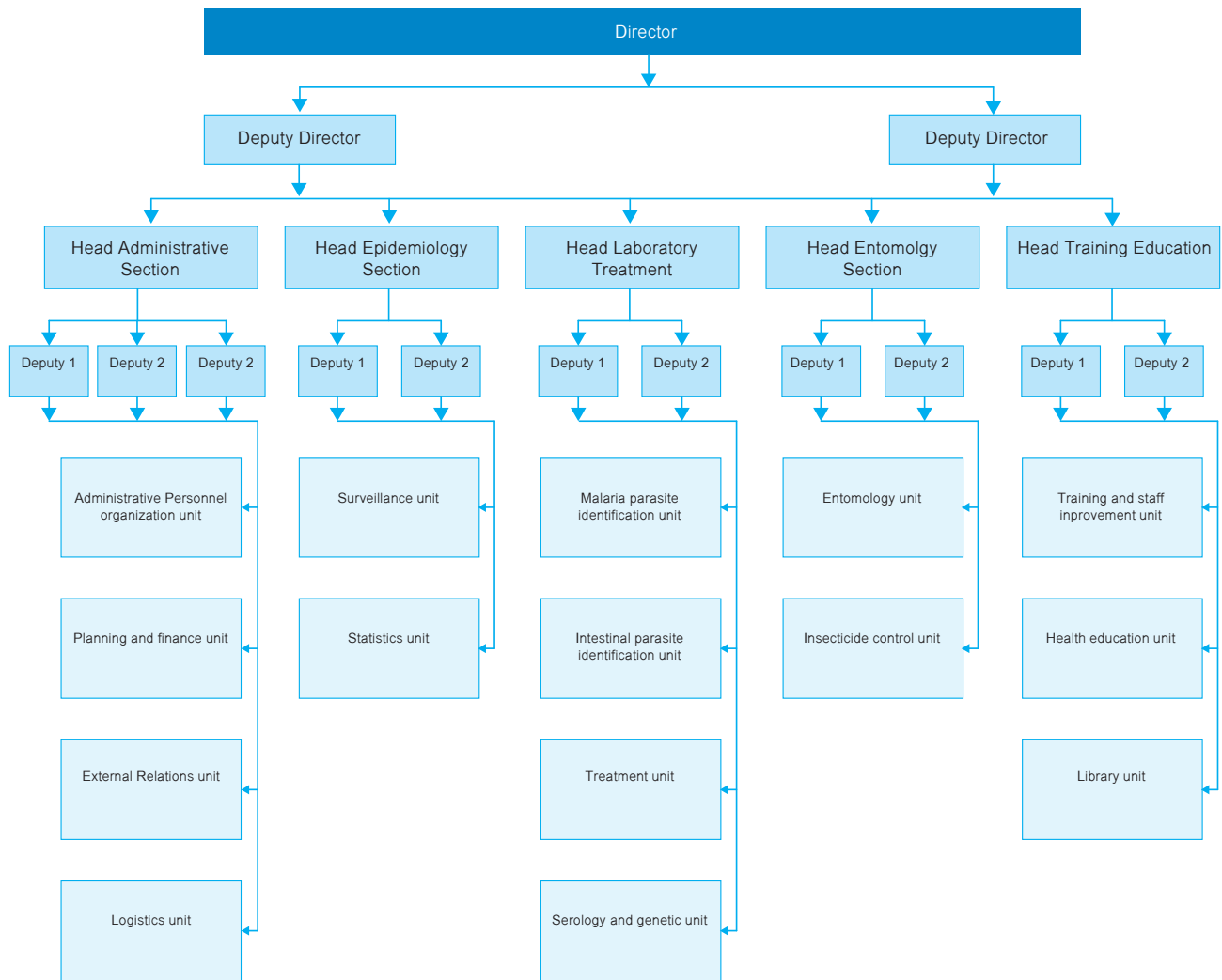


Figure 7. Organogram of CMPE

IV STRATEGIC FRAMEWORK

VISION

A malaria-free Lao PDR by 2030.

MISSION

The Lao PDR Government's malaria mission is to collaborate with all related line ministries and departments as well as key implementing partners to empower the health staff at all levels and communities to wage a rigorous battle against malaria until its elimination from the country.

STRATEGIC GOALS

PHASE 1 (2016-2020)

The overall goal of the phase 1 of the NSP is to flatten the malaria epidemic and reduce the impact of multi-drug resistance in the southern provinces and move progressively towards malaria elimination in the northern provinces while aligning with the GMS regional elimination efforts.

PHASE 2 (2021-2025)

The phase 2 goal of the NSP is to eliminate Plasmodium falciparum malaria in the entire country along with the entire GMS region and to eliminate all species of malaria in the northern provinces.

PHASE 3 (2026-2030)

The phase 3 goal of the NSP is to eliminate all forms of malaria by 2030 in the entire country.

STRATEGIC OBJECTIVES

PHASE 1 (2016-2020)

- Reduce the incidence of Plasmodium falciparum to less than 5 per 1,000 in the southern provinces by 2020
- Interrupt the transmission of Plasmodium falciparum in the Northern provinces by 2018.
- Reduce the incidence of indigenous cases of Plasmodium vivax to <1 per 1,000 in the Northern provinces by 2020.
- Prevent reintroduction of malaria transmission in areas where it has been interrupted.(defined as no local cases for at least two years)

PHASE 2 (2021-2025)

- Interrupt the transmission of Plasmodium falciparum in the entire country by 2025.
- Interrupt the transmission of Plasmodium vivax in the northern provinces by 2025.
- Prevent reintroduction of malaria transmission in areas where it has been interrupted.

PHASE 3 (2026-2030)

1. Interrupt the transmission of all forms of malaria in the entire country by 2030.
2. Prevent reintroduction of malaria transmission in areas where it has been interrupted.
3. Apply for certification of malaria free status by 2030.

This document describes the plan for Phase 1 (2016-2020) and focuses on creation of a supporting environment for malaria elimination, stopping the series of outbreaks in the south and interrupting transmission in the north through a strengthened system for surveillance and response.

It is anticipated that this three-phased approach will deliver significant short-term gains to populations at risk in the southern provinces where malaria is still a problem while at the same time moving progressively towards the longer-term gains associated with the cessation of malaria transmission first in the north, and later in the south.

Interventions will have to be flexible enough to respond to the changing situation linked to the availability and demand for forest products, opening of new plantations, hydro-electricity projects and other development projects that will continue to place large numbers of people into areas of high transmission risk. As new interventions come online those will be added to the mix incorporated into this plan.

In order to translate the strategic goals and objectives into action, the programme will pursue the following operational objectives during Phase 1 (2016-2020).

PROGRAMMATIC OBJECTIVES FOR PHASE 1

Objective 1: Establish effective program management and coordination at all levels of health system to efficiently deliver a combination of targeted interventions for malaria burden reduction and elimination.

Objective 2: Achieve universal coverage of case management by 2018 to ensure 100% parasitological diagnosis of all suspected cases and prompt and effective treatment of all confirmed cases.

Objective 3: Protect at least 90% of all populations in burden reduction provinces with an appropriate vector control intervention by 2017.

Objective 4: Strengthen the surveillance system to detect, immediately notify, investigate, classify, report and respond to all outbreaks and foci to move toward malaria elimination

Objective 5: Implement a comprehensive IEC/BCC approach to ensure that 90% of people seek treatment within 24 hours at an appropriate health facility or with a qualified care provider and at least 90% of populations residing in burden reduction areas utilize an appropriate protection tool by 2017.

V STRATEGIC INTERVENTION AREAS AND ACTIVITIES

This chapter details the strategies, activities, general timelines, and parties responsible for implementation to achieve the vision, goal, and objectives as outlined in the Strategic Framework (Section IV).

Objective 1 Establish effective program management and coordination at all levels of health system to efficiently deliver a combination of targeted interventions for malaria burden reduction and elimination.

Strategy 1.1 Strengthen program management and coordination at all levels with special emphasis on high burden provinces

Program management for malaria requires strengthening across all levels of the health system. While all PAMS and DAMN stand to benefit from enhanced coordination, emphasis for program management strengthening is placed on the high-burden provinces to accelerate a decline in the overall disease burden.

To strengthen program management, CMPE will first assess human resource needs at central and peripheral levels to ensure successful implementation of the national strategy. The needs assessment, scheduled to be carried out in 2016, will include an evaluation of what additional skills current staff may require for implementation, especially at provincial and district anti-malaria stations. Based on the results of this assessment, a capacity building plan will be designed by CMPE with support from external technical assistance. Staff at all levels will be trained on program management and planning as it relates to implementation as well as the technical aspects of malaria control and elimination in 2016, with subsequent refresher training provided every two years.

Across the country, CMPE will review current standard operating procedures for program management and supervision at central, provincial, district, and health centre-levels. CMPE will work with PAMS, DAMN, and technical partners to update all necessary documents related to implementation of the national malaria strategy and work plan. These operating procedures will focus on clarifying roles and responsibilities of all government staff and establish mechanisms for supervision and accountability. Additionally, CMPE will develop annual planning templates to standardize planning processes across all PAMS and DAMN. An annual planning and review meeting will be held in Quarter 4 of each calendar year for the purpose of finalizing and aligning provincial and district operational plans

Strategy 1.2 Advocate for high-level commitment for malaria elimination

At the 9th East Asia Summit, Honourable Prime Minister agreed to the target of malaria elimination in Lao PDR by 2030 as part of a regional initiative to achieve a malaria-free Asia-Pacific. This commitment was reinforced at the 10th East Asia Summit in November 2015 when the Asia Pacific Leaders Malaria Alliance Road Map was endorsed by all 18 heads of state in the region. The APLMA Road Map includes the priority actions to be facilitated by the highest level of government including, ensuring national and regional coordination, providing equitable access to quality commodities and services for all populations, improving program efficiency through targeting of certain interventions to achieve maximum impact, mobilizing necessary domestic resources while leveraging external donor support, and supporting innovation for elimination.

To ensure a healthy enabling environment for malaria elimination in Lao PDR, the MOH, CMPE, WHO and partners will continue to lobby for support from the highest levels of government and the private sector. The Ministry of Health's Department of Communicable Disease Control and CMPE will develop and submit a decree to the Prime Minister's office outlining the principle policies required for the health system and communities to enact to achieve the targets of this national strategy. The goals of this strategy will also be incorporated into 8th five-year Health Sector Development Plan.

To keep malaria high on the health and development agenda, CMPE will host an annual advocacy meeting for high-level government officers and relevant stakeholders from other sectors. Similar advocacy meetings will be hosted at provincial level with local stakeholders on an annual basis. CMPE will also produce semi-

annual progress reports that will be disseminated to the MOH, partners and stakeholders, and public forums, where possible.

Strategy 1.3 Expand and strengthen functional partnerships

CMPE will work to expand and strengthen partnerships for malaria with other centres and units within the MOH, other departments of government, the private sector, nongovernmental organizations, multilateral agencies, financial partners, media, and community organizations, to achieve the objectives of this strategy. CMPE will request the Ministry of Health to establish a high-level Task Force for Malaria Elimination nested within the National Communicable Diseases Control Committee that is chaired by the Prime Minister of Lao PDR in order to oversee implementation and monitor the progress of the malaria control and elimination efforts in the country. This committee is expected to meet twice per year and to provide the leadership, coordination, oversight, policy recommendations and advice on malaria control and elimination activities across the different sectors. This will ensure that malaria elimination efforts obtain the required impetus from the highest level in the Government. Similarly, PAMS and DAMN will help establish Provincial Malaria Elimination Committees, nested within the existing Provincial and District Communicable Disease Control Committees, which will include provincial government leadership, key health staff, NGO and community partners, and other essential stakeholders, to meet semi-annually to discuss progress in implementation and adapt interventions to their respective local contexts.

To improve coordination, CMPE will appoint a focal person to oversee and manage the work streams of all the partners working in malaria in Lao PDR. CMPE will also establish a work planning template for all partners and request that partner work plans be submitted to CMPE for alignment with national operational plans for malaria. The CMPE partnership focal person will be responsible for incorporating partners' annual plans into the national and provincial operational plans. CMPE and its partners will participate in the quarterly meetings of the revitalized Malaria Technical Working Group and discuss and advise on key policy decisions and approaches for successful control and elimination. Additionally, CMPE will host a quarterly partner coordination meeting as a forum for general updates on work plan progress and challenges. Further, CMPE will work through Provincial Malaria Elimination Committees to engage business owners and companies, especially in high risk areas, to develop interventions to prevent transmission of malaria on plantations, farms, mines, DAMN and other development project sites.

To expand partnerships and coordination outside of Lao PDR, CMPE will actively participate in regional partnership and networks, such as the Asia Pacific Malaria Elimination Network (APMEN), Asia Pacific Leaders Malaria Alliance (APLMA) forums, and ACT Malaria, as well as partnership forums and coordination meetings hosted by the Global Fund, and the WHO's Emergency Response to Artemisinin Resistance (ERAR) Hub, etc.

Strategy 1.4 Strengthen cross border collaboration for malaria elimination

To align with the World Health Organization's *Strategy for Malaria Elimination in Greater Mekong Subregion (2015-2030)*, the MOH and CMPE will seek broader information sharing agreements with national malaria programs and provincial and district health departments in neighbouring countries to improve understanding of transmission and population dynamics in the region. CMPE will seek to participate in semi-annual meetings with the national malaria programs in Cambodia, Myanmar, Thailand, and Vietnam to synchronize the implementation of border-related activities with neighbouring countries. CMPE, PAMS, and DAMN will work together to establish twin-city collaborations with neighbouring countries' border districts to establish regular planning meetings as well as joint monitoring and supervision visits with neighbouring country health officials.

Strategy 1.5 Secure adequate financial resources for malaria control and ensure effective utilization of funding for malaria control and elimination

The National Strategic Plan for Malaria Control and Elimination, 2016-2020 has been costed (See Section IX) and a gap analysis will be completed and updated as necessary to understand the ongoing resource

needs to ensure effective implementation. CMPE will host an annual meeting with all financial partners (government, multi-lateral financing organizations, bi-lateral donors, foundations) to provide updates on current expenditure of funding, coordinate the use of currently available resources, and mobilize additional funds where necessary. Where opportunities are presented, CMPE will work with technical and implementing partners to develop proposals to address resource gaps.

To ensure effective use of funds, CMPE will upgrade its accounting system to improve resource tracking and ensure timely disbursement of funds. CMPE will ensure that the PAMS will also use similar accounting software. CMPE finance staff will update standard operating procedures for utilizing updating system and training will be provided. CMPE will also work with the MOH's Principal Recipient's Office, PAMS, DAMN, and technical assistance to develop a payment mechanism for district health offices, health centres, and community healthcare workers to reduce implementation bottlenecks due to delayed resource disbursement, and improve tracking at central level.

Strategy 1.6 Manage procurement and supply for drugs and commodities to ensure continuous supply for all interventions

As detailed in Section II, weaknesses in the commodity supply chain for diagnostics and anti-malarials has likely contributed to recent outbreaks in malaria cases in Southern Provinces. Challenges in procurement and supply chain management (PSM) have resulted in stock-outs at health facilities at the lower levels of the supply chain, despite stocks being available at the central level. These PSM gaps include lack of standardized stock management practices, weak or no quality data, and limited capacity of staff across the health system.

To mitigate these challenges, CMPE, together with relevant MOH departments like FDD, MPSC and the PR of the GFATM and technical partners, has commenced using ODK for tracking stock and expiry of ACTs/RDTs down to the district level on a bi-weekly basis. At the same time the country has started using mSupply, an inventory management system that tracks commodities and issues invoices real time stock information for key malaria products in selected provinces with plans in place for nationwide rollout.

CMPE will work with partners to establish an integrated electronic management information system (eLMIS) at all levels of the health system. This eLMIS may be a combination of a variety of systems, some of which are currently being evaluated. It is envisaged that data from the finalised eLMIS would have an interface with DHIS2, the system chosen by the MOH to collect, analyse and report on the country's HMIS. Additionally, CMPE will ensure that the data from these information systems are being utilized for informed decision making. CMPE will also review and strengthen the PSM manual, with a focus on developing standardized PSM interventions and building the capacity of staff across the health system to implement them. This PSM plan will also be reviewed by various stakeholders at the provincial and district level, ensuring adequate buy-in. This will include building the capacity of staff at the various levels, where relevant, to carry out PSM processes like forecasting, ordering, distribution planning and stock monitoring and strengthening, and developing/strengthening the necessary tools and standard operating procedures to support these processes.

To do this, CMPE with technical assistance support, will conduct a variety of trainings. These trainings will include building management capacity at the various levels to ensure central, provincial and district level supervisors can conduct trainings or supervision visits for their relevant focus sites independently. CMPE will continue to support staff at the various levels through on-going supervision visits. As stock visibility increase, CMPE will utilize information on hand to conduct targeted supervision visits, coordinating and responding appropriately to challenges that continue to persist. Concurrently, CMPE will facilitate PSM coordination across various Ministry of Health programs and partners, to ensure CMPE's PSM plan is aligned with the broader Ministry of Health strategy for strengthening PSM.

Strategy 1.7 Strengthen operational research to guide strategic decisions

CMPE and WHO will conduct an annual review of available and relevant national and regional research

findings to inform implementation of the national strategic plan. Where additional clarification or evidence is needed, CMPE and WHO, in consultation with the Research Institute for Education Sciences as well as the National Institute of Public Health, will update operational research priorities for malaria in Lao PDR and disseminate to all partners. The research topics will be prioritized based on their relevance to the local context. Current prioritized topics include utility of mass drug administration within elimination-targeted provinces, potential opportunities for more sensitive diagnostics, and strategies for improving radical cure for *P. vivax* and gametocidal treatment for *P.f.* CMPE will identify research organizations where additional partnership is required and invite research partners to support implementation research projects. With technical guidance received from WHO, Research Institute for Education Sciences and the National Institute of Public Health, CMPE will standardize procedures for the submission, review (including ethical clearance), and routine monitoring of all malaria research projects. Based on each project, findings will be disseminated at the appropriate forums and publication may be pursued, where relevant.

Strategy 1.8 Strengthen and maintain programme infrastructure

CMPE will work in coordination with the Health Systems Strengthening Common Working Group and Ministry of Health to maintain and upgrade existing building infrastructure and equipment. CMPE will conduct needs assessment at central, provincial, and district-level to determine building issues and gaps in transportation vehicles, furniture, and information technology and laboratory equipment. Based on needs, CMPE will develop a prioritized budget for necessary infrastructure upgrades and identify potentially available resources in current government and financial partner grants or loans. Routine maintenance will be provided within the existing infrastructure.

Strategy 1.9 Strengthen M&E in line with national strategy

Collecting useful and complete data in a timely manner will help CMPE to effectively monitor and evaluate trends in malaria epidemiology, the impact of interventions, and improvements in program management to guide implementation of the national strategic plan. The core Surveillance, Monitoring and Evaluation responsibility for the National Malaria Programme will be with the Epidemiology section of CMPE. The current Monitoring and Evaluation Plan will be updated to align with the National Strategic Plan for Malaria Control and Elimination, 2016-2020. CMPE with support of technical partners will train all malaria-relevant staff on the national Monitoring and Evaluation Plan and provide refresher trainings annually; malaria M&E training will be incorporated into other health staff training where possible. All data for monitoring and evaluation will be compiled in CMPE's malaria information system and cross-analysed to improve program performance.

To evaluate overall progress toward national strategy goals, a Mid-Term Review of the NSP will be carried out by CMPE and WHO in 2018 to track progress against outlined indicators. A Malaria Programme Review will follow in 2020, providing a thorough review of national malaria progress to inform the development of the next five-year national strategic plan. A Malaria Multi-Indicator Survey (MIS) will be conducted in 2016 in order to enhance the overall understanding of the parasite prevalence and assess status in regard to key outcome indicators and intervention coverage across the country. The survey will be repeated at three year intervals with the next planned for 2019. Additionally, the planned surveys and studies conducted by partners will be incorporated into the national M&E strategy and routinely reviewed to inform program direction.

Objective 2 Achieve universal coverage of case management by 2018 to ensure 100% parasitological diagnosis of all suspected cases and prompt, efficacious treatment of all confirmed cases

For a program to successfully achieve elimination, it is imperative that all suspected cases be diagnosed and confirmed with a parasitological diagnostic test. Any patient presenting to a health facility or other authorized care provider with symptoms of malaria must be tested to determine whether treatment is necessary. Prompt identification and treatment of symptomatic infections helps halt onward transmission.

The prevalence of multi-drug resistant (MDR) malaria in GMS countries is increasing, and there is evidence of MDR malaria in southern Lao PDR. This issue presents an obstacle towards achieving elimination as resistance threatens currently used, effective treatment tools. Therefore, diagnosis and case management strategies must be successfully applied to achieve elimination while also taking into account the detection and successful treatment of malaria cases with potential MDR infections.

Strategy 2.1 Increase access to and utilization of malaria diagnostics to strengthen parasitological detection of malaria infections

To ensure equitable access to quality diagnosis across the country and ensure high screening rates of suspected malaria cases and high risk groups, CMPE, PAMS, DAMN, and HCS will work together to ensure health facilities are adequately supplied and healthcare workers are sufficiently trained to provide parasitological diagnosis for malaria. CMPE and partners will review national diagnosis performance annually to identify gaps that require strengthening. Utilizing epidemiological information, consumption data, and predicted need, CMPE and technical assistance partners will collaborate at the end of each malaria transmission season to forecast future need for rapid diagnostic tests, microscopy supplies, and other equipment and materials. Once commodities arrive in country, diagnostics will be distributed based on expected need and provincial, district, and health centre requests to ensure that all health facilities and community healthcare providers maintain a minimal diagnostic stock-level.

CMPE will work to improve microscopy availability and skills across the country. All laboratories will be expected to have at least one functional microscope to facilitate malaria diagnosis. CMPE's expert microscopists will host regional microscopy trainings every two years for PAMS, DAMN, and HC lab technicians to maintain skills in malaria diagnosis. CMPE will also routinely host students from the Health Technology College for lab technician training as it pertains to malaria. CMPE's expert microscopists will also provide in-service training to microscopists requiring additional support and follow-up.

To ensure that all healthcare service providers can adequately identify signs and symptoms of malaria, perform a rapid diagnostic test, and collect a blood smear for microscopy, CMPE will update the malaria case management training curriculum to provide dynamic, participatory learning sessions to increase information retention and improve skills. CMPE will host an annual training of trainers to all PAMS and DAMN staff on malaria diagnosis, who in turn will train all health center staff and VHV/VMWs within their catchment areas. Training information will be recorded and entered into the malaria information system.

Strategy 2.2 Provide prompt, efficacious treatment of all confirmed cases according to national treatment guidelines

Following confirmation by RDT or microscopy, it is imperative that the malaria patient is promptly treated with a quality-assured antimalarial according to national treatment guidelines. Healthcare workers will provide treatment strictly based on the results of parasitological testing, regardless of presenting signs and symptoms. To ensure that all populations at risk of malaria infection have access to efficacious treatment from a qualified provider following diagnosis, the MOH and CMPE will focus on strengthening forecasting, procurement, supply chain, and healthcare worker training and supervision.

CMPE and WHO in close collaboration with the Department of Health Care and other partners (such as LOWMRU and IPL) will update national treatment guidelines in 2016 based on the findings from the ongoing TES studies; guidelines will subsequently be reviewed annually and modified as necessary based on available evidence. Antimalarial drugs listed in guidelines will be quantified, procured and distributed to all service providers to guarantee and adequate and necessary supply. Case management training for healthcare workers will be incorporated with diagnosis training; CMPE will upgrade training curriculum to focus on participatory learning and case-based and scenario teaching. PAMS and DAMN will conduct supportive supervision visits on a quarterly basis to all health facilities in their catchment area to ensure compliance with national diagnosis and treatment guidelines and reporting protocols.

Under the 2016-2020 national strategy, primaquine will be introduced to reduce transmission of

P. falciparum and provide radical cure for *P. vivax* for G6PD normal cases confirmed through G6PD RDT. All cases of severe and complicated malaria, or cases experiencing treatment failure and those with G6PD deficiency, will be referred to the nearest hospital to provide care. The Food and Drug Department (FDD), in collaboration with CMPE, will monitor the prescription and safety of antimalarial drugs through routine pharmaco vigilance protocols.

Strategy 2.3 Strengthen existing PPM facilities and expand PPM program to include all qualified providers in burden reduction and transitional areas

The Public-Private Mix program remains an effective approach to increasing the number of reliable access points for early diagnosis and treatment in the country, particularly in the underserved and hard-to reach communities, by leveraging healthcare providers in the established private sector. There are currently 245 PPM facilities, but this may vary year to year based on the private sector facilities that choose to and are selected to participate. CMPE, working with PAMS, DAMN, Department of Health Care and FDD will seek to expand the PPM network to all qualified providers in the 5 southern provinces after completing the mapping of the private providers.

To improve oversight over PPM program, CMPE will designate an internal focal point to oversee the program at central level. CMPE and partners will also develop an operational manual to guide management of the PPM program. CMPE and partners will map out all private sector providers in targeted high-burden areas to provide an overview of entire private healthcare sector. All qualified private providers will be invited to participate in the PPM network, while unqualified private providers will be banned from providing malaria-related services through regulatory functions. CMPE will work with partners to provide training every year to PPM facilities within their district on diagnosis, treatment, stock management and reporting. In exchange for free commodities, PPM facilities will be expected to report all relevant malaria data according to the national surveillance system and comply with all regulations. DAMN will convene monthly meetings with all PPM facilities within their districts to collect reporting forms and distribute additional stock. CMPE, PAMS, DAMN will conduct supportive supervision visits on a quarterly basis to all PPM facilities to ensure compliance with national diagnosis and treatment guidelines and reporting protocols. CMPE will conduct an annual review meeting with PAMS, DAMN, Department of Health Care and FDD to share best practices and challenges and improve overall approaches to the PPM program.

In the elimination targeted provinces, it should no longer be possible for febrile patients to obtain antimalarial treatment through private clinics, pharmacies or otherwise, without a quality assured diagnosis, and without DAMN/PAMS/CMPE being promptly informed and a case investigation being carried out.

Strategy 2.4 Provide early diagnosis and treatment through village health volunteer network in the 2000 highest risk villages in burden reduction and transitional areas

Village health volunteers trained in malaria case management provide an opportunity to increase access to early diagnosis and treatment services to at-risk populations, especially those in remote areas far from public health facilities. Due to limited resources and challenges of sustainability, CMPE will transition all village malaria workers, who were previously a malaria-specific community workforce receiving incentives for providing case management and reporting, to village health volunteers, who are part of the government's community-based healthcare system and receive small support payments for providing limited clinical services and health education to communities where they are based. It is envisaged that as the malaria burden declines, VHVs will absorb additional responsibilities such as integrated management of childhood diseases (eg. diarrhoea and ARI) and malaria surveillance.

To ensure effective management, CMPE's Health Education-Training Section and Laboratory-Treatment Section will collaborate to develop an operational manual managing malaria aspects of the VHV network. CMPE will work with PAMS and DAMN to train selected VHVs on malaria diagnosis, treatment, counselling and health education, and reporting. Diagnosis and treatment commodities will be distributed through national supply chain system to health centres, which in turn will distribute to VHVs via either monthly meetings or directly during site visits. VHVs will capture malaria records via monthly reporting forms and

submit to health centres during monthly interactions. Additionally, supportive supervision will be provided to VHVs by DAMN or health facility staff on a quarterly basis.

Strategy 2.5 Provide access to malaria testing and treatment for mobile and migrant risk populations using mobile malaria teams and malaria posts at specific access points (work sites and travel routes) in areas targeting burden reduction

Mobile, migrant populations (MMP) in Lao PDR are difficult to precisely identify, track, and reach through the formal health sector. Many MMPs work or stay in high malaria risk areas (e.g. deep forest), far from health services and travel intermittently into static settlement areas where they may transmit malaria, putting the general Lao population at risk. Therefore, CMPE and partners will establish Mobile Malaria Teams (MMT) and Malaria Posts to target mobile and migration population at their work sites and along their common travel routes.

MMTs will comprise healthcare workers from the local health centers and military health personnel. On a part-time basis, two healthcare workers will depart 2-3 days per week from their health center, set up malaria clinics in forest/military/police posts and seek out MMPs in forest areas and work sites to provide EDAT services. MMTs will utilize a motorcycle to gain access to hard-to-reach or far away areas. MMTs will carry RDTs and antimalarials with them to offer diagnosis and point of care services for malaria. CMPE will work with partners to establish Malaria Posts all along strategic routes commonly traveled by MMPs, primarily near forested areas in southern provinces targeted for burden reduction. Malaria Posts will be clearly marked, readily-accessible locations where mobile and migrant populations and any others can access malaria testing and treatment from VHVs.

As MMTs are comprised of existing healthcare workers, staff will receive training on malaria diagnosis, case management, counselling and health education, and case reporting from their respective DAMN. Commodities for MMTs will be taken from health center stocks. MMTs and Malaria Posts strategies will initially be tested in Champasak Province in 2016 and if cost-effective, expanded to other appropriate areas targeting burden reduction.

International travelers to Laos will be provided advice on chemoprophylaxis when they contact CMPE, PAMS and DAMN.

Strategy 2.6 Strengthening the quality assurance and control systems for malaria diagnosis and antimalarial drugs

To achieve impact of Objective 2 strategies, quality diagnosis and treatment tools and correct use by healthcare workers must be assured. To this end, CMPE's Laboratory-Treatment Section will work with technical partners to develop national diagnosis quality assurance guidelines and job aids for healthcare workers related to diagnosis QA. Diagnosis QA workflows will be clarified between CMPE, PAMS and DAMN, provincial and district hospitals, and military and police hospitals. As will be detailed in the guidelines, CMPE will work with WHO to arrange external quality control evaluations for all microscopists at CMPE, PAMS, and DAMN, to measure skill level and identify microscopists who may need additional training support. CMPE will establish a national malaria slide bank and maintain slides for reference and training. For RDTs, as the performance of individual products is likely to vary between lots over time, CMPE will require that all RDT production lots be checked before shipment, at a lot-testing centre that collaborates with the WHO-FIND malaria RDT product testing programme, as part of good procurement practice. For routine quality assurance, a proportion of RDTs and blood smears will be collected health facilities and results will be cross-checked by expert microscopists. CMPE will also work with technical partners to develop molecular diagnostic capacity at select provincial laboratories to ensure capacity for more sensitive diagnostic testing.

Antimalarial drugs will also undergo routine quality control mechanisms to ensure efficacy and safety. The Ministry of Health's Food and Drug Department (FDD) will work with CMPE to update standard operating procedures for pharmacy inspection and sample testing of antimalarials. FDD will train provincial and district staff on inspection of private pharmacies, PPM facilities, and private non-PPM facilities to ensure that

inappropriate, counterfeit, and substandard antimalarial drugs are not available on the market. Suspect antimalarial samples will be tested at provincial mini-labs maintained by FDD. Antimalarial samples may also be sent to larger quality control laboratory in Vietnam for additional testing and comparison against mini-lab results.

Strategy 2.7 Monitor drug efficacy in burden reduction areas

Due to the rise in multidrug resistance malaria, it is of paramount importance to monitor the efficacy of antimalarials used for treatment. CMPE with support of WHO will conduct therapeutic efficacy studies annually at select sentinel sites to monitor drug efficacy and results will be disseminated to inform revision of national guidelines and policy changes. Partners, such as IPL and LOMWRU, will also support study design and implementation for drug resistance studies and their findings will be incorporated into national treatment guidelines as necessary.

Objective 3 Protect at least 90% of all populations in burden reduction provinces with an appropriate vector control intervention by 2017.

Strategy 3.1 Distribution of LLINs to all at-risk populations in burden reduction areas

Providing personal protection measures to the populations most at-risk of malaria infection is a priority for malaria control and long-lasting insecticidal nets (LLINs) are the primary personal protection measure used in Lao PDR. CMPE will use LLINs to prevent exposure of at-risk populations to vectors in an effort to control the disease and reduce the burden in high-incidence areas.

LLINs will primarily be distributed through mass campaigns every three years. CMPE, working with WHO and partners, will determine product specifications for LLINs nine to twelve months prior to distribution. Following a competitive tendering process and supplier selection, procurement and delivery will occur prior to malaria transmission season in 2016 and 2019. CMPE, with support from technical partners, will update the country's risk stratification based on available incidence data and other known risk factors to prioritize areas for distribution. In 2016, in view of the need to flatten the unabated epidemic in the southern part of the country, all rural population within these provinces will be considered to be at risk and provided with nets during the mass distribution campaign. In the rest of the country, only those areas with suspected transmission foci and areas with major development projects that are likely to attract MMPs will receive nets. Also small reserves of nets will be kept at district level for potential outbreak response purpose. CMPE will work with PAMS and DAMN to develop a distribution micro-plan for each area to ensure LLINs reach all areas in need. Pre-distribution enumeration of at risk population will be carried out.

In 2016, CMPE will collaborate with PAMS, DAMN, health center staff, and village malaria workers and village health volunteers to distribute 1.3 million LLINs in areas with the highest incidence of malaria or where knowledge exists about the presence of high risk groups like mobile and migrant populations. This will be sufficient to cover an estimated at-risk population of 2.2 million. All LLINs will be distributed free-of-charge and accompanied by a health education campaign via mass media and community mobilization strategies (See Objective 5). CMPE will update stratification and carry out quantification again in 2018 in preparation for another mass distribution campaign for areas targeting burden reduction to be conducted in 2019. CMPE will mobilize funds to procure and distribute LLINs in 2017 and 2018 in areas where nets were previously distributed in 2014 and 2015 as these are excluded from the mass campaign in 2016. CMPE will mobilize Ministry of Health funding to procure small batches of LLINs in interim years for continuous distribution via health centers primarily for pregnant women and MMPs, for replacement of damaged LLINs, and for new residents to high-risk areas.

CMPE will evaluate ownership and utilization following LLIN mass distribution campaigns via small community surveys each year; LLIN surveys will be integrated into Malaria Multi-Indicator Surveys (MMIS) in 2016 and 2019. Strategies for distribution and community education may be revised based on results. Impact of LLINs will also be assessed using epidemiological data following mass distribution campaigns.

Strategy 3.2 Indoor residual spraying (IRS) as part of focus response

Indoor residual spraying will be implemented as one of several potential tools for outbreak response in burden reduction areas and in active foci in elimination-targeted areas based on available evidence of potential efficacy of this intervention. All PAMS in burden reduction areas and some PAMS in transitional or elimination-targeted provinces will be capacitated to support IRS operations. The PAMS in Northern Lao provinces will provide IRS to any potential focal areas within their designated Northern catchment areas.

CMPE will develop SOPs for IRS, including effective application and safe use and disposal of insecticides and materials. Insecticides will be selected based on known efficacy from entomological studies. CMPE will carry out a quantification of insecticides and related consumables for procurement given the foci and outbreak potential. CMPE will provide training to all PAMS designated for IRS use in preparation for these response activities. Following the identification of a potential outbreak or an active focus with local malaria transmission, a housing census and entomological investigation will inform the need for IRS. CMPE and PAMS will spray all households within outbreak area or active focus. If IRS is utilized, the quality and coverage of IRS will be assessed by the CMPE Entomology Section within one month after spraying.

Strategy 3.3 Distribute effective personal protection tools to high risk populations in burden reduction areas including forest-goers

Mobile migrant populations (MMPs) work primarily in forests with limited personal protection measures to prevent malaria infection. Knowledge of current personal protection measures preferred by these populations and the optimal way to provide access to these tools in Lao PDR is limited. Prior to developing a larger campaign for distribution of personal protection measures to this population, CMPE will evaluate the safety, utilization and impact of personal protection tools that are presently available, such as personal repellents, space repellents and insecticide impregnated clothing. Based on the results, CMPE will target areas with high risk of malaria transmission to receive personal protection tools. CMPE will develop distribution schemes with PAMS, DAMN, and health center staff to reach remote, high-risk population groups. Following distribution, CMPE will conduct a small-scale survey to understand the effectiveness of this distribution strategy and the current utilization of these personal protection tools within the population.

Strategy 3.4 Implement entomological surveillance of vector habits, effectiveness of vector control interventions and monitor insecticide resistance

To ensure capacity to carry out entomological surveillance in Lao PDR, CMPE will continually identify training opportunities for Entomology Section staff in the region. CMPE will also support training of PAMS and DAMN staff on entomological surveillance, as necessary. CMPE will identify three sentinel sites per year for entomological surveillance. CMPE, in collaboration with PAMS, DAMN, and technical partners, will collect vector samples from these sentinel sites to monitor various vector species, vector densities and distributions, and vector behaviors. Entomological surveillance will also be carried out in potential active foci in areas targeted for elimination.

CMPE will closely monitor the efficacy of vector control tools and the potential development of insecticide resistance. CMPE will hire technical assistance to support the development of an insectary. CMPE will procure necessary insectary supplies for mosquito identification and insecticide vulnerability testing. All data collected will be entered into malaria information system.

Strategy 3.5 Promote environmental management strategies to reduce vector breeding sites as evidence of effectiveness becomes available

Given the focalized nature of outbreaks, environmental management strategies will play a role in reducing case burdens in-country. District-level staff will require training on basic entomology so that they can understand vector behaviour and identify areas likely to develop foci. Staff will assess the impact of potential environmental management interventions (such as cleaning or flushing of streams) in targeted foci. CMPE will develop policy briefs for village leaders and government policymakers on specific environmental management interventions for interrupting transmission in targeted areas. PAMS and DAMNs will be

encouraged to organize local stakeholder meetings across all relevant sectors to raise awareness and knowledge of local-level environmental management interventions

Objective 4 Strengthen the surveillance system to detect, immediately notify, investigate, classify, report and respond to all outbreaks and foci to move toward malaria elimination

As Lao PDR focuses on burden reduction in southern provinces and targets elimination in Northern provinces, a comprehensive, easy to use surveillance system must be in place to facilitate reaching these sub-regional targets. Across the country, the routine case reporting or passive surveillance at health facility and community level must be strengthened. This requires implementing a system that allows for the timely submission of general malaria case information disaggregated down to health facility or village-level and the consistent review of this data by district, provincial, and central staff to ensure that potential outbreaks are prevented by a rapid and adequate response. In areas targeting elimination or transitioning towards elimination, a lower case burden will facilitate case investigation and other active surveillance strategies aimed at identifying and halting transmission. This system should have the capability to detect all malaria infections, investigate all confirmed cases to identify the source of infection and classify cases as local or imported, and facilitate the monitoring and eventually elimination of active foci. All surveillance efforts in the elimination provinces will be closely coordinated with NCLE and the Rapid Response Teams (RRTs) already in place will be involved in malaria surveillance as well.

Strategy 4.1 Upgrade malaria information storage and management systems

CMPE, working in conjunction with DPIC and WHO, will transition from an Excel-based database to a centrally-maintained web-based database as part of the national scale-up of the DHIS2 system for disease reporting across the country. CMPE's Epidemiology Section will work with the MOH and WHO technical assistance to ensure all data forms collected throughout the health system as well as community level are easily adapted, made available on the DHIS2 platform, and stored in this comprehensive database. CMPE will also have the capability of storing data on these servers not related to DHIS2 case reporting, such as entomological surveillance or the results of community surveys. Any additional data collection exercise, as with the scale-up of active case detection activities, will be linked to the DHIS2 database. DPIC will ensure all security and file back-up on the central servers located in Vientiane. CMPE Epidemiology staff will be given remote access to this server to retrieve and analyze data on a regular basis. A DHIS2 dashboard will be established for automated analysis of all malaria-related data at CMPE's central office, as well as at PAMS and DAMN.

Strategy 4.2 Ensure timely and complete reporting of all malaria data captured through the passive case detection system, including all health facilities, village workers, mobile malaria teams, and PPM facilities.

To facilitate accurate reporting and timely submission of malaria case data from peripheral level, CMPE with support from WHO will establish the new malaria information system utilizing the national DHIS2 system in all districts by the end the 2016. Facility and community-based forms will be updated to ensure all pertinent information related to each malaria case is collected, as well as information related to health facility performance and preparedness including number of patients tested and available stock of diagnostics and treatment commodities. CMPE will finalize list of indicators for reporting and dissemination and develop SOPs for all staff involved in data collection and reporting aligned with the national information system standards. CMPE will also develop and disseminate standard procedures of reporting system, indicator and data dictionary, roles and functions of different members at each level. CMPE, PAMS, and DAMN will provide training to all healthcare providers on routine data collection as part of case management training. CMPE will train PAMS and DAMN on reporting through DHIS2 as the system is rolled out.

Under the upgraded DHIS2 system, CMPE will assess information technology needs at peripheral-level to ensure proper functioning of the disease reporting system and prepare a list of HCs with access to laptop and internet; HCs with potential 3G internet and HCs without internet. As necessary, CMPE will mobilize

the funds and provide PAMS and DAMN with computers to facilitate timely data entry and may upgrade technology infrastructure to ensure that data can be submitted remotely through internet or mobile networks.

Village malaria workers, private facilities enrolled in the PPM network, mobile malaria teams, and malaria posts will fill in the paper-based form and submit to their designated health centers five days after of the end of month. Health centers will submit all relevant data forms from their catchment areas to the DAMN ten days after the end of the month. In remote areas with lack of access to roads or transportation, appropriate IT/e-health solutions will be piloted and scaled up to ensure as near real time reporting as possible from the village and health facility level to the districts while ensuring that there are appropriate linkages to the DHIS2 platform. DAMN will enter all data submitted from peripheral facilities into the DHIS2 system and data will immediately be accessible at PAMS and central level for quality checks and analysis. PAMS and DAMN will be trained on data review and validation to ensure all data submitted are accurate. Within each PAMS and DAMN, whilst one staff member will be entrusted with the data entry function, another member will take on the data validation and QA function. PAMS and CMPE will follow-up in-person or via phone if data submitted by DAMN is incomplete or delayed. The Epidemiology Section will consolidate and validate data from districts and central hospitals, and prepare summaries to share with CMPE management, DCDC, DPIC and development partners.

Refresher trainings will be conducted yearly, particularly with DAMN that have reporting issues during the initial rollout of DHIS2, and with PAMS to build a strong capacity for data quality control and analysis. CMPE will make multiple visits to PAMS and DAMN as needed during the system transition period to troubleshoot any issues and to ensure an efficient adoption of DHIS2. CMPE with at least two dedicated staff within Epidemiology Section will work with PAMS and DAMN to develop DHIS2 dashboards for the routine review and analysis of all data entered to monitor trends and adjust strategies accordingly. CMPE will assign staff to monitor and support provinces, districts to ensure data completeness and timeliness; assign staff for data analysis and generation of reports, prepare clear plans to disseminate reports and information to appropriate audiences and coordinate with other stakeholders for sharing information, and integration where possible.

Strategy 4.3 Implement outbreak alert and response systems through MOH rapid response teams at provincial and district level in burden reduction areas

Due to human movement and the changing dynamics of malaria epidemiology in Lao PDR, malaria outbreaks remain a potential risk and may jeopardize the targets of this national strategy. To ensure rapid identification and response to all potential outbreaks, CMPE will review and update national guidelines for outbreak alert and response, including the thresholds for outbreak alert based on expected case burden in different geographical areas. Alerts generated through appropriate eHealth applications will be integrated into DHIS2 dashboards to facilitate automated identification and notification of potential increases in cases.

Central staff at CMPE will be trained on leading rapid response teams to react to any potential outbreaks. CMPE will in turn train PAMS and DAMN on outbreak identification and response. CMPE, PAMS, and DAMN will be expected to respond to all outbreaks within one week of identification.

Once a potential outbreak has been identified, outbreak investigation should be initiated within 3 days and include key informant interviews, focus group discussion with community leaders or at risk groups, active case detection to identify hotspots within the outbreak area, and entomological investigation including the identification of vector breeding sites. In areas of potential outbreaks and based on the identified causes of the outbreak, CMPE, PAMS, and DAMN may implement the following response measures: focal screen and treat, presumptive treatment, additional LLIN distribution, indoor residual spraying, environmental management to reduce vector breeding sites, and health education to at-risk populations. Outbreak reports will be disseminated to provide feedback on the response to all levels of the health system structure. PAMS and DAMN will maintain an emergency buffer stock of diagnostics, antimalarials, LLINs, indoor residual spraying supplies, and IEC/BCC materials for provision during outbreaks.

Strategy 4.4 Implement case investigation in elimination-targeted provinces

Provinces targeting elimination or transitioning towards elimination have a low case load that will allow for in-depth investigation of each case. Case investigation, including a detailed travel history, facilitates the identification of the source of infection and classification of each case as local or imported. The identification of the source of local, or indigenous cases, helps to detect focal areas where transmission is still occurring and must be halted to achieve elimination.

Before case investigation is rolled out in target provinces, an operational manual will be developed as part of the overarching national surveillance guidelines. CMPE will advocate with DCDC to ensure that malaria is listed as a notifiable disease both at the national level (as part of the weekly reporting system) as well as within all elimination-targeted provinces. Surveillance trainings in these provinces will be tailored to include a component on case investigation and the importance of case classification and follow-up for malaria elimination.

In elimination-targeted provinces, all cases must be investigated. CMPE, with support from WHO, will develop a case investigation form to collect necessary details for case classification. When a presumed or confirmed case of malaria is identified, healthcare workers will contact district health officials according to the disease notification policy. District health staff including current RRT members will track the identified malaria case to household level and carry out case investigation as soon as possible. Case investigation data will be recorded via electronic form and submitted to CMPE for review. The CMPE Epidemiology Section will review case investigation data as it is submitted to classify cases based on understanding of transmission dynamics across the country and region. When local cases and suspected transmission areas have been identified, foci investigation and response will be triggered.

Strategy 4.5 Implement foci investigation and response to halt transmission in elimination-targeted provinces

Following the identification of potential active foci of local malaria transmission in elimination targeted areas, CMPE will conduct a thorough investigation to understand the drivers of transmission in the area and solutions for halting transmission. CMPE, with assistance from technical partners, will establish the criteria for foci identification, investigation, and classification. CMPE will lead foci investigation in Northern provinces in collaboration with PAMS and DAMN staff. CMPE will train PAMS and DAMN on an annual basis on foci investigation, which will be integrated into general surveillance training. CMPE will also work towards the establishment of a Taskforce for malaria investigation and response especially at district and provincial levels (nested within the provincial malaria elimination committees).

All data collected during foci investigation will be stored in the malaria information system database. Using a geo-referenced system linked to DHIS2, all foci and response measures will be mapped at village and household level to help appropriately allocate interventions. Annually, case-based surveillance data will be analyzed to identify any potential transmission foci that were not investigated during the malaria transmission seasons and will be classified based on information available. Entomological assessment and mapping will be incorporated into the foci investigation activities. Solutions to halt transmission in each focus based on local context and the results of the focus investigation will be developed by collaborative teams within CMPE.

Objective 5 Implement IEC campaigns to ensure that 90% of people seek treatment within 24 hours at an appropriate health facility or with a qualified care provider and at least 85% of populations residing in burden reduction areas utilizing an appropriate protection tool by 2017

Strategy 5.1 Develop IEC/BCC messages for malaria control and elimination

To ensure at-risk populations gain access to and utilize interventions to prevent and/or treat malaria, the general populations' understanding of malaria must be increased through targeted messaging and

appropriate media. To this end, CMPE will work with key stakeholders including CIEH to develop the national communication and advocacy plan in line with this national strategy plan.

Each year, based on the results of community surveys and perceived gaps, CMPE will develop an information, education, and communication operational plan, which will include the development of key messages and identification of media for message distribution to targeted populations. Key stakeholders, such as the Ministry of Forest and Agriculture, the Ministry of Education, the Ministry of Labor, the Ministry of Defense, the Ministry of Information and Culture, the Lao Women's Union, and relevant youth organizations, will be sensitized to the annual IEC Operational Plan.

Strategy 5.2 Deploy mass media campaign for malaria

CMPE, under the guidance of the TWG for IEC will effectively deploy mass media campaigns to inform and educate all populations about the causes of malaria, prevention and treatment options, primary risk areas in Lao PDR and the GMS. Media specific messages will be designed for radio, television, billboards, print media, and mass media at community events. CMPE will prioritize different media based on population preference identified via community surveys. The messages and campaigns will be prepared and scheduled for broadcast and/or publication prior to and during transmission season. Mass media campaigns will also be deployed during large events like mass distribution of LLINs or World Malaria Day. As the user group for each format varies, CMPE will tailor each message for the appropriate audiences.

Strategy 5.3 Mobilize communities to improve awareness about malaria risk, prevention, diagnosis and treatment

As part of the broader sensitization campaign to successfully reduce the burden of malaria and prepare for elimination, communities require information on risks of malaria, risk factors associated with infection, and signs and symptoms to encourage prompt treatment-seeking behavior. The effectiveness of strategies detailed under Objectives 2, 3, and 4, are largely dependent on community behavior, emphasizing the need for strong community engagement.

To engage communities on malaria, CMPE will deploy several community engagement strategies. CMPE will utilize World Malaria Day (April 25th) to host events in multiple high-risk communities to increase understanding of the disease and operations to prevent or reduce the country's burden. CMPE's Health Education-Training Section with support from CIEH network at provincial and district level will engage community leaders, healthcare staff, and village health volunteers to assist in carrying out community dialogue events using inter-personal communication techniques to discuss malaria and the importance of prompt treatment-seeking behavior and use of personal protection tools to reduce morbidity and mortality. CMPE will provide materials for distribution during community dialogue, such as pamphlets or apparel, which will include key IEC/BCC messages for re-enforcement. CMPE will implement a Knowledge, Attitudes and Practices Survey in 2016 and 2019 with support of partners to evaluate community knowledge and behaviors related to malaria and inform the revision of strategies for both community mobilization and mass media.

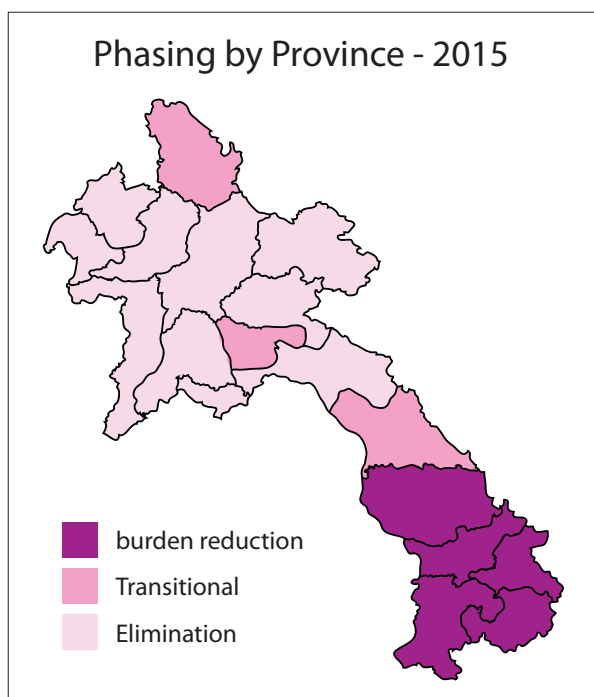
VI IMPLEMENTATION OF THE STRATEGIC PLAN

6.1 PHASING

The malaria situation in Lao PDR is not uniform nationwide. In the north, the secular declining trend observed in the country until 2011 has been continued into the present. However, in the south, the continuing spurt in forest related activities including major development projects contributes to the high incidence. 97% of all confirmed cases in 2014 were found in the five Southern provinces.

Interventions need to be targeted based on the presence of vectors and incidence of malaria. Low-endemic areas will require different approaches to eliminating malaria than higher-endemic areas, which need to focus on flattening the epidemic. Prioritizing interventions based on incidence will result in a more targeted and efficient use of resources.

As a result, CMPE will be instituting a phased approach towards combating malaria, at the province-level. As interventions are implemented and incidence declines, provinces will transition to elimination provinces. Presently, five provinces are in a burden reduction setting, three are in transition and the remaining 10 provinces are already in elimination. By the end of this National Strategic Plan in 2020, it is expected that 14 of 18 provinces will be in an elimination setting. Only the four southernmost provinces (Saravane, Sekong, Champassack and Attapeu) will be focused on burden reduction.



Burden Reduction

Provinces: 5 (Savannakhet, Saravane, Sekong, Champassack, Attapeu)

Population: 2,408,830

2014 Case Load: 48,913

Transitional

Provinces: 3 (Khammouane, Phongsaly and Xaysomboun)

Population: 703,591

2014 Case Load: 796

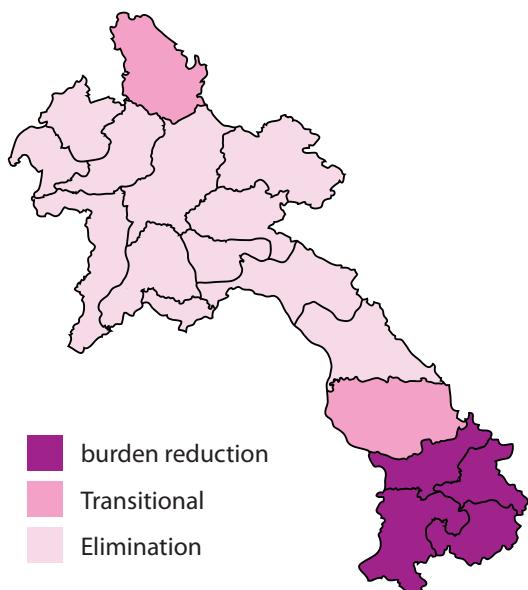
Elimination

Provinces: 10

Population: 3,363,397

2014 Case Load: 965

Phasing by Province - 2017



Burden Reduction

Provinces: 4 (Saravane, Sekong, Champassack, Attapeu)

Population: 1,390,511

2017 Case Load: 15,573

Transitional

Provinces: 2 (Phongsaly and Savannakhet)

Population: 1,231,907

2017 Case Load: 2,456

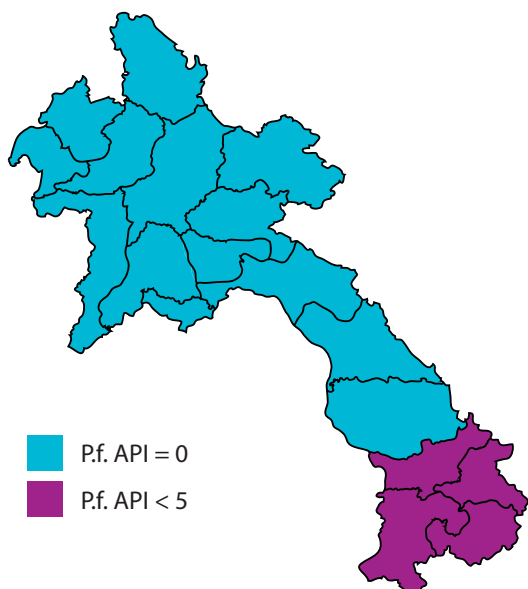
Elimination

Provinces: 12

Population: 3,981,588

2017 Case Load: 767

Phasing by Province - 2020



Burden Reduction

Provinces: 4 (Saravane, Sekong, Champassack, Attapeu)

Population: 1,390,511

2020 Case Load: 6,257

Transitional

Provinces: --

Population: --

2020 Case Load: --

Elimination

Provinces: 14

Population: 6,018,225

2020 Case Load: 3,162

Table 4. Strategic Intervention Area by Phasing Area

Phase	Objective 1 (Program Management)	Objective 2 (Diagnosis and Treatment)	Objective 3 (Vector Control)	Objective 4 (Surveillance)	Objective 5 (IEC/BCC)
Burden Reduction	<p>1.1 Strengthen program management and coordination at all levels with special emphasis on high burden provinces</p> <p>1.2 Advocate for high-level commitment for malaria elimination</p> <p>1.3 Expand and maintain functional partnerships</p> <p>1.4 Strengthen cross border collaboration for malaria elimination</p> <p>1.5 Secure adequate financial resources for malaria control and elimination</p>	<p>2.1 Parasitological detection of all malaria infections</p> <p>2.2 Provide efficacious treatment of all confirmed cases</p> <p>2.3 Expand PPM program to include all qualified providers</p> <p>2.4 Extend VMWs to every endemic village in the five southern provinces</p> <p>2.5 Provide access to malaria testing and treatment for MMPs through MMTs and MPs at specific access points and advice on chemoprophylaxis to international travelers</p> <p>2.6 QA and QC for malaria diagnosis and antimalarials</p> <p>2.7 Monitor drug efficacy</p>	<p>3.1 Distribution of LLINs to all at-risk populations</p> <p>3.2 Indoor residual spraying (IRS) as part of outbreak response</p> <p>3.3 Distribute effective personal protection tools to high risk populations</p> <p>3.4 Entomological Surveillance</p> <p>3.5 Environmental management to reduce vector breeding sites</p>	<p>4.1 Upgrade malaria information system</p> <p>4.2 Ensure timely and complete reporting of all malaria data through the passive case detection system</p> <p>4.3 Implement outbreak alert and response systems</p> <p>4.5 Strengthen monitoring and evaluation</p>	<p>5.1 Develop IEC/BCC messages for malaria control and elimination</p> <p>5.2 Mass Media Campaign</p> <p>5.3 Community mobilization</p>
Transitional	<p>1.6 Manage procurement and supply for drugs and commodities to ensure continuous supply for all interventions</p> <p>1.7 Strengthen operational research to guide strategic decisions</p>	<p>2.1 Parasitological detection of all malaria infections</p> <p>2.2 Provide efficacious treatment of all confirmed cases</p> <p>2.6 QA and QC for malaria diagnosis and antimalarial drugs</p>	<p>3.1 Distribution of LLINs as part of outbreak response</p> <p>3.2 Focal indoor residual spraying (IRS) for elimination and prevention of re-introduction</p> <p>3.4 Entomological Surveillance</p> <p>3.5 Environmental management to reduce vector breeding sites</p>	<p>4.1 Upgrade malaria information system</p> <p>4.2 Ensure timely and complete reporting of all malaria data through the passive case detection system</p> <p>4.4 Implement case notification investigation in elimination-targeted provinces</p> <p>4.5 Strengthen monitoring and evaluation</p>	
Elimination	<p>1.8 Strengthen and maintain programme infrastructure</p> <p>1.9 Strengthen M&E in line with national strategy</p>				

6.2 HUMAN RESOURCE DEVELOPMENT

Health service provision is constrained by serious weaknesses relating to human resources for health (HRH). The lack of human resource availability and capacity has been one of the primary challenges faced by CMPE and its implementing partners. Key issues include: limited numbers of qualified health workers; inappropriate distribution of qualified staff among geographic and health system levels; low and under-funded salaries; lack of incentives (financial, training, personal development); and inadequate reimbursement of costs leading to poor staff morale and low staff productivity. Many of the malaria endemic villages in southern Laos still have access issues to health facilities in terms of physical proximity. This is also obviously an issue for MMPs.

The national malaria programme will need to be strengthened at all levels with adequate and qualified human resources if the vision and goal of malaria elimination is to be realized in the country in a phased manner by 2030. A comprehensive Human Resources and Capacity Development Plan will need to be developed in line with the HR policies and regulations of the MOH, annually reviewed and adjusted in line with the changing dynamics of the malaria situation within the different provinces.

CMPE has prepared a Roadmap that sets out the activities required to be undertaken to develop the overarching Human Resource and Capacity Development Plan in line with NSP programmatic strategy 1.1 for the years 2016-2020.

- Three priority components for an overarching HR & Capacity Development Plan have been identified:
- Knowledge Transfer for Grant Management,
- Knowledge Transfer for Technical Programs
- Human Resource (staffing) Plan.

A road map for the development of the overarching Human Resource & Capacity Development Plan for the Lao PDR Malaria Programme has recently been developed. The overarching HR & Capacity Development Plan will include activities to ensure coordination and partnership with other stakeholders including NGOs, CSOs, and private sector and regional/global network and research and academic institutions for in country capacity building to be capable of resource mobilizing, designing, implementing and monitoring results and progress. The plan will address implementation and management of core activities and the need for accountability and monitoring of capacity building results and progress against agreed performance measures. A major focus of knowledge transfer for senior staff will be managing and implementing complex programmes within a decentralized health system.

As Grant Management Capacity Development through knowledge transfer has been identified as a priority requirement, the plan will be completed in March 2016. The Knowledge Transfer for Technical Programs Plan will be completed in June 2016. The Human Resources (Staffing) Capacity Plan will be completed in September 2016.

Requirement for knowledge transfer at different levels will be addressed. Training curriculums will be standardized according to the Lao PDR national training standards and international/WHO guidelines and to ensure the quality of the trainings. Where necessary, management tools, standard operating procedures (SOPs), curriculums, delegation authorities and duties to the second person (if the primary decision maker is not available) will be revised or developed. Strategies will be put in place for CMPE to collaborate with other sectors for development, implementation and assessment of human resource and technical capacity development. The needs analysis will address key issues identified in the malaria programme risk analysis, as follows: staffing numbers, skills mix and location, performance management, staff motivation, communication and training. The plan will address:

- Retaining a trained and skilled workforce by improving the working conditions, providing the

professional development opportunities, providing financial and non-financial incentives and career opportunities for individuals.

- Detailed plans for training and meeting/supervision schedules during the grant cycle (e.g. number of participants, days of courses etc.).
- The relevance/rationale of each training/meeting/supervision initiative and show links to issues identified in analysis/needs assessment
- Performance measures for each event.
- A tracking system in order to systematically follow up and track progress against issues (financial and programmatic) identified per province through supervisions
- Links between elements of the capacity development plan (e.g. how proposed TA will contribute to overall training efforts) and with broader health sector work such as HMIS development, and HR village health care worker training under the HSS programme.

VII COORDINATION MECHANISMS

In view of the highest level of political commitment for malaria elimination in Lao PDR, CMPE will request the Ministry of Health to set up a high-level National Task Force for Malaria Elimination nested within the National Communicable Diseases Control Committee that is chaired by the Prime Minister of Lao PDR in order to oversee implementation and monitor the progress of the malaria control and elimination efforts in the country and provide the leadership, coordination, policy recommendations and advice on malaria control and elimination activities across the different sectors. Similarly, PAMS will help establish Provincial Malaria Elimination Committees, nested within the existing Provincial and District Communicable Disease Control Committees to coordinate malaria control and elimination efforts among the different sectors at sub-national level.

The National Task Force for Malaria Elimination will be requested to establish an independent External Quality Assurance Committee comprised of former malaria programme managers, national level epidemiologists, retired WHO experts, and other experts nominated by government and development partners in order to provide external quality assurance for the implementation of the NSP. This Committee will not be directly engaged in the national malaria elimination response but will meet bi-annually; review the progress made in the implementation of this plan and provides the necessary recommendations. The reports of this independent committee will be provided to the National Task Force for Malaria Elimination as well as external stakeholders. The committee will play a key role during the elimination certification evaluation process by providing the required evidence.

To expand partnerships and coordination outside of Lao PDR, CMPE will actively participate in regional partnership and networks, such as the Asia Pacific Malaria Elimination Network, APLMA forums, as well as partnership for a and coordination meetings hosted by the Global Fund, WHO's Emergency Response to Artemisinin Resistance (ERAR) Hub, etc. CMPE will also coordinate a broad range of cross-border malaria activities with all its neighbours in order to limit the spread of the disease across the borders and share information (particularly through the GMS data-sharing platform that is currently being developed) and experiences on a regular basis.

CMPE is committed to implement the NSP (2016-2020) in close collaboration with all implementing partners and mobilizing the necessary support from MOH, donors and other key stakeholders including related line ministries and departments. CMPE will therefore work to expand and strengthen partnerships for malaria with other centres and units within the MOH, other departments of government, the private sector, nongovernmental organizations, multilateral agencies, financial partners, media, and community organizations, to achieve the objectives of the NSP. CMPE and the MOH expect each and every partner to align their respective projects/programmes with the NSP regardless of their funding source. During the course of the NSP, CMPE would like the potential partners to avoid duplication of their proposed activities with CMPE / current partners and fill the implementation gaps to the extent possible.

Coordinating the work of diverse partners ranging from health and allied line ministries to international and local NGOs is certainly a major challenge and CMPE is proposing to shoulder this coordination responsibility through further strengthening inputs at national and provincial levels. To improve coordination within the country, CMPE will appoint a focal person to oversee and manage the work streams of all the partners working in malaria in Lao PDR. CMPE will also establish a work planning template (adapted from the template finalized by DPIC, MOH) for all partners and request that partner work plans be submitted to CMPE for alignment with national operational plans for malaria. The CMPE partnership focal person will be responsible for incorporating partners' annual plans into the national and provincial operational plans. CMPE and its partners will participate in the quarterly meetings of the revitalized Malaria Technical Working Group and discuss and advise on key policy decisions and approaches for successful control and elimination. Additionally, CMPE will host a quarterly partner coordination meeting as a forum for general updates on work plan progress and challenges. Further, CMPE will work through Provincial Malaria Elimination Committees to engage business owners and companies, especially in high risk areas, to develop interventions to prevent transmission of malaria on plantations, farms, mines, dams and other development project sites.

VIII MONITORING AND EVALUATION

In order to achieve the national goal of eliminating malaria by 2030, progress against the goals, objectives and outputs of the NSP must be monitored and evaluated on a regular basis. This section of the National Strategic Plan 2016-2020 outlines the baseline and targets for the key indicators under each objective area according to the proposed timelines and facilitates the oversight of the implementation of the national malaria program.

CMPE with technical support from WHO and other partners, will conduct regular monitoring against the identified indicators in order to consistently assess the efficiency and effectiveness of the program, identify successfully implemented activities and propose practical actions to mitigate challenges and address underperforming areas of work. Connecting activities with outcomes, outputs as well as impact through the M&E system will facilitate evidence-based decision making on the part of the management and key implementers. Remedial action can be undertaken based on a thorough review of the collected information and consideration of available options to address the shortcomings.

Key indicators at impact, outcome and output level have been identified and the baseline against each has been established using the most recently available data. Realistic, time-bound targets have been determined which align with the overall programmatic objectives and will be attainable given effective implementation of the planned activities.

The M&E component of the NSP will be managed by CMPE under the overall guidance of DCDC and DPIC. Support from WHO and the relevant partner stakeholders will be obtained to obtain the data required for monitoring and evaluation. The primary data sources will be: the existing routine passive detection system (MIS), case-based reporting expected to be available from the beginning of 2016 (on the DHIS2 platform), entomological surveillance information, the Malaria Multi-Indicator Surveys (MMIS)(to be conducted in Q3 2016, 2019), partner surveys (PSI, UCSF and HPA have planned surveys over the timeframe of the NSP), the mid-term review of the NSP (2018), and the Malaria Programme Review (2020).

Collection of data and reporting on indicators will occur every day, month, quarter or year, depending on the indicator and data availability. Targets for the indicator framework in the M&E Plan are set on an annual basis and are not cumulative. The Monitoring & Evaluation Indicator Framework for the NSP (2016-2020) is summarized in Table 5.

National Strategic Plan (2016-2020) – Key Indicators for Monitoring and Evaluation										
ITEM	INDICATOR	BASE LINE 2014	TIMELINES					SOURCE OF DATA	FREQUENCY	RESPONSIBLE
			2016	2017	2018	2019	2020			
GOAL	IMPACT INDICATORS									
Reduce the incidence of malaria to less than 1 infection per 1000 people at risk in each district and eliminate Plasmodium falciparum including multidrug resistance by 2020	API (Number of confirmed malaria cases per 1,000 mid-year population per year). Reported from all sources (public health facilities, community level services and private sector [PPM] providers).	7.3	7.0	6.2	5.2	4.0	2.5	DHIS 2 / MIS	Annually	CMPE Epi Unit
	Number of provinces by phase, measured using API (cases per 1000 pop.)	Elimination prov: 10	10	12	13	14	14	DHIS 2 / MIS	Annually	CMPE Epi Unit
	Elimination-targeted: Less than 1 Transitional: Between 1 and 2 Burden reduction: Greater than 2	Transitional 3	3	2	1	0	0	DHIS 2 / MIS	Annually	CMPE Epi Unit
	Annual inpatient malaria deaths	Burden Reduct: 5	5	4	4	4	4	DHIS 2 / MIS	Annually	CMPE Epi Unit
	Annual Blood Examination Rate: number of parasitological tests carried out per 100 persons per year.	4 (MIS)	<15	<15	<10	<10	<5	DHIS 2 / MIS	Annually	CMPE Epi Unit
	Test positivity rate(RDT+ microscopy)	4.6	4	4	3.5	3.5	3.5	DHIS 2 / MIS	Annually	CMPE Epi Unit
	Percentage of malaria cases by species among parasitological confirmed malaria cases treated in public health facilities	16.4%	10.9%	9.2%	8%	6.6%	5%	DHIS 2 / MIS	Annually	CMPE
		Pf:49% (MIS)	37%	35%	32%	28%	23%	DHIS 2 / MIS	Annually	CMPE Epi Unit
		Pv:47% (MIS)	60%	62%	65%	69%	74%	DHIS 2 / MIS	Annually	CMPE Epi Unit
		Mix: 3% (MIS)	3%	3%	3%	3%	3%	DHIS 2 / MIS	Annually	CMPE Epi Unit

ITEM	INDICATOR	BASE LINE 2014	TIMELINES					SOURCE OF DATA	FREQUENCY	RESPONSIBLE
			2016	2017	2018	2019	2020			
	Percentage of districts out of the total districts in 2014 that have reached the API threshold for entering the elimination phase (API <1/1,000)	88/147 (54)	93/147 (63)	103/147 (70)	110/147 (75)	115/147 (78)	125/147 (85)	DHIS 2 / MIS	Annually	CMPE Epi Unit
OBJECTIVES										
Specific Objective n°1: Establish effective program management and coordination at all levels to efficiently deliver a combination of targeted interventions	Stock-out Rate (RDT/ACT): Percentage of health facilities with no stock-out of RDTs/ACT lasting more than 7 consecutive days at any time during the past 3 months	28.5%	90%	90%	95%	98%	100%	ODK/ DHIS2	Semi-annually	
Specific Objective n°2: Achieve universal coverage of case management services by 2018 to ensure 100% parasitological diagnosis of all suspected cases and effective, efficacious treatment of all confirmed cases	Percentage of malaria cases that received a positive parasitological test prior to treatment Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy at public sector health facilities. Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy at communities. Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy at private sectors.	95%	96%	97%	98%	99%	100%	DHIS 2 / MIS	Annually	
Specific Objective n°3: Protect at least 90% of all populations at risk of malaria with an appropriate vector control intervention by 2017	Percentage of people living in target villages who slept under an insecticide-treated net (ITN) during the previous night. [Where an ITN is an LLIN/LLIHN/insecticide-treated conventional bednet] Percentage of forest goers in targeted villages who reported sleeping under an ITN the last time they slept in the forest.	86% (2012)	90%	90%	95%	95%	98%	Malaria Multi-Indicator Survey	MMIS – 2016 & 2019	

ITEM	INDICATOR	BASE LINE 2014	TIMELINES					SOURCE OF DATA	FREQUENCY	RESPONSIBLE
			2016	2017	2018	2019	2020			
Specific Objective n°4: Strengthen the surveillance system to detect, immediately notify, investigate, classify, report and respond to all outbreaks and foci to move toward malaria elimination	Percentage of households in target areas with at least one ITN and/or covered by indoor residual spraying (IRS) in the last 12 months	NA	90%	NA	NA	95%	NA	Malaria Indicator Survey	MMIS – 2016 & 2019	
	Percentage of HMIS or other routine reporting units submitting timely reports according to national guidelines	20.9%	80%	90%	95%	>95%	>95%	DHIS 2 / MIS	Annually	
	Percentage of confirmed cases fully investigated within 3 days in districts with API <1 in Northern provinces (including case investigation form).	NA	50	60	70	80	>95	DHIS 2 / MIS	Annually	
	Percentage of confirmed active foci (in districts with API <1 in Northern provinces) investigated in which an appropriate response was initiated within 7 days.	NA	50	90	>95	>95	>95	DHIS 2 / MIS	Annually	
	Percentage of target population who could explain how malaria is prevented through the use of ITN.[The indicator will be disaggregated by the specific information requested: cause, symptoms, treatment or preventive measures, and by the type of interviewee: head of household, women of reproductive age].	36% (2012)	90%			90%		Malaria Indicator Survey	MMIS – 2016 & 2019	
Specific Objective n°5: Implementing IEC campaigns to modify treatment-seeking behaviour (90% of people seeking treatment for fever within 24 hours in appropriate health facility / with care provider having quality assured diagnostics and anti-malarial treatment) and at least 85% of high-risk populations utilizing an appropriate protection tool by 2017										

IX FINANCIAL PLAN & BUDGET

9.1 COSTING METHODOLOGY

The costing for the National Strategic Plan (2016-2020) was performed using an activity-based costing approach to provide a robust estimate of the resources required to achieve elimination. The methodology identified resources down to the sub-activity level. Quantities required were determined of each resource for each activity on a quarterly basis over the next five years. Unit costs were sourced from historical expenditure for commodities, travel, and human resources and active Global Fund grant budgets. Inflation was factored in for the duration of the five years.

9.2 ESTIMATED BUDGET

The estimated cost of the NSP over the next five years (2016-2020) is approximately \$72,800,000. The largest cost element is Vector Control (Objective 3), which accounts for an estimated 26% (\$18.7M) of the budget. The spending within this objective is almost exclusively concentrated in the distribution of LLINs (\$17.7M).

The second largest estimated cost is for Case Management (Objective 2), which accounts for 20% (\$14.4M) of the total budget. The 3 highest spend strategies are:

- Strategy 2.4: Strengthen village malaria worker network - \$4.2M
- Strategy 2.1: Strengthen case detection - \$3.3M
- Strategy 2.5: Test & treat mobile migrant risk populations - \$1.9M

The third largest estimated cost is for Surveillance (Objective 4), at \$13.5M over the five-year period (19% of total budget). The majority of the costs for Objective 4 are focused on strengthening the passive case detection reporting (Strategy 4.2) which account for \$11.3M. The other primary cost driver for this objective is the supervision and monitoring for surveillance activities (Strategy 4.5) at \$1.7M.

CMPE staff salaries are included in the intervention area where they concentrate. However, as PAMS and DAMN staff typically work across all objective areas, their salaries cannot be allocated to any specific objective. Additional HR and program expenditures (PAMS & DAMN salaries) account for \$12.6M (17%).

The two remaining objectives, Program Management (13%) and IEC/BCC (5%), account for the remainder of the budget. The total estimated budget by objective is depicted in Figure 9.

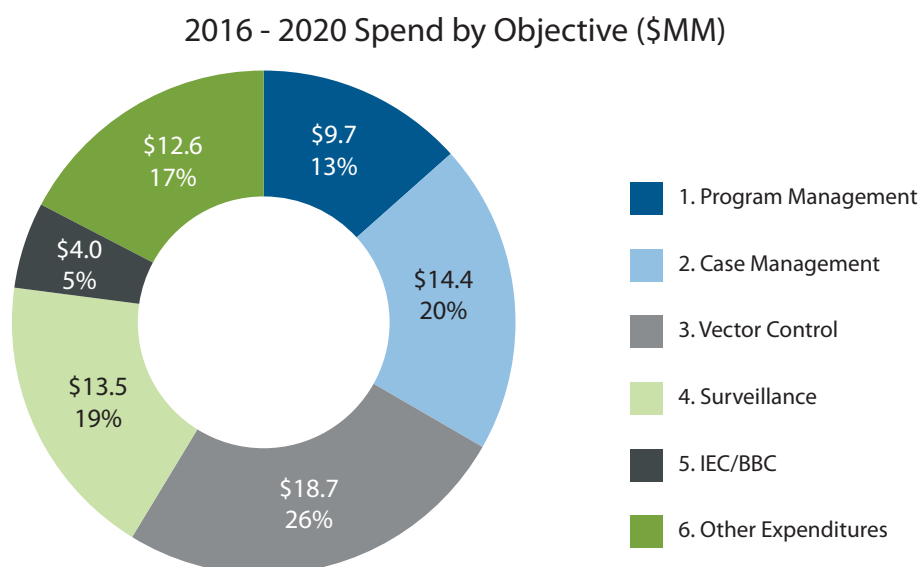


Figure 9. NSP- Projected Total Spend by Objective (2016-20)

One-third (33%) of the total cost is required in 2016, driven largely by three factors:

1. A significant scale-up in the country's DHIS2 surveillance system which is being rolled out that year, requiring both training and additional technology (\$6.7M)
2. Mass distribution of LLINs which occurs in 2016 (\$6.2M) and is planned again for 2019 (\$7.3M)

Investment in IT equipment in 2016 and 20% replacement in 2019 activities (~\$4M) and Transportation equipment which is purchased in 2016 and maintained throughout five years (~\$6M) For 2016 to 2020, the average annual cost is \$14.6M annually, or about \$3.6M per quarter.

	2016	2017	2018	2019	2020	Total
Total	\$24,153,317	\$11,516,425	\$9,689,776	\$17,146,779	\$10,282,183	\$72,788,479
Program Management	\$2,408,698	\$1,978,719	\$1,671,152	\$1,820,545	\$1,813,396	\$9,692,511
Case Management	\$4,098,871	\$2,396,688	\$2,569,226	\$2,542,398	\$2,747,024	\$14,354,208
Vector Control	\$6,434,006	\$2,224,567	\$1,670,292	\$7,435,532	\$892,670	\$18,657,067
Surveillance	\$7,043,315	\$1,662,958	\$844,523	\$2,401,261	\$1,556,635	\$13,508,692
IEC/BCC	\$1,911,794	\$870,490	\$418,130	\$289,670	\$466,272	\$3,956,356
Additional HR (PAMS & DAMS)	\$2,256,632	\$2,383,003	\$2,516,452	\$2,657,373	\$2,806,186	\$12,619,646

Table 6. Projected Budget by Programmatic Objective and Year (2016-2020)

All activities were additionally categorized by the most relevant intervention area. Overhead and salaries accounted under management costs (\$19.8M) represent the largest single line-item, followed by investments in the purchase and distribution of LLINs (\$17.7M), and passive surveillance activities (\$11.3M) that are largely driven by capital investments in transportation and IT equipment. Diagnosis and Treatment activities account for \$11.4M, mostly accounted through public health facilities (\$4.4M) and VMWs (\$4.2MM).

Activity Cost Analysis by Year

	2016	2017	2018	2019	2020	Total
Active Surveillance	\$44,451	\$131,785	\$3,263	\$109,409	\$3,639	\$292,547
Capacity Building	\$175,178	\$26,211	\$27,897	\$130,630	\$30,623	\$390,539
Community Mobilization	\$1,354,384	\$718,001	\$113,280	\$119,624	\$126,323	\$2,431,611
Diagnosis and Treatment through MMWs	\$1,152,029	\$241,480	\$105,876	\$269,283	\$118,066	\$1,886,733
Diagnosis and Treatment through PPM	\$213,681	\$212,823	\$197,557	\$198,574	\$103,986	\$926,622
Diagnosis and Treatment through public	\$1,138,523	\$594,897	\$949,409	\$662,181	\$1,047,414	\$4,392,424
Diagnosis and Treatment through VMWs	\$774,817	\$812,389	\$848,798	\$867,516	\$910,022	\$4,213,542
Entomological Surveillance	\$80,283	\$32,900	\$41,852	\$63,587	\$45,878	\$264,499
Environmental Management	\$0	\$0	\$0	\$0	\$0	\$0
Foci Investigation and Response	\$884	\$9,917	\$933	\$960	\$987	\$13,682
IRS	\$139,675	\$51,172	\$134,230	\$54,384	\$147,005	\$526,466
LLIN/LLINs	\$6,179,631	\$2,104,150	\$1,455,830	\$7,277,032	\$656,989	\$17,673,633
Management	\$3,842,161	\$3,976,015	\$3,801,654	\$3,990,236	\$4,189,377	\$19,799,443
Mass Drug Administration	\$0	\$0	\$0	\$0	\$0	\$0
Mass Media	\$503,768	\$98,591	\$247,934	\$109,942	\$276,480	\$1,236,714
Monitoring and Evaluation	\$542,543	\$573,461	\$604,273	\$638,085	\$673,790	\$3,032,153
Outbreak Response	\$5,362	\$4,415	\$17,221	\$4,477	\$4,510	\$35,985
Passive Surveillance	\$6,662,171	\$1,167,945	\$455,974	\$1,898,751	\$1,138,153	\$11,322,994
Personal Protection Measures	\$0	\$0	\$0	\$0	\$0	\$0
Planning and Coordination	\$752,815	\$460,236	\$464,434	\$469,391	\$518,211	\$2,665,088
Procurement and Supply Management	\$824	\$870	\$919	\$970	\$1,024	\$4,606
Quality Control and Assurance	\$590,137	\$299,166	\$218,442	\$281,748	\$289,706	\$1,679,199
Total	\$24,153,317	\$11,516,425	\$9,689,776	\$17,146,779	\$10,282,183	\$72,788,479

9.3 RESOURCE MOBILIZATION

Financial Partners Mapping

The key sources of contributions to the National Strategic Plan over the next several years include: the Government of Lao PDR, the Global Fund to fight AIDS, TB, and Malaria through both the “New Funding Model” (NFM), and “Regional Artemisinin Initiative” (RAI) grants, United States Agency for International Development (USAID) and the President’s Malaria Initiative (PMI), the Asian Development Bank (ADB), and the Bill and Melinda Gates Foundation (BMGF). A preliminary funding gap analysis has been conducted and will be updated as existing resources are aligned with the NSP, and new resources are allocated for implementation of the NSP. As described under Strategy 1.5, annual meetings with financial partners will be coordinated by CMPE to align resources to ensure impactful utilization of funding for malaria elimination.

Resource Mobilization

To successfully implement the NSP, the Ministry of Health and CMPE will continue to develop relationships with current financial partners, while exploring new potential sources and mechanisms for sustainable resources necessary for malaria elimination. The CMPE will increase dialogue with relevant ministries and departments within the Government of Lao PDR including the Ministry of Finance and Parliament to understand how to increase domestic resources for malaria. Furthermore, DCDC and CMPE will continue to emphasize the importance of ensuring transparency, accountability, and efficiency in resource disbursements to ensure effective collaboration.

