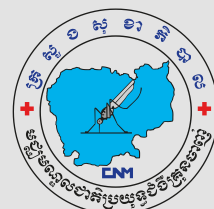




# Cambodia Malaria Elimination Action Framework 2016-2020



Kingdom of Cambodia  
Ministry of Health





# Foreword

It is with great honor that I present the Malaria Elimination Action Framework (MEAF) 2016-2020 developed under the leadership of the National Center for Parasitology, Entomology and Malaria Control (CNM) and with support from partners. The long-term vision of the Royal Government of Cambodia is to make the country totally free from the burden of malaria. Cambodia plans to achieve elimination of *Plasmodium falciparum* malaria by 2020 and *Plasmodium vivax* malaria by 2025. This national commitment was reinforced by Samdech Akka Moha Sena Padei Techo Hun Sen, Prime Minister of the Kingdom of Cambodia, at the 9th East Asia Summit held in Myanmar in 2014.

To achieve these elimination goals, Cambodia must have a very clear and a strong evidence-based strategic plan that outlines the tested and novel approaches to be operationalized at a scale important for driving the elimination efforts in the country. MEAF 2016-2020 prepared after numerous consultations presents the elimination-oriented strategies and activities crucial for setting Cambodia on the path to and achieving *falciparum* elimination. The plan also includes the total budget for the associated period and is accompanied by micro-plans detailing where, when, how, and by who all the activities in the plan will be implemented.

It is necessary that all CNM staff takes ownership over this strategy as the primary implementer and partners support CNM where necessary to achieve the national elimination goal. The Ministry of Health (MOH) Cambodia therefore seeks cooperation with all the involved partners for the implementation of MEAF 2016-2020. The MOH strongly hopes that all involved partners within the Royal Government as well as the development partners will apply MEAF 2016-2020 Plan as the direction-setting tool for effective implementation of elimination-focused malaria program.

The MOH Cambodia looks forward to working alongside everyone to free Cambodia from malaria.

Phnom Penh, January 2016

The Minister of Health *HS*

  
*Mam Bunheng*

Dr. MAM BUNHENG



# Preface

Cambodia has significantly reduced malaria morbidity and mortality over the last 10 years and is on the path for elimination as laid out in the National Strategic Plan for Elimination of Malaria in the Kingdom of Cambodia, 2011-2025, which was endorsed by Samdech Akka Moha Sena Padei Hun Sen, Prime Minister of the Kingdom of Cambodia. The Malaria Elimination Action Framework (2016-2020) is an amendment to the original strategy and reflects new strategic updates based on changes in the country's epidemiological and programmatic context, while taking into account recommendations from the 2012 Malaria Program Review and recent global and regional policy guidelines.

The Malaria Elimination Action Framework was developed to clearly describe the approach, implementation strategies, and roles and responsibilities of stakeholders involved in the national malaria response. It is a dynamic document that lays out in detail the five-year action plan for elimination, but will be updated as necessary based on results produced and the availability of new evidence or tools. This document was developed primarily by the National Centre for Parasitology, Entomology and Malaria Control (CNM), with support from the World Health Organization (WHO), Clinton Health Access Initiative (CHAI) and other technical partners (as described in Annex 1). Consultations with Ministry of Health provincial and district staff, Ministry stakeholders from Central Medical Stores (CMS) and the Department of Food and Drug (DDF), as well as technical and implementing partners took place between May-July 2015 to generate consensus on elimination approaches.

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.

The successful implementation of Cambodia's Malaria Elimination Action Framework will contribute to the country's overall objectives for elimination of the disease as well as regional objectives to interrupt transmission of *P. falciparum* in areas of multidrug resistance, including ACT resistance, by no later than 2020, and in all areas of the GMS by 2025.



Dr. Huy Bero  
Director, CNM



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# Acknowledgements

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The Malaria Elimination Action Framework (MEAF), 2016-2020, was developed between May-September 2015 by the National Center for Parasitology, Entomology and Malaria Control (CNM). This framework was constructed through numerous consultations within CNM along with malaria focal points from the provincial and district health departments, other departments with the Ministry of Health, and technical, implementing, and financial partners. The MEAF development process was overseen by CNM Director, Dr. Huy Rekol; Deputy Director, Dr. Lek Dysoley, and Chief of Technical Bureau, Dr. Siv Sovannaroth. Inputs on strategy formulation, microplanning, monitoring and evaluation, and costing of the framework were also provided by other senior management staff and representatives of various programs and units at CNM including Dr. Chea Nguon (Deputy Director), Dr. Chea Huch (Deputy Director), Dr. Tho Sochantha (Deputy Director), Dr. Heng Pisal (Deputy Director), Dr. Muth Sinuon (Deputy Director), Dr. Meas Tha (Deputy Director), Dr. Leang Rithea (Research Unit), Dr. Boukheng Thavrin (IEC/BCC Unit), Mao Sokny (Entomology Unit), Dr. Po Ly (VMWs Unit), Dr. Bun Kea (Epidemiology Unit), Mam Boravann (PPM Unit), Ouk Rada and Hok Chantheasy (Procurement Unit), Mam Tel & Kunthea Kalyan Khan (Finance Unit). Other CNM staff also contributed to the writing of the MEAF and completion of the costing.

Technical and financial support for development of the MEAF was provided by WHO and CHAI. Partners including Population Services International (PSI), Malaria Consortium (MC), Partners for Development (PfD), University Research Co. (URC), Health Poverty Action (HPA) and United Nations Office for Project Services (UNOPS) also participated in the strategy development process.

Additional feedback on the MEAF was provided by the Bill and Melinda Gates Foundation (BMGF); Emergency Response to Artemisinin Resistance (ERAR) team; health specialists from the Asian Development Bank (ADB), and technical officers from The United States Agency for International Development (USAID) and the President's Malaria Initiative (PMI).

The Ministry of Health (MOH) hereby expresses its sincere appreciation for everyone's contributions to the completion of MEAF, 2016-2020.

# Acronyms and Abbreviations

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ACT	Artemisinin-based combination therapy
ADB	Asian Development Bank
API	Annual Parasite Index
APLMA	Asia Pacific Leaders Malaria Alliance
APMEN	The Asia Pacific Malaria Elimination Network
ASMQ	Artesunate-Mefloquine
BMGF	Bill and Melinda Gates Foundation
CMS	Central Medical Store
CNM	National Centre for Parasitology, Entomology and Malaria Control
DDF	Department of Drug and Food
DHA-PIP	Dihydroartemisinin and Piperaquine
GFATM	The Global Fund to Fight AIDS, Tuberculosis and Malaria
GMS	Greater Mekong Subregion
HC	Health Center
HIS	Health Information System
IPC	Institut Pasteur du Cambodge
IRS	indoor Residual Spraying
LLIN	Long-lasting Insecticidal Net
LLIHN	Long-lasting Insecticidal Hammock Net
MEAF	Malaria Elimination Action Framework
MDR	Multidrug Resistance
MIS	Malaria Information System
MMW	Mobile Malaria Worker
MoH	Ministry of Health
NFM	New Funding Model
NMCP	National Malaria Control Program
OD	Operational District
PHD	Provincial Health Department
PMW	Plantation Malaria Worker
PPM	Public-Private Mix
PSI	Population Services International
RAI	Regional Artemisinin Initiative
RCAF	Royal Cambodian Armed Forces
RDT	Rapid Diagnostic Test
TES	Therapeutic Efficacy Studies
UNOPS	United Nations Office for Project Services
URC	University Research Council
VHSG	Village Health Support Group
VHV	Village Health Volunteer
VMW	Village Malaria Worker
WHO	World Health Organization

# Executive Summary

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Cambodia has made considerable progress in diminishing their malaria burden over the last decade and has a vision of a malaria-free country by 2025. The Malaria Elimination Action Framework (MEAF, 2016-2020) is the guiding document designed to direct the necessary strategies and interventions for Cambodia to successfully reach their elimination objectives over the next five years. The framework was also developed to align the national malaria response to the WHO technical strategies highlighted in the Malaria Elimination in the Greater Mekong Subregion 2015-2030 to contribute to the overall interruption of *P.falciparum* transmission in areas of multidrug resistance, including ACT resistance, in the Greater Mekong Subregion.

In the past decade, the National Centre for Parasitology Entomology and Malaria Control (CNM) has worked to cut the number of reported malaria cases (both confirmed and clinically diagnosed) in the public and community levels to half, from 113,855 cases in 2004 to 56,271 cases in 2014. The overall malaria mortality rate has also decreased from 0.98 per 100,000 in 2010 to 0.12 per 100,000 in 2014. This achievement could be credited to the successes of CNM and the introduction of the National Strategic Plan (2011-2025), which led to increased coverage of malaria control interventions. Despite this dramatic reduction, malaria transmission is still endemic in 21 out of the 25 provinces with more than half the population (an estimated 8.6 million people) still at risk. The northeast region of the country still accounts for over 70% of the malaria burden, mainly along the forested borders of Viet Nam, Lao People's Democratic Republic, and Thailand.

Building off the national strategy with this new framework and accelerating the approach to elimination based the country's epidemiological and programmatic context, Cambodia has the goal to reduce the incidence of malaria to less than 1 infection per 1000 people at risk in each operational district and eliminate *Plasmodium falciparum* including multidrug resistance by 2020.

Intervention strategies will cover a wide range of activities to increase the capacity of the malaria program, its tools and prepare the country for elimination. The specific framework objectives are tailored to the scale-up of these key elimination strategies:

- Providing effective program management and coordination at all levels by 2017 to efficiently deliver a combination of targeted interventions for malaria elimination
- Achieving universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases
- Protecting at least 90% of all populations at risk of malaria with an appropriate vector control intervention by 2017
- Enhancing the surveillance system to detect, immediately notify, investigate, classify and respond to all cases and foci by 2017 to move toward malaria elimination
- Implementing comprehensive IEC/BCC approach that facilitates at least 90% of people seeking treatment for fever within 24 hours at a health facility or with a qualified care provider and at least 85% of at-risk population utilizing an appropriate protection tool by 2017

The Ministry of Health (MOH) will ensure that the required program management capacity is available at all levels of the health system and CNM leadership will support program units and health offices to hire and train additional human resources to perform the activities outlined in the framework. The MEAF (2016-2020) is planned to be implemented jointly by CNM and all implementing partners. An Independent National Malaria Elimination Committee will be established to ensure effective implementation of this plan and monitoring of the overall goal of elimination.

The malaria situation in Cambodia is heterogeneous due to variance in malaria burden by geographic area, growing multidrug resistance and mobility of at-risk populations. To ensure the most operationally feasible strategies are implemented, this framework has outlined malaria strata based on those characteristics. This will assist CNM in determining what intervention packages will be used in what specific areas. ODs were placed in four strata defined as elimination-targeted, transitional, burden reduction, or non-endemic. The expansion and rollout of elimination activities will follow a phased approach, based on the operational stratification and capacity of the malaria program to transition.

Under the MEAF (2016-2020), elimination activities will begin in 18 ODs in the northwest of the country, where surveillance activities will be intensified and will be brought to national scale over the next five years as transitional and higher transmission areas reduce their burden by deploying a targeted response to efficiently interrupt transmission and make it operationally feasible to follow-up with cases and investigate focal areas.

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# 1 Introduction

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The rationale for pursuing malaria elimination in Cambodia is based on the current situation and opportunity, including:

- 1) Malaria interventions have had a significant impact, particularly on *P. falciparum*, in reducing incidence down to such low levels in the country that interruption of transmission appears to be a realistic objective;
- 2) Further delay in addressing the problem of multidrug resistance could lead to the emergence of untreatable *P. falciparum* malaria;
- 3) Government leaders have re-affirmed their political and financial commitments to achieving malaria elimination in the country.

The Malaria Elimination Action Framework seeks to build on the successes of the National Centre for Parasitology Entomology and Malaria Control (CNM) and accelerate progress towards elimination in Cambodia by 2025. This Framework describes how CNM will aggressively pursue elimination in low-endemic areas while strengthening interventions to reduce the burden of disease in moderate and high transmission areas that will eventually transition towards elimination.

This Framework highlights the necessity to foster support from the highest level of government to ensure effective multi-sectoral engagement, secure necessary resources internally and externally to support full strategy implementation; address human resources requirements for malaria at all levels; ensure effective national leadership and governance, including stakeholder coordination; expand health services to provide full access for people in remote areas.

At a technical level, Cambodia will target elimination in low endemic areas by progressively implementing a robust surveillance system that facilitates immediate case reporting and investigation followed by foci investigation and response. In high burden areas, efforts will be focused on scaling-up access to and strengthening the quality of diagnosis and treatment in both the public and private sectors and ensuring universal coverage with appropriate vector control interventions. Special effort will be made to extend services to mobile and migrant populations, including increasing the number of access points through village malaria workers, mobile malaria workers, and plantation malaria workers. Cross-cutting support, including program management, monitoring and evaluation, and behavior change communication, will be strengthened to support the core interventions.

This Framework will be rolled out in a phased approach between 2016 and 2019 in an effort to achieve elimination of *P. falciparum* and multi-drug resistant malaria by 2020.

## 2 Country Profile

Cambodia is located in southern Indochina Peninsula with a total land area of 181,035 square km extending approximately 580 km from east to west and 450 km from north to south. Cambodia shares its 2,438 km border with Thailand in the west and north, Laos in the north and Vietnam in the east and southeast.

### 2.1 SOCIO-POLITICAL SYSTEM

Cambodia is divided into 25 provinces and four municipalities (Phnom Penh, Sihanoukville, Kep, and Pailin), as shown in Figure 1. Each province is divided into districts (srok), and each district into communes (khum). In addition, there are a group of villages (phum), although they are not considered formal administrative units. Each municipality is divided into sections (khan), each section into quarters (sangkat).

Figure 1. Map of Cambodia showing 25 provinces and 4 municipalities



Cambodia is a multi-party democracy under a constitutional monarchy, currently ruled by Prime Minister Hun Sen of the Cambodian People's Party (head of government) and King Norodom Sihamoni (head of state). The country's legislative branch is composed of the executive and the bicameral Parliament of Cambodia, which includes a 61-seat Senate, a 123-seat National Assembly, and an upper house.

### 2.2 DEMOGRAPHICS

Cambodia has a population of approximately 15 million people, with a growth rate of 1.63%. The birth rate is 25.4%, with over 50% of the population below the age of 22. 20.5% of the population lives in urban areas, with an annual rate of change of 2.65%. The capital city, Phnom Penh, is also the largest, with a population of 1.7M. The majority of the country's population (90%) is Khmer, with a small percentage of Vietnamese (5%), Chinese (1%), and other ethnicities (4%). The official language is Khmer, spoken by 96.3% of the population, and the primary religion is Buddhism, practiced by 96.9% of the population.

According to the 2008 Census, 3.5 million people (26.5% of the total population) were categorized as a migrant ("a person who has moved to their enumeration area from another village or another country, which was the person's last residence"). Over the 5 years previous to 2008, approximately 1.7 million people migrated

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between different rural areas, of which 45% of them migrated from another province. Migrants are mainly young adults who moved for family or economic reasons. Almost half of them are skilled agricultural, forestry and fishery workers.

## 2.3 ENVIRONMENT AND CLIMATE

Cambodia is predominantly a low-lying country that occupies the central plains of the lower Mekong basin and is bordered on three sides by dense forested mountainous areas. Topographically the country is divided into two distinct parts: (i) the central low lying plains and the flat coastal areas; and (ii) the mountainous ranges and high plateau surrounding the low lying land. The landscape in the central plains is dominated by Tonle Sap Lake, the Bassac River and the Mekong River system, which cross the country from the north to the south. Surrounding the central plains, which cover three quarters of the country's area, are densely forested and sparsely populated highlands.

The percentage of Cambodia covered in forest has fallen from about 72% in 1973 to only about 46% in 2013. Forest is one of the most important economic and environmental resources of the country and a key source of government revenue and employment for the local people. At least 32% of the land is classified as agricultural (22.7% arable, 8.5% permanent pasture, and 0.9% permanent crops).

There are two distinct meteorological seasons in Cambodia: the rainy season (May to October) and the dry season (November to April). The temperature changes regionally and seasonally. The warmest month is April, when temperature can rise above 38°C, and the coldest of about 22°C is January. The average annual temperature is 27°C.

## 2.4 SOCIO-ECONOMIC CONTEXT

Cambodia is considered a low-income country, although the country has experienced strong economic growth over the past decade. Gross National Income Per Capita (PPP) in 2013 was \$2,890 and GDP (PPP) grew 7.3% from \$44B in 2012 to \$50B in 2014. Cambodia remains a predominantly agricultural country. Agriculture and forestry contribute significantly to country's GDP. Thus, the majority of the labor force is agricultural (55.8%), followed by services (27.3%), and industrial (16.9%). Adult labor force participation is high (78.9% for women and 86% for men) but as of 2012, 17.7% of the population continued to live under the poverty line.

The country's economic potential and natural resources are drawing foreign investment - especially from China and neighboring Vietnam. Garment-making is the biggest industry, employing around half a million people and accounting for 80% of exports. Tourism is expanding and Cambodia hopes to tap into offshore oil and gas reserves. The inflation rate has increased from 2.9% in 2013 to 4.2% in 2014.

## 2.5 HEALTH SYSTEMS ANALYSIS

Cambodia's health expenditure accounts for 7.5% of the country's GDP. The country has approximately 0.17 physicians and 0.7 hospital beds per 1000 people. The life expectancy at birth increased by 12 years from 2002-2012 to an average of 72. The ten leading causes of morbidity in the country in 2012 were acute respiratory infection; diarrhea; malaria; cough (at least 21 days); gynaeco-obstetric issues; tuberculosis; road accidents; measles; dengue hemorrhagic fever; and dysentery. Communicable diseases are thus a leading

cause of morbidity, accounting for 83% of the reported disease burden. Non-communicable diseases (NCDs) are increasing significantly, causing an estimated 53% of deaths per year as of 2012.

The Ministry of Health (MOH) has overall responsibility of the health sector, including: development of policies and legislation, strategic planning, resource mobilization and allocation, monitoring, evaluation, research, providing training to support the provinces. The MOH's main objective in health sector reform is to improve and extend primary health services through the implementation of the operational districts (OD) system. Provincial health departments (PHDs) are the link between the MOH and ODs, and implement health policies, ensure equitable distribution and effective use of resources, manage provincial/referral hospitals, and support the development of ODs. ODs deliver services according to the health sector objectives and community's needs, ensure equitable distribution and effective utilization of resources and mobilize additional resources.

The resource allocation for health from the state budget has increased steadily, while external assistance by donors remains a substantial source of funding. The Government of Cambodia's contribution is mostly in the form of salaries and allowances for staff at all health levels. Within the total health expenditure of approximately \$70 per capita (2012), out-of-pocket health expenditures remain high at above 60% of total health expenditure. The weak regulatory framework, and a need to increase the provision of services, has led to a rapid development of the private sector. According to the 2013 Cambodia Malaria Survey, 25% of those surveyed reporting fever in the past 2 weeks, 25% initially sought treatment in private facility, 23% visited a pharmacy/drug shop, and 22% sought treatment at Health Centers (HC). Barriers to accessing services in the public health sector include distance and rising costs of transport, restricted opening hours at government facilities and the probability of encountering long waiting times.

In order to supplement for health services under the public health system, MOH and National Disease Programs have scaled up several community systems for health including the establishment of village health support groups and HC management committees; community-based prevention and treatment support for TB and HIV; use of village malaria workers (VMWs) and mobile malaria workers (MMWs) to expand early diagnosis and treatment; and use of village health volunteers (VHVs) and village health support groups (VHSGs) to implement health education programs. These community activities have improved the quality, accessibility and utilization of health services, contributing to the general improvement in health indicators.

In addition to public health sector, a substantial share of healthcare services is provided through regulated and unregulated private sector. The providers in private sector comprise of wide range of outlet types at retail level, including registered health outlets (pharmacies, depot A and B pharmacies, and clinical pharmacies), non - registered health outlets (drug stores, mobile providers), and general/non - health outlets (grocery stores and shops). Unlicensed outlets in the country decreased from 1081 in November 2009 to 28 in July 2011, but this oversight only seems relative to pharmacies and depots. There are still numerous unlicensed outlets in the rural areas which are not regulated by MoH and continue to provide health services without any official supervision.

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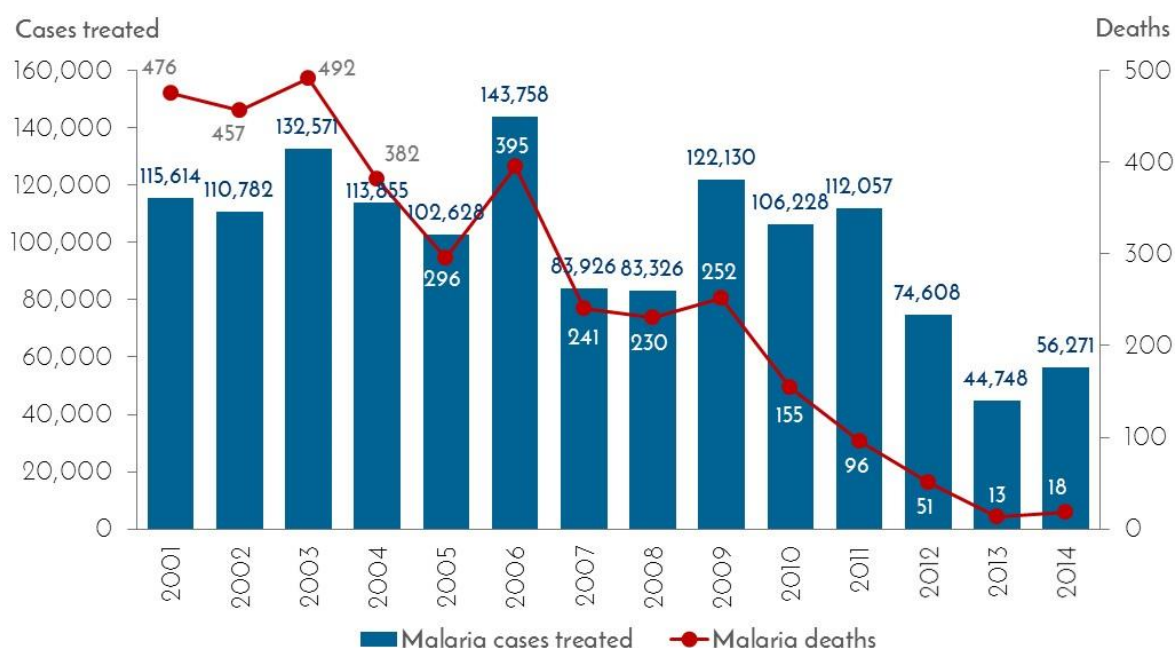
# 3 Malaria Situational Analysis

## 3.1 HISTORY OF MALARIA CONTROL

Interventions to reduce malaria in Cambodia started in 1951 as part of the Global Eradication Campaign. Following a 6-year indoor residual spraying campaign using DDT, malaria prevalence rates reduced from 60% to 0.9% by the early 1960s. From 1970-75, malaria activities were reduced to disruptions related to the civil war. During the Khmer Rouge from 1975-78, all malaria activities were discontinued. In 1984, the Ministry of Health (MoH) founded and designated a specialized institution, the National Malaria Centre, to provide technical and material support to malaria treatment facilities in provincial and district hospitals and to develop and execute a nation-wide malaria control strategy. It was not until the early 1990s that logistical support for malaria diagnosis and treatment became integrated with the national essential drugs program and the Malaria Center transitioned from purely hospital based curative activities to more proactive community based health education, evaluation and control activities. The National Malaria Centre (CNM) was reorganized in December 1995 with added responsibilities for schistosomiasis and dengue control activities. The official name of the institution was changed to "National Centre for Parasitology, Entomology and Malaria Control", but has retained the acronym CNM.

In 2000, the country introduced ACTs at a national scale. With support from Global Fund to Fight HIV, Tuberculosis, and Malaria (GFATM), CNM successfully extended access to insecticide treated bed nets and diagnosis and treatment. In 2004, CNM piloted the village malaria worker program, which was extended in 2009 to the highest-risk villages and remote areas. Following initial evidence of artemisinin resistance in 2006, a containment project was launched in 2009 along the Cambodia-Thai border to increase coverage of control interventions and limit case management factors associated with the growth of resistance. In the past 10 years, the number of reported malaria cases has been halved, from 113855 cases in 2004 to 56271 cases in 2014, as shown in Figure 2 below.

Figure 2. Malaria Cases and Deaths Reported by Public Facilities and VMWs, 2001-2014



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In 2011, Samdech Decho Hun Sen, Prime Minister of Cambodia, endorsed the National Strategic Plan for Elimination of Malaria in the Kingdom of Cambodia, 2011-2025. The National Strategic Plan calls for elimination in the following phased approach:

- **Short -Term (by 2015):** To move towards pre-elimination of malaria across Cambodia with special efforts to contain artemisinin resistant *P. falciparum* malaria.
- **Medium -Term (by 2020):** To move towards elimination of malaria across Cambodia with an initial focus on *P. falciparum* malaria and ensure zero deaths from malaria.
- **Long-Term (by 2025):** To achieve phased elimination of all forms of malaria in Cambodia

## 3.2 EPIDEMIOLOGICAL PROFILE

### 3.2.1 Parasites

*Plasmodium falciparum* was the predominant species among confirmed malaria cases until 2011. With the roll-out and scale-up of multi-species (Pan) rapid diagnostic tests in 2009, the proportion of infections due to *P. falciparum* shifted and for the first time in 2012, *P. vivax* accounted for the majority of the cases (see Figure 3). In 2014, *P. vivax* infections accounted for 47% (26,183) of cases, followed by 23% (12,422) of *P. falciparum* cases, followed by 30% (16,540) of mixed infections<sup>1</sup> of both *P. falciparum* and *P. vivax*. Prevalence of *Plasmodium* infection has declined in each successive national survey, from a weighted national prevalence (as measured by microscopy) declining from 4.4% in 2004, to 2.6% in 2007, to 0.9% in 2010, and finally to 0.1% in 2013<sup>2</sup>.

Figure 3. Malaria cases in Public Sector, by Species, and Annual Blood Examination Rate<sup>3</sup>, 2010-14



<sup>1</sup> Mixed infections predominantly include *P. falciparum* species in Cambodia and should be interpreted and managed as such.

<sup>2</sup> Malaria Consortium and CNM. Cambodia Malaria Survey 2013. 2013.

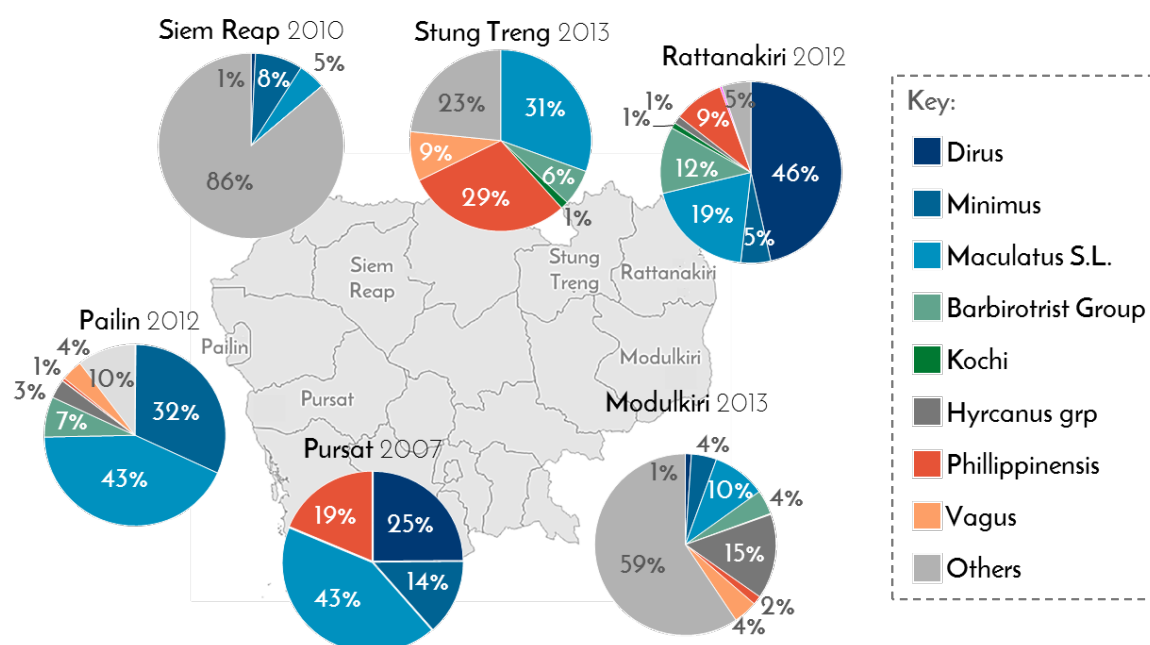
<sup>3</sup> ABER (%) is calculated as number of people tested by microscopy and RDTs in a year divided by total estimated population

### 3.2.2 Vectors

Twenty five malaria vector species have been identified in Cambodia between 2007 and 2013. *An.maculatus* s.l. is present throughout Cambodia with *An.minimus* s.l. more prevalent in the west, while *An.dirus* in the northeast. Other vectors such *An.barbirotrist*, *An.phillipinensis*, *An.vagus*, and *An.hyrceanus* are also present in Cambodia (see Figure 4).

*An.dirus* is found forested mountains and foothills, cultivated forests, and rubber plantations, whereas *An.minimus* is found outside the forests or in areas where the forests have been cleared. *An.maculatus* is found in hilly or mountainous areas and breeds in or near permanent or semi-permanent bodies of clean water like streams or rivers. *An.epiroticus* is able to breed in water with some salinity and is therefore typically found in Cambodia's coastal areas. These vectors bite during all hours of the evening, but peak biting hours are usually found to be between 8 pm and 12 am.

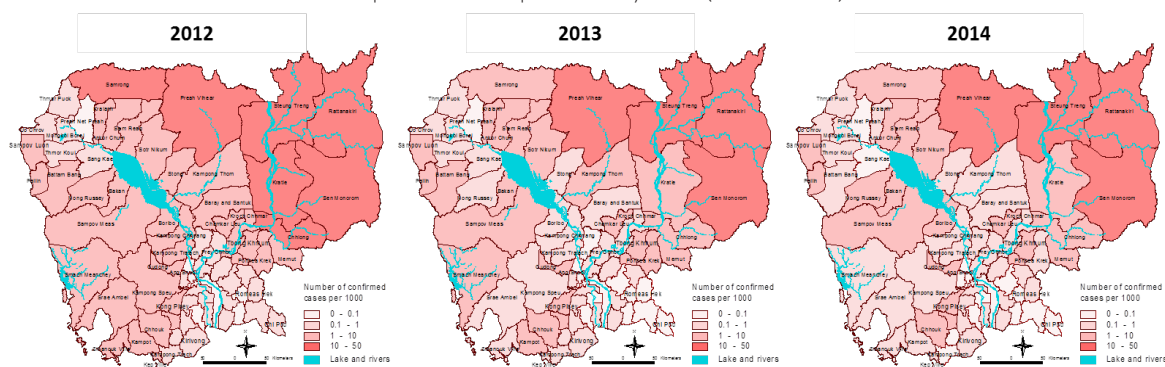
Figure 4: Vector Distribution according to Entomological Surveillance at Sentinel Sites (2007-2013)



### 3.2.3 Malaria Transmission






In Cambodia, malaria transmission is endemic in 21 out of 25 provinces, but incidence is highest in the north eastern part of the country, where the malaria burden has become more concentrated over the past 3 years (see Figure 5). Transmission occurs primarily in the hot and rainy season between July and November. It is estimated that 58% of the population, or approximately 8.6 million people, live in malaria at-risk areas. Malaria risk is highest in forest or forest fringe areas of the country, usually found along the borders of Viet Nam, Lao People's Democratic Republic, and Thailand.

Figure 5. Confirmed Malaria Cases (Public Health facilities and VMWs)  
per 1000 Population by OD (2012-2014)



Human movement is common in Cambodia and contributes to the continuous geographical distribution of malaria through the importation (related to populations coming from outside the country) and intra-portation (related to populations moving within the country) of parasites. In the 2013 Cambodia Malaria Survey, prevalence as measured by PCR was highest among forest goers (5.4%) and travelers (2.2%), compared to residents (1.2%)<sup>4</sup>. The profiles of mobile and migrant populations (MMP) in Cambodia include seasonal workers associated with agriculture, construction or mine workers, forest workers, security personnel, and visitors traveling for tourism or to see relatives. Profiles of types of MMPs and their associated activities are described in the table below.

Table 1. Profile and Activities of Mobile and Migrant Populations in Cambodia<sup>5</sup>

PROFILE	ACTIVITIES	EXAMPLE
 <b>Seasonal Workers</b>	Agricultural activities occurring during planting season (end of dry season) and harvesting season (end of rainy season, usually in foothills/plains/valleys)	<ul style="list-style-type: none"> <li>Farming</li> <li>Rubber or cassava plantations</li> </ul>
 <b>Construction/ Mine workers</b>	Activities related to infrastructure construction or mining in forested areas, usually in upland forest/hills/valleys	<ul style="list-style-type: none"> <li>Dam or road construction</li> <li>Gold or gem mines</li> </ul>
 <b>Forest Workers</b>	Activities in heavily forested and remote areas in small mobile groups, usually in upland forest/hills	<ul style="list-style-type: none"> <li>Gathering forest products</li> <li>Hunting</li> <li>Logging</li> <li>Fishing</li> </ul>
 <b>Security Personnel</b>	Activities related to patrolling in forested border areas, including military, police, border patrol units	
 <b>Visitors</b>	Tourism, visits to relatives which could include spending up to one week in or near the forest	<ul style="list-style-type: none"> <li>Family event</li> <li>National holiday</li> <li>Ecotourism</li> </ul>

<sup>4</sup> Malaria Consortium and CNM. *Cambodia Malaria Survey 2013*. 2013.

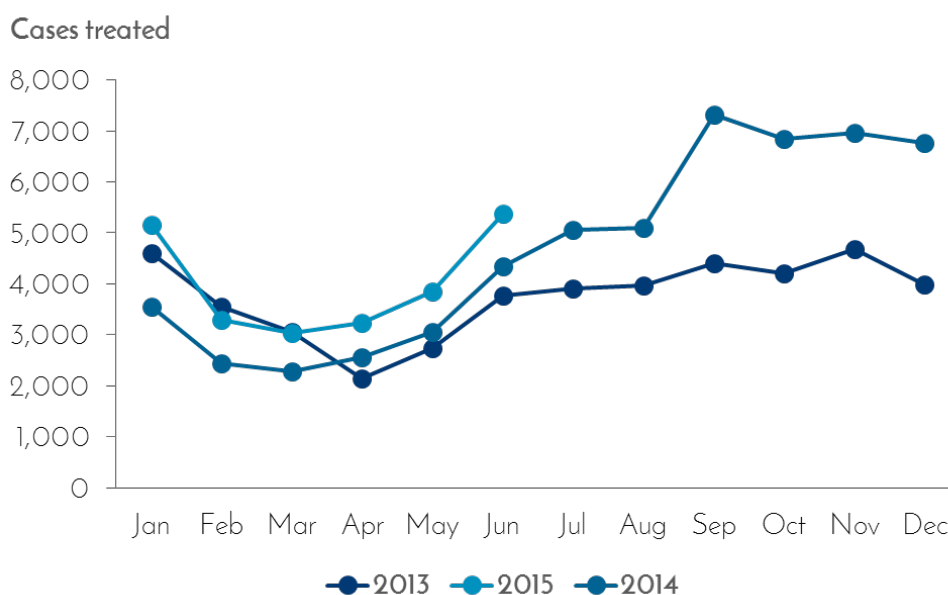
<sup>5</sup> Guyant P, Canavati S, Chea N, et al. Malaria and the mobile and migrant population in Cambodia: a population movement framework to inform strategies for malaria control and elimination. *Malaria J*. 2015. 14: 252.

### 3.3 CURRENT SITUATION AND TRENDS

#### 3.3.1 Morbidity and Mortality

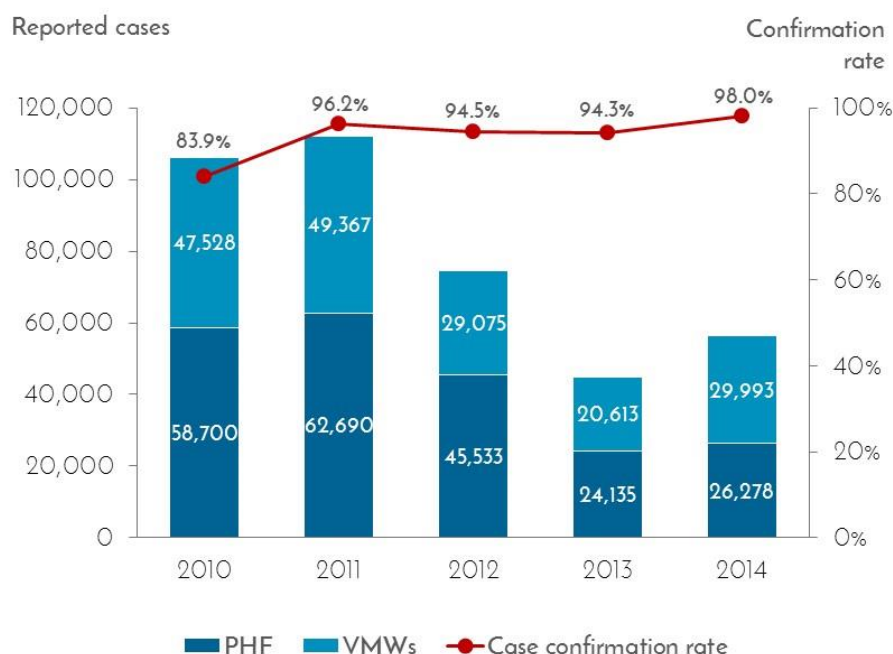
In 2014, Cambodia recorded 56,271 malaria cases in public health sector comprised of public health facilities and Village Malaria Workers (VMWs), a 47% decrease from 2010. However, this case load showed approximately 26% increase compared to 2013 and this trend of increase in number of cases, starting in April 2014 has continued in 2015. In first seven months of 2015, the total number of confirmed cases (public health facilities and VMWs) has increased by 36% compared to the same period in 2014, as depicted in Figure 6, indicating a potential resurgence of the malaria burden nationally.

Figure 6. Malaria Cases (Public Health Facilities and VMWs) by Month (January 2013 – June 2015)



The case confirmation rates by microcopy and/or RDTs in public sector have remained consistently high ( $\geq 90\%$ ) since 2011, as shown in Figure 7. VMWs diagnosed and treated more than half of malaria cases recorded in the public sector in 2014 and 100% of these cases are confirmed by RDT.

Figure 7. Number of Malaria Cases Recorded by Public Health Facilities and VMWs (2010-2014)



This overall case load does not include malaria cases treated by the private sector, which is believed to treat up to two-thirds of patients with febrile illness. Antimalarial market share data also indicates that up to 60% of antimalarials are sold or distributed throughout the private sector in Cambodia [ACT Watch Survey 2013]. As of December 2014, there were nearly 1200 licensed private providers enrolled in the PPM program implemented by CNM, Population Services International (PSI) and University Research Council (URC) in 34 ODs out of total 45 malaria endemic ODs. These private providers recorded 17,361 confirmed malaria cases in 2014. However the case data from unlicensed health and non-health outlets that also provide malaria services is not captured as these outlets are not part of the PPM program. Thus the number of malaria cases recorded in public health sector is an underestimation of the true burden of the disease.

A total of 8 Operational Districts (ODs) accounted for 73% of cases treated in public health facilities, VMWs, and the private sector in 2014: Steung Treng OD (Steung Treng province), Kratie OD (Kratie province), Tbeng Meanchey OD (Preah Vihear province), Ratanakiri OD (Ratanakiri province), Sen Monorom OD (Mondulakiri province), Samraong OD (Oddar Meanchey province), Sampov Meas OD (Pursat province), kampong Speu OD (Kampong Speu province) (see Figures 8 and 9). The combined population of these provinces is only 1.8 million, 12% of the total population of Cambodia.

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Figure 8. Malaria Cases Recorded in Public and Private Sector by OD (2014)

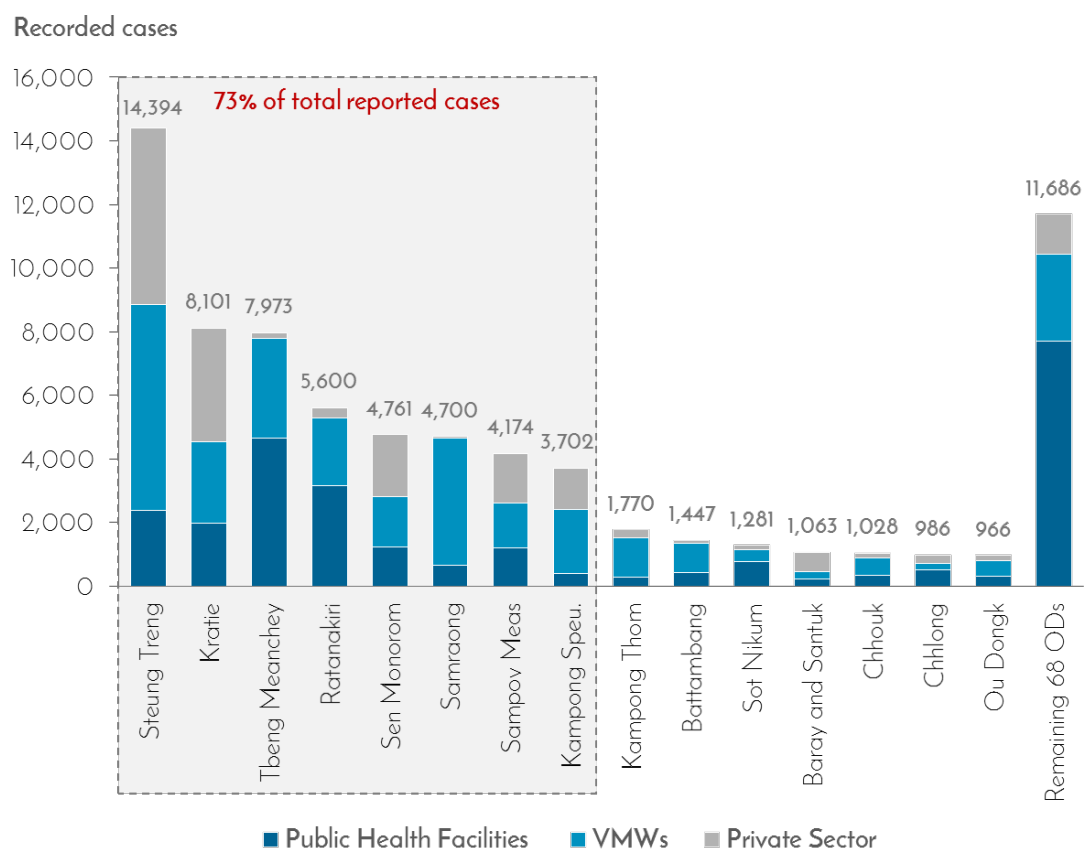
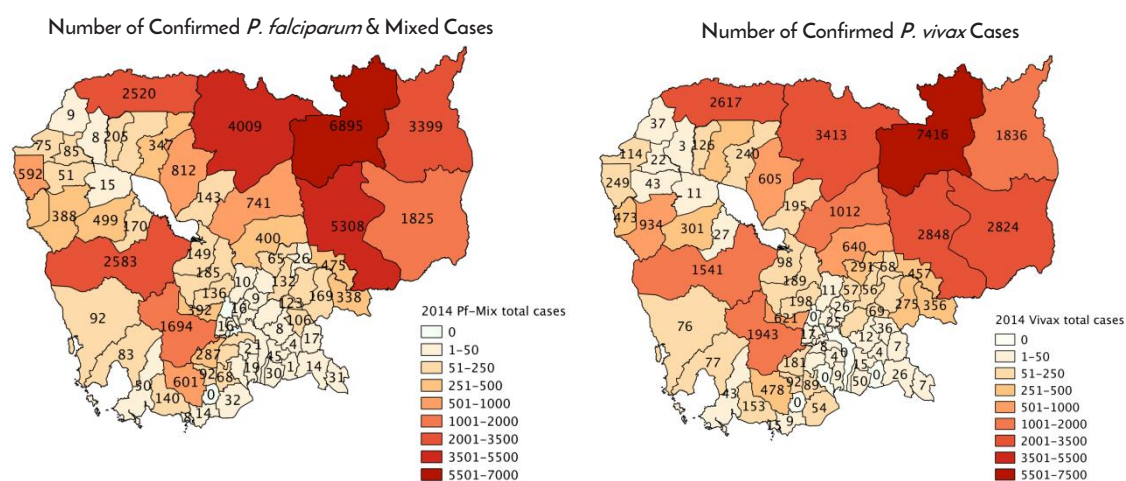


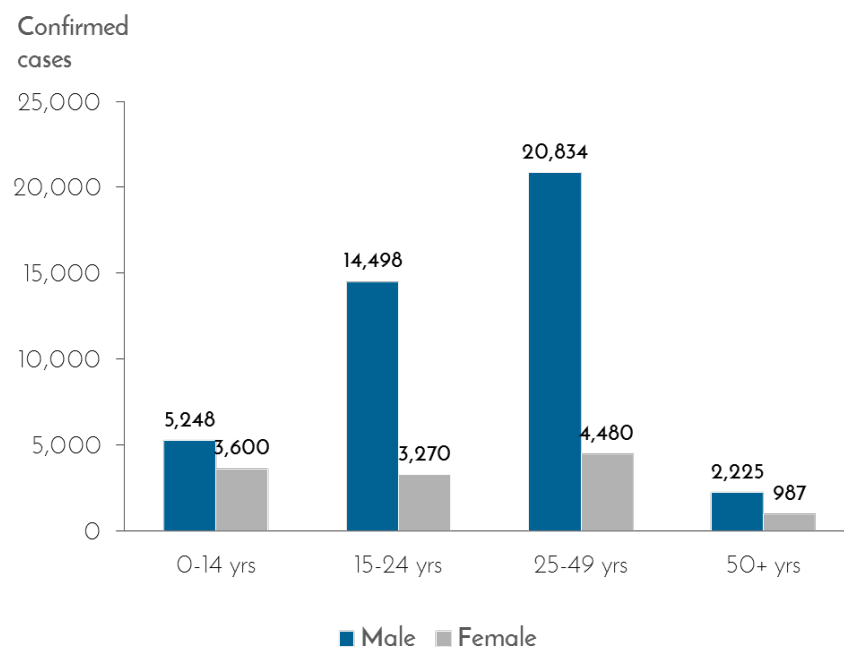
Figure 9. Distribution of Absolute Number of Infections by Species by OD (2014)





Cambodia's malaria case load is primarily concentrated in adult males, with males between the ages of 15-49 years comprising two-thirds of malaria cases reported in the public sector in 2014, as shown in Figure 10. This trend is likely related to the exposure of these populations to forest-associated vectors during peak biting hours as adult males are often working in agricultural or forest-related industries at these times.

Figure 10: Malaria Cases Recorded by Age and Gender - Public Health Facilities and VMWs (2014)



Cambodia recorded 18 malaria deaths in 2014, a slight increase from 12 in 2013, but a 60% decrease from 45 in 2012. The overall malaria mortality rate has decreased from 0.98 per 100,000 in 2010 to 0.12 per 100,000 in 2014. This achievement could be attributed to the introduction of the National Strategic Plan (2011-2025), which built national attention on malaria and led to increased coverage of malaria control interventions.

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### 3.3.2 Multi-Drug Resistance

Parasite resistance to artemisinin and other ACT partner drugs has been detected in five South-East Asian countries, including Cambodia. There is a concern that multi-drug resistance could spread, given the high level of population mobility. If resistance were to spread to or emerge in India or sub-Saharan Africa, the public health consequences could be dire, as no alternative antimalarial medicine is currently available with the same level of efficacy and tolerability as ACTs.

Artemisinin resistance was first identified in clinical studies in Cambodia in 2006, however retrospective analysis of molecular markers indicates that artemisinin resistance likely emerged as early as 2001 before the widespread deployment of ACTs in Cambodia. Initially, due to high treatment failure rates with artesunate-mefloquine (AS-MQ), the first-line treatment for the treatment of uncomplicated *P. falciparum* malaria was changed from co-blistered AS-MQ to fixed-dose dihydroartemisinin-piperaquine (DHA-PPQ) in Pailin in 2008 and then nationwide in 2010.

After the implementation of this new treatment policy, an increase in treatment failures with DHA-PPQ was quickly identified in therapeutic efficacy studies in Pailin followed by seven other provinces between 2008 and 2014 in the western and northern part of the country. In provinces with DHA-PPQ failure, the decision to re-introduce ASMQ per national policy was reached in 2014 as first-line treatment, since the proportion of *P. falciparum* strains with multiple *Pfmdr1* copy numbers (which confer mefloquine resistance) is currently minimal in the area. DHA-PPQ remains the first-line treatment in the rest of the country. Quinine plus doxycycline over 7 days has been adopted as second-line therapy.

As of June 2015, failure rates of DHA-PPQ have crossed 60% in Siem Reap and have reached 30-40% in provinces including Oddar Meanchey, Stung Treng and Battambang, as shown in Table 2. Further increase in multidrug resistance including artemisinin resistance could lead to the resurgence of malaria not only in Cambodia, as well as neighboring countries. In areas with early treatment failure, alternatives to ACT, specifically quinine and doxycycline, administered via inpatient care may be required.

Table 2. Day 28 Cure Rates following Treatment with ACT from 2010-2014<sup>6</sup>

ACT	2010	2011	2012	2013	2014
<b>DHA-PIP</b>	<ul style="list-style-type: none"> <li>76% Pailin</li> <li>93% Pursat</li> <li>100% Rattanakiri</li> </ul>	<ul style="list-style-type: none"> <li>90.5% Pursat</li> <li>100% Kratie</li> </ul>	<ul style="list-style-type: none"> <li>91.3% Pursat</li> <li>69.2% Battambang</li> <li>100% Kampong Speu</li> <li>100% Kampong Thom</li> </ul>	<ul style="list-style-type: none"> <li>98.3% Rattanakiri</li> <li>100% Kratie</li> <li>100% Kampot</li> <li>93.3% Preah Vihear</li> </ul>	<ul style="list-style-type: none"> <li>37.5% Siem Reap</li> <li>66.7% Stung Treng</li> <li>89.4% Mondulkiri</li> </ul>
<b>ASMQ</b>	<ul style="list-style-type: none"> <li>100% Pailin</li> </ul>				
<b>Artesunate-Pyronaridine</b>	<ul style="list-style-type: none"> <li>86.7% Pailin</li> <li>89.8% Pursat</li> </ul>				

Previously, drug resistance stratification risk was divided into two tiers: Tier 1 being those nine provinces with demonstrated artemisinin resistance; and Tier 2 referring to the other 12 provinces that, by definition, are at risk but where resistance has not been confirmed. Because resistance affects the malaria situation of the entire country, no tier stratification will be used, but evidence of multidrug resistance will be one of the factors used in the phasing strategy.

<sup>6</sup> As recorded via therapeutic efficacy studies (TES)

## 3.4 PROGRAM ORGANIZATION, MANAGEMENT AND PERFORMANCE

### 3.4.1 National Malaria Program Organization

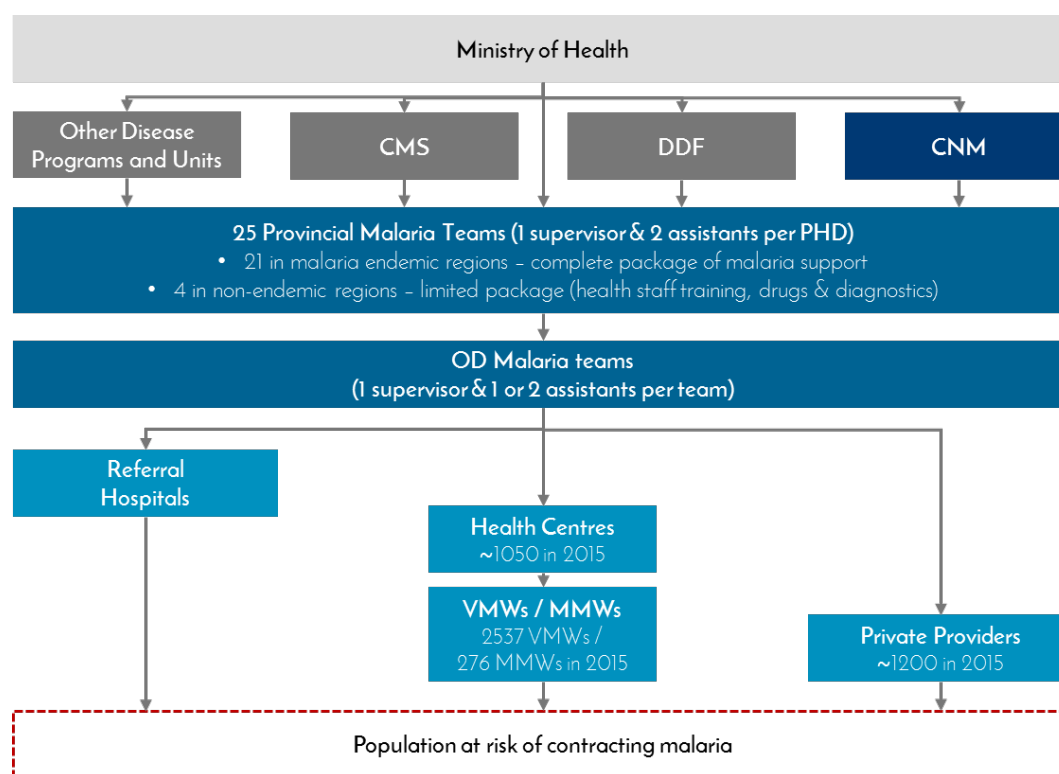
In recent years CNM has evolved from an essentially vertical program to a more administratively decentralized and integrated program within the Cambodian public health system (Figure 11). The providers in public health system are composed of:

1. National, provincial and district referral hospitals (RH)
2. HCs and Health Posts: minimum level primary health care services mainly for rural populations that cover around 10,000–20,000 people each
3. Community health volunteers/workers (under MOH/National Disease Programs or NGOs)

Responsibility for the detailed planning of many activities has been assigned to staff at PHDs and ODs with dedicated malaria teams. Implementation of activities relating to public sector malaria diagnosis and treatment are now more fully integrated into the general health services at the health post, HC and referral hospital level.

In addition, CNM in collaboration with partners also provide malaria diagnosis and treatment services through collaboration with private providers. Under the Public-Private Mix (PPM) program, the licensed private sectors are enrolled, trained and monitored for malaria case management services and case load reporting.

Figure 11. Structure of National Malaria Program Organization



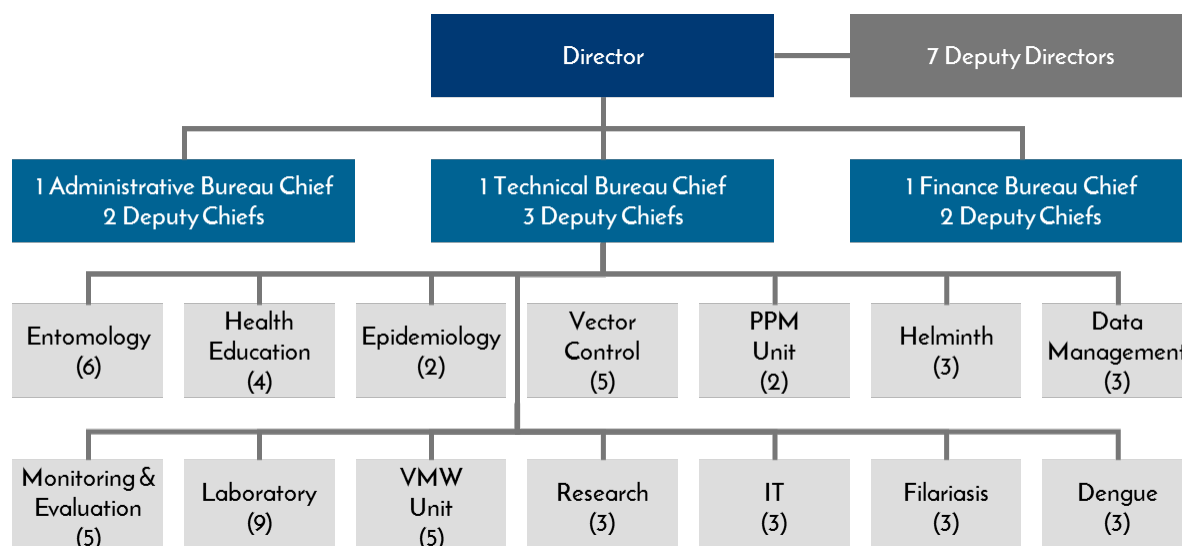
### 3.4.2 CNM Structure

CNM is divided into three main bureaus each handling the technical, financial and administrative aspects of the NMCP (Figure 12). All three bureaus are under the direct management of the Director. The Deputy Directors provide necessary support in terms of technical oversight, financial planning, partner relations and/or project management.

The Technical Bureau oversees treatment, training and supervision for the four disease-specific programs. The malaria program is the largest among the disease specific programs managed by the Technical Bureau, accounting for 75 percent of the Technical Bureau's staff. The work of the Bureau is carried out by twelve technical units: Entomology, Epidemiology, Research, Vector Control, Monitoring and Evaluation, Laboratory, Health Education, IT, Helminthiasis, Filariasis, PPM and Village Malaria Workers. The Administration Bureau is primarily responsible for administration including personnel and logistics management. The bureau oversees the functioning of 6 units, namely Administration, Transportation, Procurement, Library, Security and Cleaning. The Procurement Unit is responsible for the quantification, ordering and purchasing of drugs, commodities, equipment and goods required by the programs operated by CNM. The Finance Bureau manages all financial matters including donor supported grants and projects. The Bureau's work is carried out by three units, namely Accounting; Planning and Materials; and Financial Services Unit. The Financial Services Unit is solely responsible to manage the GFATM grants.

CNM has a total staff of 152 (as of December 2014) out of which 80 are government staff, 38 are temporary and 15 are contracted under the GFATM grants and 19 under other malaria grants. The organizational structure of CNM and the staff per unit is shared in Figure 12 below.

Figure 12. Organizational Structure of CNM and Staff Number per Unit



### 3.4.3 Program Performance

Cambodia has strong political will for and commitment to malaria elimination from both government and partners. Financial support from the government includes resources to support infrastructure, transport, and permanent human resources. The government supports decentralization of health activities to the peripheral level for more efficient and effective implementation of strategies, but low salaries and capacity within the staff across the health levels is a significant challenge to quality implementation and provision of services. Salary and capacity growth severely affects hiring and retaining of talented staff within the public health system in Cambodia. Partners offer a range of malaria expertise in terms of research, technical assistance and implementation of malaria program throughout the country, but coordination remains a challenge.

CNM has experience in managing concurrent multi-million grants for malaria. CNM has administered/received grants from GFATM since 2002; Bill and Melinda Gates Foundation (BMGF, 2009-2010); and has recently started new malaria projects (2015-2016) funded by Regional Artemisinin Initiative (RAI) and New Funding Model (NFM) under GFATM and Pilot Elimination Project in Preah Vihear province under Asia development Bank (ADB). For GFATM, CNM has acted both as Principle Recipient and Principal Implementing Partner (PIP).

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# 4 Strategic Plan

## VISION: A Malaria-Free Cambodia

**MISSION:** The Royal Government of Cambodia's mission is to work together with all relevant partners and the communities themselves to enable sustained delivery and use of the most effective prevention and treatment measures for those affected most by malaria by mobilizing all the required resources and ensuring compliance with all national standards and guidelines for key malaria interventions toward elimination.

### GUIDING PRINCIPLES:

1. Political commitment, leadership and ownership
2. Equity in access to services, especially for the most vulnerable and other underserved populations at risk of malaria
3. Improvement of performance of health services
4. Innovative tools and approach
5. Community participation
6. Inter-sectoral approach

**GOAL:** Reduce the incidence of malaria to less than 1 infection per 1000 people at risk in each operational district and eliminate *Plasmodium falciparum* including multidrug resistance by 2020

Specific objectives:



1

Providing effective program management and coordination at all levels by 2017 to efficiently deliver a combination of targeted interventions for malaria elimination



2

Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases



3

Protect at least 90% of all populations at risk of malaria with an appropriate vector control intervention by 2017



4

Enhance the surveillance system to detect, immediately notify, investigate, classify and respond to all cases and foci by 2017 to move toward malaria elimination



5

Implementing comprehensive IEC/BCC approach that facilitates at least 90% of people seeking treatment for fever within 24 hours at a health facility or with a qualified care provider and at least 85% of at-risk population utilizing an appropriate protection tool by 2017



Image Credit: AFRIMS

# 1

**Provide effective program management and coordination at all levels by 2017 to efficiently deliver a combination of targeted interventions for malaria elimination.**

## 1.1 Strengthen Program management and coordination

The Ministry of Health will ensure that the required program management capacity for planning, implementation, monitoring and evaluation is available at all levels of the health system. The CNM will develop and update a human resource development plan and advocate for high level commitment for implementation of this plan. CNM leadership will support program units and PHD/OD health offices to hire additional human resources to perform activities as detailed under the Malaria Elimination Framework. National policies and guidelines will be reviewed and updated as necessary based on the results of monitoring and evaluation. CNM will carry out Mid-Term Review of Strategic Plan in 2017 and Malaria Program Review in 2019 with support from WHO and external stakeholders. Outcomes of these reviews will inform revision of Malaria Elimination Action Framework.

All health staff involved in malaria operations will be trained on program management approaches and planning and technical guidance for malaria elimination. Standard operating procedures for all activities managed at provincial and district level will be developed to improve management and accountability of malaria operations. Provincial health departments will meet with district health staff carry out an annual review

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to chart progress against the national monitoring and evaluation plan and develop provincial operational plans in quarter four for the coming year. CNM and PHDs will meet in quarter one of each calendar year at Annual Malaria Review Meeting to align operational plans across provinces. These plans will be submitted to the Ministry of Health to improve transparency and coordination. As data is collected and information analyzed, national, provincial, and district plans will be adapted on an ad hoc basis to respond to the dynamic malaria situation accordingly. To support those working on malaria at provincial and district-level, CNM will carry out bi-annual supervisory visits with field staff to assist in planning, implementation, monitoring and evaluation of malaria control activities.

A Malaria Elimination Taskforce will be created at national level amongst senior management at CNM, MOH, and lead technical and implementing partners, to serve as a steering committee to guide implementation of the Malaria Elimination Action Framework. Additionally, an Independent Malaria Elimination Commission will be appointed to monitor overall country progress towards elimination in preparation for eventual certification. This Commission will be expected to meet biannually to advise the CNM and make periodic verification visits at provincial level. Terms of reference for Independent Malaria Elimination Commission will be created to define roles and responsibilities and members with necessary experience will be selected.

## 1.2 Advocate for high level commitment to malaria elimination

The Prime Minister of the Royal Government of Cambodia has committed to elimination of all forms of malaria by 2025. This support was reiterated at the 2014 East Asia Summit in November 2014, when 18 heads of state from the Asia-Pacific region, including Cambodia's, committed to the goal of malaria elimination in the entire region by 2030. The Ministry of Health, CNM, WHO, and partners, including the Asia Pacific Malaria Leaders Alliance (APLMA), will continue to advocate for commitment to malaria elimination at the highest levels to secure effective multi-sectorial engagement, address human resources requirements for malaria, ensure effective national leadership and governance, expand health services to provide full access for people in remote areas, and determine appropriate approaches to sustain community-level services beyond malaria specific services.

Elimination goal and objectives will be included and prioritized in national health sector strategy. The CNM will issue official malaria progress reports to senior management of the Ministry of Health as well as publish these updates on the CNM's website (<http://www.cnm.gov.kh/>) to maintain visibility of the program.

## 1.3 Expand and maintain functional partnerships

Partners including governmental sectors, national and international nongovernmental organizations, the private sector, media, bilateral and multilateral agencies, and funding institutions will be harnessed for achievement of the malaria elimination goal. A National Multi-Sectoral Malaria Elimination Committee, consisting of all relevant health and non-health stakeholders, will meet bi-annually to discuss current progress and challenges related to malaria elimination. Provincial elimination committees, consisting of key health staff and other inter-sectoral partners relevant to malaria, which already exist in some areas of the country, will be expanded and strengthened to support interventions specific to the local context.

CNM will appoint focal person to coordinate all country partnerships. CNM will require all partners and their activities to be aligned with the elimination action framework. The Malaria Elimination Sub-Technical Working



Group, made up of government staff and representatives from partner organizations with extensive international and local expertise in malaria, will meet every two months to coordinate activities. Working groups representing each thematic area (Case Management, Vector Control, Surveillance and Monitoring and Evaluation, Procurement and Supply Chain, and IEC/BCC) will meet on an ad hoc basis to advise the STWG and CNM.

At Annual Malaria Review Meeting in quarter one of each calendar year, one day will be dedicated for technical and financial partners to present achievements and indicate future plans for coming year. CNM will utilize current partnerships with the WHO, the Asia Pacific Malaria Elimination Network (APMEN), and other technical partners to develop program capacity and liaise with other regional malaria programs to inform technical strategies.

#### 1.4 Strengthen cross border collaboration for malaria elimination

Cambodia recently endorsed the Strategy for Malaria Elimination in Greater Mekong Subregion (2015-2030), along with neighboring Vietnam, Thailand, and the Lao People's Democratic Republic (Lao PDR), which will support alignment of national strategies and monitoring and evaluation frameworks. The CNM, in close collaboration with WHO and implementing partners, and in the context of the Greater Mekong Strategy, will strengthen existing cross border activities and establish new ones through conducting biannual planning and review meeting, and harmonization and synchronization of interventions at border areas with neighboring countries. Coordination between border districts of Cambodia and neighboring countries will be strengthened through data sharing agreements and formal action planning sessions. IEC/BCC materials will be developed in relevant languages for each area to ensure that key messages are absorbed by targeted audiences.

#### 1.5 Mobilize resources to support program implementation

Resource mobilization efforts to ensure successful implementation will be led by CNM and MOH to support program implementation. A full costing of this Action Framework will be carried out and updated as necessary. This will include financial analysis of costs associated with malaria elimination, a gap analysis, and the development of a sustainability plan. For any financial gaps, a business plan will developed and disseminated to guide financial partners and their investments in Cambodia's malaria elimination program. Following annual review and planning meeting, CNM will meet with financial partners to align resources with elimination action framework. For external financial partners, CNM will develop applications as opportunities are presented. CNM will also explore the potential of innovative financing mechanisms to increase domestic resources for malaria elimination. A sustainability plan will be developed in 2018 to ensure that all essential activities are continued through elimination certification and prevention of reintroduction phase.

CNM will work with the MOH's technical working group for engaging with the private sector to ensure malaria elimination is a priority for investment and public-private collaboration. Specific private sector entities may be engaged in malaria elimination depending on the area targeted and the private sector's stake in that region.

#### 1.6 Introduce and scale up appropriate interventions for mobile, migrant and other underserved populations at risk of malaria infection

Due to the high risk of infection among mobile and migrant populations, special efforts will be enacted to reach this population with strategic interventions. CNM will appoint focal person to engage with and coordinate

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partners and activities directed towards mobile and migrant populations (MMPs). Mobility analysis will be carried out on a regular basis to inform population movement and areas to be targeted for appropriate interventions. Mapping and census of MMPs will be conducted every year at regular intervals in these specific areas of risk to target bed net distribution and other interventions. This mapping and any ongoing operational research among underserved populations will be utilized to regularly update Strategy to Address MMPs for Malaria Elimination in Cambodia. Industries supporting employment of mobile and migrant populations, forestry, plantation and farming, construction, and tourism, in at-risk areas will be engaged in malaria prevention strategies.

Cross-border activities, as listed under Strategy 1.4, will take into consideration specific interventions for MMPs. Periodic meetings between Ministers of Health from Cambodia, Vietnam, Laos, and Thailand, and associated malaria programs will be held to facilitate planning on underserved populations along the border as areas. As necessary, CNM will collaborate with other sectors, such as Ministry of Foreign Affairs and the Department of Immigration, the Department of Tourism, Department of Forestry, and provincial-level administrators to appropriately target these at-risk populations. All IEC interventions must take account minority populations that speak languages other than Khmer.

Military personnel, considered the most easily accessible group of MMPs, will be targeted for engagement. In collaboration between the United Nations and the Royal Cambodian Armed Forces (RCAF), all soldiers traveling to endemic areas outside the country will be screened pre- and post-deployment to reduce risk of infection and importation. CNM will work with RCAF to ensure that all prevention, case management, and surveillance activities are aligned with the country's malaria elimination action framework.

## 1.7 Strengthen Procurement and Supply Management System (PSM)

CNM will work alongside Central Medical Store (CMS) at MOH and agencies procuring on behalf of donors to select and register appropriate products, issue tenders and secure procurement of items, and ensure timely delivery and proper storage. CNM will establish a PSM working group to share regular updates regarding procurement and distribution; share stock levels of different commodities; coordinate with different partners and resolve any related matters.

CNM will strengthen mechanisms of forecasting and quantification at central level to include all malaria commodities to be distributed by CMS and partners in the country. CNM will work with CMS and PHDs/ODs to improve distribution of medicines, reagents, insecticides and other essential commodities as per the need at peripheral health facilities across the country. A PSM plan will be developed for all malaria commodities and shared with CMS for in-country distribution. CNM will appoint a PSM focal point to oversee the implementation and monitoring of the PSM plan and the CNM staff will receive training and capacity building on PSM systems.

CNM will also implement a mHealth-based stock management system at HCs across the malaria endemic ODS to develop transparency to stock availability, monitor supplies and ensure no commodity stock outs occur at any point of time at lower health levels. Health staff will be trained on the stock management system and SOPs will be established to take appropriate response when needed. Stock levels at central level via national drug inventory system at CMS will be closely monitored by CNM and supply plan will be updated as needed.



Image Credit: Brendan Brady / IRIN

## 2

### Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases

In an elimination setting, all suspected malaria cases must be diagnosed and confirmed with a parasitological diagnostic test. Thorough testing of all patients presenting with the signs and symptoms of malaria at a health facility or to a trained community healthcare worker is necessary to identify and promptly treat infections within the population and halt transmission. Diagnosis is a key factor of any malaria program not only to ensure good fever case management as malaria cases decrease, but also to surveillance and response.

Furthermore, resistance of *P. falciparum* to artemisinin and other antimalarial medicines has reached alarming levels in Cambodia. In the areas along the Cambodia-Thailand border, drug failure (defined by positivity up to 42 days after treatment) is increasing. The dilemma is that multidrug resistance is both an impediment to elimination and a reason for pursuing it. Therefore, it is imperative that diagnosis and treatment strategies are based on evidence, and are effectively coordinated and monitored.

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## 2.1 Strengthen the parasitological detection of malaria infections

The national malaria treatment guidelines, which also include national diagnosis protocols, will be reviewed periodically and revised as necessary. Malaria diagnosis services will be available at all public health facilities, licensed private sector providers, trained village malaria workers and mobile malaria workers, military medical services, and select border check points and mobile clinics. All suspected malaria cases will be parasitologically confirmed before treatment and treatment will only be provided to positive cases. Pregnant women residing in endemic areas will be screened for malaria during first antenatal visits. Diagnosis with microscopy and rapid diagnostic tests (RDTs) will continue to be used in all areas for prompt parasitological diagnosis; microscopy is the preferred diagnostic tool, but if microscopy is not available, RDTs will be used for to inform case management and facilitate reporting.

As an operational district transitions toward elimination, all malaria cases confirmed by RDT and/or microscopy will be re-confirmed by an expert WHO-accredited microscopist. Microscopists will record presence of both asexual stages and gametocytes during microscopy testing. Molecular diagnostics will be utilized as a surveillance tool for understanding the level of asymptomatic infections in low endemic areas with multidrug resistance to guide operations, but will not be used routinely for detecting and treating cases.

All service providers authorized to diagnose malaria will be trained on how to prepare malaria slides, conduct RDTs, and collect dried blood spot (DBS) cards as necessary. Case management trainings will occur annually for all healthcare workers and will be led by Provincial Health Department and Operational District Health Staff. CNM will lead PHD/OD staff in training of trainers workshop to standardize training curriculum and ensure consistent knowledge and skills related to malaria among the healthcare work force. Regular support and supervision visits will be carried out by PHD/OD staff on a quarterly basis to monitor the quality of case management services at all public facilities. Among existing microscopy-equipped laboratories, training and re-training of all laboratory technicians/assistants on WHO microscopy accreditation will be continued. All laboratories will participate in quality assurance and control procedures (see Strategy 2.5).

## 2.2 Ensure prompt efficacious treatment of all confirmed uncomplicated and severe malaria cases according to national malaria treatment guidelines including the utilization of low dose primaquine to reduce the transmissibility of Pf and radical cure for Pv

All confirmed malaria cases will be treated according to national guidelines.<sup>7</sup> Treatment will be strictly based on parasitological results and all malaria infections will be treated regardless of presence of signs and symptoms. Malaria treatment or referral services will be available at all public health facilities, licensed private sector providers, trained village malaria workers and mobile malaria workers, military medical services, and select border check points and mobile clinics that offer confirmed and free diagnosis. CNM will implement primaquine nationally at appropriate dosage for treatment of *P. falciparum* and *P. vivax* infections.

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<sup>7</sup> The current first line treatment of uncomplicated *P. falciparum*, *P. vivax*, *P. ovale*, and *P. malariae* malaria is ACT plus gametocidal drug. For *P. falciparum* infections or mixed infections that include *P. falciparum*, a single low-dose of primaquine will be used. For *P. vivax* and *P. ovale* infections, standard dose of primaquine up to 14 days will be utilized to prevent relapse. Prior to treatment with primaquine for *P. vivax* cases, Glucose-6-Phosphate Dehydrogenase (G6PD) testing will be carried out.

In line with the WHO recommendations all malaria cases will be treated and tracked to ensure cure. All malaria cases detected in elimination targeted ODs will be followed-up with on day 7 and day 28 following diagnosis; a blood smear will be collected and read by a microscopist to ensure parasite clearance. If a patient is still positive either on day 7 or on day 28 or becomes symptomatic again within the 28 days window, he/she will be admitted to the closest inpatient public facility and treated with second-line medications. All referral facilities will keep stock on hand of both first and second line treatments for this reason. Admitted patients may be remunerated and consent may be obtained to ensure compliance with inpatient care. Due to the issue of growing drug resistance, national treatment guidelines will be reviewed on an annual basis and revised as necessary based on available evidence.

In-order to strengthen case management, CNM and PHD/OD staff will target all service providers who are involved with malaria diagnosis and treatment for training on management of both uncomplicated and severe malaria, as well as drug resistance monitoring, which will be combined with training on diagnosis, surveillance, and health education. Ad hoc training will be provided if there are immediate changes to national treatment guidelines. Regular support and supervision visits will be carried out by PHD/OD staff on a quarterly basis to monitor the quality of case management services at all public facilities. Among other service providers (military, private sector), designated stakeholders will be responsible for carrying out monitoring visits.

DDF will update regulations on use of antimalarials to include all antimalarial medicines that are not aligned with national treatment guidelines or essential medicines list; DDF will remove and confiscate unapproved antimalarials from all healthcare providers. DDF's Pharmacovigilance Unit will monitor healthcare workers to ensure correct prescription and adherence to treatment regimens of antimalarial drugs and to monitor potential adverse events.

## 2.3 Increase availability of quality case management services among private sector providers and industrial work sites and plantations

Access to diagnosis and treatment will be extended among all licensed private sector providers in each endemic OD. CNM will manage PPM facilities in provinces with identified multi-drug resistant (formerly Tier 1 provinces) and partners will manage PPM facilities in surrounding areas (formerly classified as Tier 2 provinces) up until 2018, after which the whole PPM program will be managed by CNM. Prior to starting PPM in a new area, CNM and partners will map all private sector providers. From this exercise, qualified and licensed private sector providers will be engaged for participation in the public-private mix (PPM) program. Private providers under the PPM program will be trained on early diagnosis and treatment according to national treatment guidelines, provided with ACT and RDTs, and incorporated into the national malaria surveillance system. Supportive supervision visits to the private providers will be carried out by CNM, peripheral staff, and partners. Additionally, coordination meetings will be held between CNM and partners as well as between CNM and peripheral staff to optimize PPM program management.

Private providers that do not qualify for the PPM program will not be allowed to sell antimalarials or diagnostics, nor will they be allowed to provide malaria diagnosis or treatment. CNM's map of private providers will be shared with the PHDs, the Department of Drug and Food (DDF), and the Anti-Economic Crime Police to help enforce this regulation. Additionally, CNM will identify select unlicensed private providers that the PHD, DDF, and Anti-Economic Crime Police should target for licensing such that they can be registered under the PPM program.

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## 2.4 Place at least one village malaria worker in all villages in malaria risk areas

Village malaria workers are the foundation of malaria case detection, treatment services, and surveillance in Cambodia. To continue to extend access to malaria case management in remote communities at risk of malaria, the number of villages with VMWs and MMWs will be scaled-up from 2539 currently to 4528 over the course of this strategy. The target will be to place at least one village malaria worker in every village including cross-border sites considered at risk for transmission or importation of multidrug resistance. With limited resources, CNM will utilize a risk stratification to prioritize villages in the highest incidence areas to be added to the VMW program. To build sustainability into the VMW program, CNM will collaborate with MoH to convert VMWs into multi-purpose healthcare workers wherever possible in short-to-medium term and absorb them into the national network of community healthcare workers in long term. VMWs will continue to provide diagnosis and treatment to symptomatic populations, support referral for severe or complicated malaria cases to nearest health facilities, engage in OD/HC-led LLIN distribution at village-level, and provide health information and counselling to communities. In low-endemic areas targeted for elimination, VMWs will utilize immediate case notification system for reporting and may support active case investigation and detection activities at community-level. Directly-observed therapy will be carried out by VMWs at village-level, where appropriate.

CNM will collaborate with partners to introduce and scale up cross border interventions using VMWs and MMWs. CNM will also work with PHD and OD staff to map large-scale private sector work sites, including plantations and long-term construction projects, to identify areas vulnerable to importation from mobile and migrant populations. At identified sites, CNM will recruit Planation Malaria Workers (PMWs) or Mobile Malaria Workers (MMWs) to provide diagnosis and treatment services. Existing PMWs and MMWs under the management of partners will be transferred to CNM control by 2020.

The work of VMWs will be managed by CNM's VMW Unit in collaboration with OD and HC staff. An operational manual will be developed to guide VMW placement, implementation of VMW-related interventions, and regular training and supervision of VMWs. All VMWs will receive annual training on malaria, case management, counselling and health education, and surveillance reporting from OD/HC staff. VMWs will participate in a monthly meeting with district and HC staff on reporting, commodity distribution, and health education activities.

## 2.5 Strengthening the quality assurance and control systems for malaria diagnosis and antimalarial drugs

To ensure accurate diagnosis, quality of both microscopy and RDTs must be assured at all levels of the health sector. The National QA/QC guidelines for malaria along with standard operating procedures (SOP) for laboratory diagnosis will be developed and disseminated to all PHD/OD staff and service providers. Staff at CNM central laboratory and existing provincial and operational district laboratories will be trained on the National QA/QC guidelines. For external quality control, microscopy will be assessed through the submission of samples by expert microscopist at CNM. All laboratories will participate in Accredited External Competency Assessment (ECA), supported by WHO. A slide bank will be developed to support quality assurance and training on malaria diagnosis.

Maintaining microscopy quality nationally will be essential to detecting treatment failure.



RDT brand will be selected from among WHO pre-qualified suppliers and results from FIND quality testing will be considered. CNM will submit RDTs for lot testing upon arrival in country by sending the samples to Institut Pasteur in Cambodia. Only batches with good performance will be distributed. Quality of transport and storage of diagnostic supplies will be routinely evaluated. There will be support and supervision visits to facilities and villages to assess the how service providers perform RDTs; onsite training will be provided by CNM and PHD/OD staff if skills require refreshing.

All antimalarials will be procured from WHO pre-qualified suppliers. The quality of the antimalarials that come into the country will be adequately assessed for quality by the National Drug Quality Control laboratory. Batch testing of all malaria medicines will be done to ensure quality.

## 2.6 Utilize mass drug administration in targeted communities based on evidence and local context

Based on results of currently ongoing national and regional research projects including the pilot studies of Médecins Sans Frontières (Belgium) and Mahidol Oxford Research Unit (MORU, Bangkok) in Cambodia and The Shoklo Malaria Research Unit in Myanmar assessing the logistics, acceptance, safety, and efficacy of mass drug administration (MDA) and WHO recommendations, CNM will consider the strategy of MDA in active foci with suspected reservoirs of large asymptomatic parasite carriers with an objective to interrupt malaria transmission in low transmission settings and to achieve rapid case reduction in moderate-to-high transmission settings. Based on WHO recommendations, MDA will be considered in areas with good access to treatment, vector control and good surveillance. MDA will also be considered as part of the immediate response in situations requiring epidemic control while other interventions are put in place. Strategic decision making and operational planning for MDA will take place on ad hoc basis in consultation with WHO, local technical partners and international experts.

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Image Credit: Jeffrey Lau/South China Morning Post

# 3

## Protect at least 90% of all populations at risk of malaria with an appropriate vector intervention by 2017

### 3.1 Develop vector management strategy for malaria elimination

CNM will collaborate with PHD/OD staff, WHO, and other stakeholders to develop a vector management strategy and insecticide resistance monitoring plan based on WHO guidelines, that takes into account all potential intervention packages for reducing receptivity and human-vector interaction by geographical target area. Utilizing entomological surveillance at local level and information on insecticide effectiveness and resistance in Cambodia, this strategy will take into account cost-effectiveness and potential impact of each strategy. The vector management strategy will guide implementation and will be updated on an ad hoc basis based on ongoing transmission. CNM will train central, provincial, and district-level staff on vector management strategy.

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### 3.2 Distribution of long lasting insecticide-treated Nets (LLINs) and hammock nets (LLIHNs) to all populations at risk

Long lasting insecticide-treated nets and hammock nets will be distributed to all populations at risk as the primary vector control strategy and areas will be prioritized based on risk strata. Quantification of LLIN/LLIHN need (1 LLIN per 1.8 people and 1 LLIHN per household) will be based on annual village-level risk stratification. LLINs/LLIHNs will be procured from GFATM-approved suppliers, received by the central warehouse, and distributed and stored at provincial and district-level. Mass distribution campaigns will be carried out in 2015 at village-level and led by trained staff from operational districts and HCs and 3-4 years afterwards (currently planned for 2018), dependent on residual effect and quality of LLINs/LLIHNs distributed in 2015. CNM targets 90% coverage LLINs among all at-risk populations. CNM will monitor LLIN ownership and utilization utilizing community survey 1 month and 6 months following mass distribution campaigns. Impact of LLINs will be evaluated in each geographical area utilizing surveillance data.

In target areas reporting low LLIN ownership following mass distribution, additional stock will be distributed to HCs based on the need to provide continuous distribution of LLINs via village malaria workers. Among mobile populations, LLINs/LLIHNs will be distributed annually at workplace (e.g. longstanding farms, plantations, industrial sites, as identified by OD and HC staff) through net lending or net giving programs. LLIHNs will be distributed continuously near forest locations at select touch points. All LLIN distribution campaigns will be supported by coordinated information, education, and campaigns.

### 3.3 Indoor residual spraying (IRS) in all classified active foci to halt transmission

Indoor residual spraying will be implemented in active foci in response to the presence of local cases identified via passive or active case detection systems. IRS will be used in low-endemic ODs targeted for elimination where immediate case reporting and investigation are in place and entomological evidence and community factors indicate that IRS will be impactful to interrupt transmission. IRS also may be deployed in response to outbreaks in high-endemic areas. To ensure effective, safe IRS, well-defined standard operating procedures will be developed for IRS planning, implementation, and monitoring. The insecticide for IRS will be chosen based on available efficacy data for Cambodia, procured by CNM, and distributed to ODs. OD and HC staff will be trained on IRS to support implementation with CNM. IRS will be deployed by trained staff following identification of a local case and mapping of all households in the foci. IRS will cover all households around index case. IRS quality and impact will be monitored by CNM entomology team.

### 3.4 Strengthen operational research on potential interventions to reduce residual transmission

To ensure protection against vectors among high-risk groups (e.g. those who work outside at night), CNM will analyze the results of ongoing and completed operational research projects including the pilot on insecticide treated clothing by Naval Medical Research Unit for military/army personnel, and research projects on efficacy of topical and spatial repellents conducted by Tropical Institute of Antwerp/WHO and MORU/Liverpool School of Tropical Medicine respectively to evaluate the safety, utilization, and impact of personal protection measures for vulnerable populations e.g. people who work outside at night, people who work in forest. Personal protection packs for forest goers, also called "forest packs", which is a backpack that can include an LLIN/LLIHN, hammock, repellent, rain coat, torch, and IEC materials, are currently being distributed in two research pilots by Family Health International and Partners for Development in Cambodia measuring the



utility and impact of this intervention. Based on the results of this research, CNM will also consider this intervention and develop a strategy to utilize these packs for increasing personal protection among forest goers. Additional vector control measures, including community drug administration with ivermectin and other insecticide-based materials, may be studied within the Cambodia context in line with elimination goal. Results of all operational research projects will inform strategies for scale-up among the most at-risk populations.

### 3.5 Utilize environmental management strategies to reduce vector breeding sites

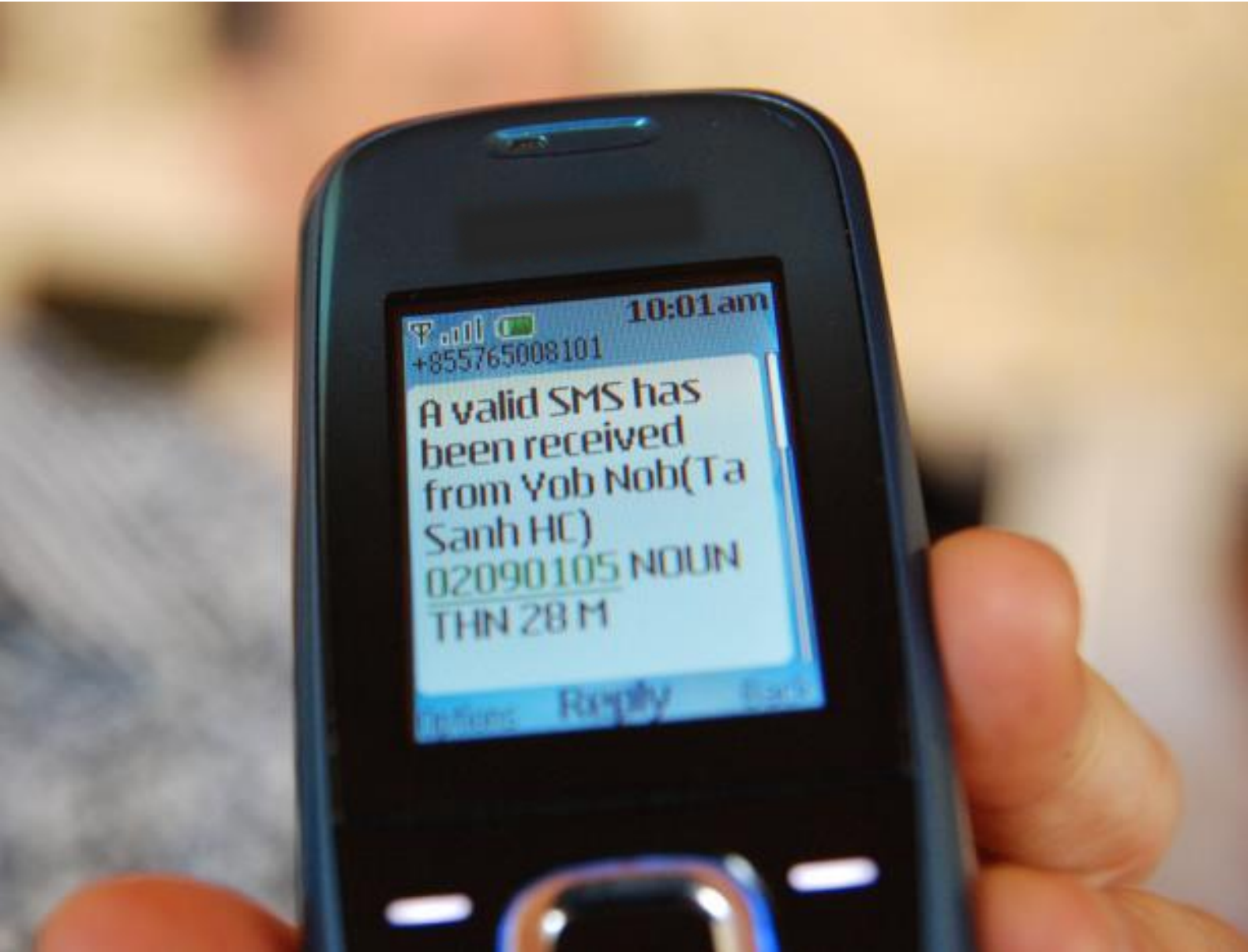
CNM will capacitate PHD and OD staffs in endemic provinces on basic entomology and concepts of environmental management via annual trainings (1 training per year with at least one malaria staff from each province). In active foci where entomological surveillance is carried out, CNM with support from PHD and OD staff, will assess the impact of potential environmental management interventions and develop policy guidance for village leaders and provincial and district government to deploy these techniques. A strong inter-sectoral collaboration is required for deployment of environmental management at local level. CNM will work with district elimination committees and local health staff to engage communities to participate in environmental management activities. In areas of high transmission, CNM will implement a research project to assess the potential utility and cost-effectiveness of housing improvement to decrease transmission and assess the costs of deploying this intervention.

### 3.6 Strengthen entomological surveillance for malaria elimination in active foci for malaria elimination

CNM will hire and train additional staff for the entomology unit to build capacity necessary for entomological surveillance for elimination. CNM will also develop central insectary to facilitate all entomological testing on vector behavior and effectiveness of potential vector control interventions. CNM will develop standard operation procedures for all entomological testing. Annually, CNM will select three routine sentinel sites, varied based on the environmental and geographical context, to monitor malaria vectors. Entomological surveillance will include identification of vector species, monitoring vector behavior and bionomics, mapping species distribution and density, identification of host preference, seasonal fluctuation of species, and assessment of an area's receptivity. In ODs targeted for elimination, an entomological assessment will be carried out based on reported transmission to guide deployment of appropriate interventions. Entomological assessment will also be carried out in all districts reporting potential outbreaks based on set outbreak thresholds.

### 3.7 Routinely monitor insecticide resistance

CNM will work with WHO and technical partners to harmonize current labs in Cambodia into one central lab for insecticide resistance monitoring and efficacy testing for vector control interventions. CNM will routinely monitor the efficacy of LLINs, insecticides, and repellents among colonized and field mosquitos. Based on results, a strong collaboration between Ministry of Health, Ministry of Agriculture, and Ministry of Environmental Management is needed in order to continually harmonize regulations for the registration of all public-health related insecticides and the enforcement of these regulations. CNM will periodically review quality assurance for vector control products using standard protocols of the World Health Organization's Pesticide Evaluation Scheme (WHOPES).



## 4

Enhance the surveillance system to detect, immediately notify, investigate, classify and respond to all cases and foci by 2017 to move toward malaria elimination

The implementation of malaria case surveillance based on specific and rigorous standards defines an elimination program. Malaria case surveillance for elimination aims to detect and notify all malaria infections, ensuring that they are given prompt, efficacious treatment to prevent secondary cases and to investigate each malaria case to determine whether it was locally acquired or imported from outside the country and determine risk factors associated with infection. Once a local case of malaria has been detected and notified, active case detection and a focus investigation is carried out by trained malaria staff to assess the receptivity and vulnerability of an area and what drives transmission and determine what interventions are necessary to successfully interrupt transmission.

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## 4.1 Define system specifications for upgraded Malaria Information System (MIS)

CNM's Epidemiology Department and Technical Bureau will convene all relevant stakeholders involved in surveillance to review current national systems, ongoing surveillance pilots, and best practices from other elimination countries to develop the system architecture for malaria elimination surveillance system. CNM will utilize surveillance working group to develop system specifications based on these consultations to finalize system to record, collect, and analyze malaria data. System specifications will explicitly define technology and network needs and reporting forms. System specifications will be disseminated to all stakeholders. Additional hardware and software required for MIS will be procured by CNM.

Routine monthly surveillance will be strengthened across the country to ensure complete and timely reporting from public facilities, village malaria workers, PPM network facilities, military/police health services, and implementing partners. CNM will collaborate with Department of Planning and Health Information (DPHI) to improve integration of Health Information System and MIS. System platform will also facilitate immediate case reporting from all service providers in low endemic areas targeted for elimination. Other data from case investigation, case detection, vector control interventions, entomological surveillance, therapeutic drug efficacy studies, and commodity procurement, distribution, and utilization, as well as all partner data, will be integrated into malaria information system to facilitate comprehensive analysis. Dashboards will be updated in malaria information system to inform rapid response.

## 4.2 Strengthen and build capacity to implement the surveillance system

Following the development of the system specifications, CNM will develop surveillance operational manual on overall surveillance system, reporting, and response. The surveillance operational manual will be reviewed annually and updated as necessary. CNM will work with PHD/OD to update terms of reference for all malaria-dedicated staff to include all responsibilities for surveillance. PHD/OD health staff will work with HCs to assign malaria surveillance responsibilities to specific staff focal person. CNM will also collaborate with Communicable Disease Control (CDC) Departments' Rapid Response Teams (RRT) at HC level to involve RRT staff in malaria surveillance activities.

CNM will assess the need to hire additional staff at central and peripheral level for surveillance and response. To ensure adherence to national reporting guidelines and active surveillance activities, CNM will lead trainings on surveillance among PHD/OD/HC staff, village malaria workers, PPM network facilities, and implementing partners. CNM will collaborate with military and police on surveillance training. Training will be integrated into other malaria trainings where possible.

## 4.3 Strengthen passive case detection and routine reporting by all health care providers

Malaria will be a notifiable disease among all public and private sector providers and community healthcare workers across all endemic and non-endemic ODs. CNM will collaborate with DPHI to upgrade Health Information System to align with malaria surveillance system specifications and operational manual. New forms reflecting all necessary malaria data from passive case detection system will be developed and disseminated to service providers. CNM will collaborate with military/police forces to develop mechanisms for monthly reporting of malaria passive case data.

CNM will utilize “Day 0 surveillance” system as a foundation for real-time case reporting in all low endemic ODs targeted for elimination. When a case is diagnosed and treated for malaria, all service providers will utilize mobile phone/tablet for real-time reporting of case details, including geo-referenced data, through mobile phone network to MIS. MIS will trigger immediate alerts to malaria response teams at CNM and PHD/OD/HC staff of relevant catchment area. As malaria decreased in an area, CNM will scale-up real-time case reporting in a phased approach across HCs/referral hospitals in all endemic ODs, provincial and national hospitals.

#### 4.4 Strengthen active case detection, case investigation and reporting for all malaria infections

Active surveillance activities will be carried out in low endemic areas targeted for elimination. Active surveillance activities will be detailed in the national malaria surveillance operational manual, which will be updated as necessary. All confirmed cases presenting at HC and hospital will be investigated following passive case detection, classified (local case, imported, introduced and induced) taking into account patient household location and travel history, and reported via real-time case reporting system to MIS. Cases diagnosed by village malaria workers and PPM network facilities will be notified to real-time case reporting system and when alerted, HC will carry out investigation within 48 hours to classify source of infection.

Reactive case detection, screening carried out in response to a reported case, will be conducted around index cases using RDTs and/or microscopy; RDTs for point of care diagnosis and blood smears will be collected and read as soon as possible (maximum within 48 hours) by microscopist at HC or RH to identify additional infections missed by RDT. Regardless of results, all household members will be treated presumptively with first line antimalarials as per national drug policy. Other diagnostic tools may be considered for active detection as available and cost-effective. Proactive case detection, screening conducted based on suspicion of transmission or infections among high-risk groups, will be carried out dependent on previous year’s malaria trends, seasonality of transmission specific to an area, or based on an influx of mobile or migrant populations from endemic areas. Case detection will be utilized to halt any ongoing transmission and identify specific drivers of transmission in each focus. Village malaria workers, village leaders, and provincial malaria elimination committee will be sensitized on issues of importation management and transmission potential to increase information sharing that might trigger proactive case detection.

All cases diagnosed during reactive or proactive case detection will be treated according national guidelines. All confirmed cases found during case detection will be investigated, classified, and reported utilizing mobile phones/tables to MIS by HC staff. In circumstances where there is a high likelihood of an undetected asymptomatic parasite reservoir that is causing transmission, presumptive treatment may be prescribed to community members within a transmission focus or hotspot.

#### 4.5 Strengthen investigation, classification, and appropriate response to all malaria transmission foci

Following case investigation and reactive case detection and based on evidence of potential local transmission, CNM in collaboration with PHD/OD staff will investigate, classify and map all foci (village-based) of malaria transmission using a geo-referenced system to help appropriately allocate interventions by area or household. Annually, case-based surveillance data will be analyzed to identify any potential transmission foci that were

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not investigated during the malaria transmission seasons and will be classified based on information available. Entomological assessment will be incorporated into foci investigation. Training of all PHD/OD staff involved in foci investigation and response will occur annually and will be included in general surveillance training.

CNM Epidemiology Unit will map and classify transmission foci as outlined in the foci investigation form - active foci (new, residual, potential). Based on foci classification and factors driving transmission, CNM will work with appropriate units to lead response, which may include additional vector control, environmental management, and case detection and treatment. All data emanating from foci investigation and response will be entered into a geo-referenced database and maintained over time to inform elimination strategy.

#### 4.6 Strengthen management and usage of data at all health levels

All data from passive case detection, active case investigation and detection, and foci investigation will be integrated along with data on entomological surveillance and intervention coverage within the MIS for full analysis by CNM. The CNM's Epidemiology Unit will continuously analyze the malaria situation for every OD as data is entered into MIS. PHD/OD will have access to all relevant MIS data, will analyze their data regularly, and will take the appropriate response in coordination with CNM. Annual trainings on data collection, reporting and analysis at the central and peripheral level will take place. Regular feedback will be provided to all health levels through epidemiological reports. Semi-annual malaria bulletins will be generated and disseminated.

#### 4.7 Outbreak preparedness and response

In elimination-targeted ODs, local cases are responded to immediately. In higher-incident areas targeted for burden reduction or transitioning to elimination, potential for large outbreaks remains. CNM will collaborate with MOH CDC and partners to develop Outbreak Preparedness and Response (OPR) standard operating procedures to address the outbreak identification, alert mechanisms and response activities. CNM will collaborate with the RRTs (CDC) working at provincial level for quick outbreak detection and investigation activities. CNM will also develop OPR early warning system that predicts, detects, and informs on the response to contain all potential outbreaks through immediate implementation of preventive and control measures. Rainfall and temperature data can be used at district level for outbreak prediction. To assist districts in the identification of outbreak-prone areas and populations at risk, the country will embark on annual re-stratification of all districts using surveillance data and mapping of outbreak-prone areas. CNM will update outbreak thresholds regularly.

CNM will form outbreak response teams for each region of the country made up of PHD/OD staff and rapid response teams from within the Communicable Disease Control Department to lead response to outbreaks. Similar to foci investigation and response, CNM will work with appropriate units to lead interventions for outbreak containment, which may include additional vector control, environmental management, and case detection and treatment. CNM staff and PHD/OD/HC will be trained on outbreak preparedness and response. CNM will establish flexible funding mechanism to reserve funds for outbreak response activities including the procurement and storage of buffer supplies.

## 4.8 Strengthening program monitoring and evaluation

Completeness, timeliness and reliability of the data collected by MOH and CNM is important for monitoring and evaluation of epidemiological trends, impact of interventions, and improving management and decision making. To support strengthening monitoring and evaluation, CNM will update national monitoring and evaluation plan and review as necessary. Update the TORs and SOPs/checklists for the M&E team at CNM and PHD/OD/HC level to ensure high quality monitoring of case management, vector control, and surveillance activities. A community survey based on methodology from previous Cambodia Malaria Surveys will be implemented in 2016 and serve as baseline for elimination. Due to the transition to elimination, other surveys, such as the Knowledge, Attitudes, Practices, and Beliefs Survey will be used on an ad hoc basis and in a targeted manner to track progress and inform decision making.

Intervention coverage and operational targets for implementation will be assessed regularly to ensure successful implementation of this strategy at a level necessary to sustainably interrupt transmission. Periodic review and evaluation of the national malaria program will be conducted during the implementation period. CNM's M&E Unit will support the Annual Malaria Review, the Mid-Term Review of Action Framework in 2017 and Malaria Program Review in 2019 with support from WHO and external stakeholders. The Annual Review will be used to update progress on all indicators in monitoring and evaluation framework.

## 4.9 Strengthen operational research for malaria

CNM will review and finalize the Policies and Guidelines to Conduct Malaria Research in Cambodia. CNM will name a focal point for coordinating all operational research for malaria. Once guidelines are established, CNM will collaborate with partners to conduct trainings for all staff on research design and implementation. To improve coordination for malaria research, CNM will establish a malaria research working group under the CNM research network to review protocols and provide technical input and direction for the country's research agenda. CNM will require all partners to submit research data on a regular basis and information will be shared widely to inform changes in strategy. Priority research topics (included in other sections) include new, sensitive field diagnostics, improved surveillance for malaria drug resistance, and scale-up of cost-effective personal prevention measures.

## 4.10 Routinely monitor the efficacy of first line antimalarial and test new drug regimens

To monitor the efficacy of ACTs and track multi-drug resistance, CNM will work with WHO and partners to carry out therapeutic efficacy studies (TES) on the country's first-line antimalarials. TES will be carried out at sentinel sites throughout the country or on all tracked cases in areas of low endemic malaria transmission. Additionally, CNM will work with technical partners to test new treatment regimens that may be more effective in the Cambodia context.

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Image credit: Positive Deviance Initiative

## 5

Implementing comprehensive IEC/BCC approach that facilitates at least 90% of people seeking treatment for fever within 24 hours at a health facility or with a qualified care provider and at least 85% of at-risk population utilizing an appropriate protection tool by 2017

### 5.1 Improve quality and dissemination of IEC/BCC messages for malaria elimination

In the context of elimination action framework, CNM will revise the current IEC/BCC strategy and messages in collaboration with partners to align with and support the implementation strategies in case management, vector control and surveillance for malaria elimination. Specifically, community mobilization and mass media strategies will be incorporated with an overall aim to deliver quality malaria-related information on prevention, malaria signs and symptoms, and access to quality diagnosis and treatment.

To promote behavior change related to health seeking and personal protection, the CNM will develop and distribute malaria IEC materials to members of the public to reinforce key malaria elimination messages. The CNM will also utilize a multi-media strategy to deploy messages via radio, television, newspaper, the World Wide Web, cellphone networks, and billboards. The messages and mediums will be targeted toward the most at-risk and underserved populations. Messages for mass media will be developed each year during workshop

for development IEC/BCC guidelines (see Strategy 5.1). Updates on intervention campaigns, country progress toward elimination, and warnings on potential outbreaks will be disseminated through these mediums as well.

CNM will map IEC/BCC programs of the Ministry of Health and partners to develop a joint work plan on an annual basis for the implementation of all malaria IEC/BCC activities in the country. CNM will develop and harmonize the different IEC/BCC messages and materials across the partners and suited to different regions, including highland ethnic minorities, non-Khmer speakers, and mobile and migrant populations. To improve coordination, CNM will convene IEC/BCC sub-technical working group quarterly or for ad hoc meetings to share progress on BCC activities, identify best practices and challenges in implementation, update key messages and develop new BCC materials in the context of malaria elimination.

CNM's Health Education Unit (HEU) will also conduct monitoring and supervision of IEC/BCC activities in selected ODs every quarter. CNM will conduct annual knowledge, attitudes, practices, and beliefs (KAPB) survey to evaluate the impact of IEC/BCC messages, inform the customization of strategies and approaches that are compatible with the practices, customs and beliefs of various communities. Based on results, IEC/BCC strategies and related materials for future campaigns will be updated. CNM's HEU will include key messages under IEC/BCC guidelines and general malaria health education in all trainings provided to PHD/OD/HC staff, VMWs/MMWs/VHVs, and providers under PPM network in all endemic and non-endemic areas.

## 5.2 Strengthen community mobilization for increased uptake of malaria interventions

CNM will work with community leaders at district and village level to mobilize communities and increase awareness about malaria prevention and access to quality diagnosis and treatment. Community sensitization and training workshops will be organized in cooperation with ODs/HCs involving important community actors including community healthcare workers, private sectors providers, police/military, religious leaders, village chiefs, village health support groups, women volunteers under Ministry of Women's Affairs, teachers and other stakeholders to strengthen the linkages between the key actors and quality malaria service providers.

The Health Education Unit will work with other units at CNM and partners to conduct a mapping exercise to identify source communities of mobile and migrant populations and utilize community mobilization approach to deliver IEC/BEC messages effectively. CNM will also collaborate with partners to work with large-scale employers and implement IEC/BCC activities at their sites using mobile malaria worker and plantation malaria worker. For endemic and non-endemic areas, CNM in cooperation with VHVs/VMWs and Village Chief will continue to develop effective delivery models for the education of MMPs and other vulnerable populations at high-risk of malaria infection on disease prevention and appropriate treatment seeking behavior. Further, CNM will continually evaluate pilot projects on malaria education focused on MMPs and if effective, include them in the national IEC/BCC strategy if found effective.

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Table 3: Implementation Activities in the Strategic Plan, Operational Plan for 2016-2018

OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Goal: Reduce the incidence of confirmed malaria cases to less than 1/1000 inhabitants in each operational district to progress towards Plasmodium falciparum elimination by 2019.														
Objective 1: Provide effective program management and coordination at all levels to efficiently deliver a combination of targeted interventions for malaria elimination by 2019.														
Strategy 1.1. Strengthen program management and coordination														
1.1.1 Develop and regularly update human resource development plan to build capacity at program level	CNM	MOH, WHO	x				x				x			
1.1.2 Train all malaria-dedicated staff on program management, planning, and technical guidance for malaria elimination	CNM	WHO, Partners			x	x			x	x			x	x
1.1.3 Review and update relevant key policy and standard operating procedures to align with elimination goals	CNM	WHO, Partners	x	x			x	x			x	x		
1.1.4 Conduct Annual Planning and Review Meeting for development of malaria operational plans at all levels	CNM	PHDs, ODs, Partners	x				x				x			
1.1.5 Form Malaria Elimination Task Force, develop Terms of Reference, and conduct Malaria Elimination Task Force meetings	CNM	Partners	x	x	x	x	x	x	x	x	x	x	x	x
1.1.6 Appoint National Independent Malaria Elimination Committee for WHO certification, define Terms of Reference, and conduct meetings	CNM	International and National Partners		x		x		x		x		x		x
1.1.7 Monthly provincial supervision by three regional elimination task forces	CNM		x	x	x	x	x	x	x	x	x	x	x	x
Strategy 1.2. Advocate for high level commitment to malaria elimination														
1.2.1 Organize annual advocacy meeting for malaria elimination	CNM	MOH, Partners		x		x		x		x		x		x
1.2.2 Semi-annual progress report developed, submitted to MOH, and posted on CNM website	CNM	Partners	x		x		x		x		x		x	
1.2.3 Participate in regional advocacy meetings for malaria elimination	Partners	CNM	x	x	x	x	x	x	x	x	x	x	x	x
1.2.4 Incorporate elimination goals and targets in national health sector strategy	CNM	MOH	x											
Strategy 1.3. Expand and maintain functional partnerships														
1.3.1 Appoint CNM focal person for partnership coordination by region	CNM		x											
1.3.2 Identify and map partners (public and private sector) supporting malaria elimination agenda on annual basis	CNM		x				x				x			
1.3.3 Update terms of reference for Malaria Sub-Technical Working Group (STWG) and conduct bi-monthly meetings	CNM		x	x	x	x	x	x	x	x	x	x	x	x
1.3.4 Organize partner-focused day at Annual Planning and Review Meeting	CNM	Partners	x				x				x			
1.3.5 Actively participate in Asia Pacific Malaria Elimination Network (APMEN) and the Asia-Pacific Leaders Malaria Alliance (APLMA) networks	APMEN, APLMA			x				x				x		

OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategy 1.3. Expand and maintain functional partnerships														
1.3.6 Conduct Provincial Multi-Sectoral Malaria Elimination Committees meetings quarterly	PHDs, ODs	Partners	x	x	x	x	x	x	x	x	x	x	x	x
1.3.7 Conduct National Multi-Sectoral Malaria Elimination Committee meetings bi-annually	CNM	National-level ministries		x		x		x		x		x		x
Strategy 1.4. Strengthen cross border collaboration for malaria elimination														
1.4.1 Conduct bi-annual meeting to synchronize implementation of all malaria activities with neighboring countries	GMS National Programs		x		x		x		x		x		x	
1.4.2 Regularly share information of mutual interest at national and provincial/district levels with neighboring countries	Provinces/Districts of GMS Countries	GMS National Programs	x	x	x	x	x	x	x	x	x	x	x	x
Strategy 1.5 Mobilize resources to support program implementation														
1.5.2 Develop and disseminate business plan (including financial analysis) to increase investments for current resource gaps.	CNM	WHO, CHAI	x								x			
1.5.2 Develop and disseminate business plan (including financial analysis) to increase investments for current resource gaps.	CNM	WHO, CHAI	x								x			
1.5.3 Carry out annual meeting with financial partners on national operational plans to align investments with program strategy	CNM	WHO, CHAI, Partners		x				x				x		
1.5.4 Develop proposals to financial partners as opportunities present	CNM	WHO, CHAI		x	x			x	x			x	x	
1.5.5 Explore and assess new and innovative financial mechanisms	CNM	WHO, CHAI, Partners			x									
Strategy 1.6 Introduce and scale up appropriate interventions for mobile, migrant and other underserved populations at risk of malaria infection														
1.6.1 Appoint CNM focal person to coordinate partners and activities related mobile, migrant, and underserved populations	CNM		x											
1.6.2 Carry out mobility mapping to identify where and when populations move and how movement relates to malaria transmission	Consultant/ Partner	CNM	x	x				x			x	x		
1.6.3 Conduct GPS mapping of farms/plantations and other large scale employed sites at risk of malaria on a bimonthly basis	HCs and VMWs	ODs, CNM	x	x	x	x	x	x	x	x	x	x	x	x
1.6.4 Review and finalize the Strategy to Address MMPs for Malaria Elimination in Cambodia	CNM	Consultant, Partners			x								x	
1.6.5 Utilize multi-sectoral meetings at national and provincial level to devise and implement strategies necessary to reduce risk among MMPs	CNM, PHDs and ODs	National ministries,		x	x							x	x	
1.6.6 Provide pre- and post-deployment malaria screening for all Royal Cambodian Armed Forces and other security personnel	CNM	RCAF, IPC		x				x				x		
1.6.7 Align RCAF malaria policies for prevention, case management, and surveillance with national malaria policies	CNM	RCAF		x				x				x		
1.6.8 Diagnosis and treatment and provision of forest packs for hard-to-reach MMPs and other high-risk populations	#N/A	#N/A	x	x	x	x	x	x	x	x	x	x	x	x

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OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategy 1.7 Strengthen Procurement Supply Management System (PSM)														
1.7.1 Update TORs of PSM team at CNM and appoint focal persons for procurement, supply and stock management (at national level) and regional oversight (3 regions)	CNM Pharmacy Unit	PSM Working Group	x											
1.7.2 Update forecasting tool used for the quantification of all malaria commodities at central level and train relevant staff	CNM Pharmacy Unit	CHAI, JSI, PSM Working Group	x											
1.7.3 Develop annual forecast of all malaria commodities and submit the procurement plan to procurement partner	CNM Pharmacy Unit	Procurement Partner, PSM Working Group		x				x			x			
1.7.4 Strengthen capacity of CMS and OD staff on PSM	CNM Pharmacy Unit	PSM Working Group		x				x				x		
1.7.5 Update forecast when necessary	CNM Pharmacy Unit	PSM Working Group		x				x			x			
1.7.6 Supervision of OD and HC stores; VMW and PPM meetings	CNM Pharmacy Unit	CNM VMWs and PPM Units	x	x	x	x	x	x	x	x	x	x	x	x
1.7.7 Facilitate registration of new products for faster procurement and use	CNM Pharmacy Unit	Partners	x	x	x	x	x	x	x	x	x	x	x	x
1.7.8 Regularly review stock levels at CMS via central LMIS systems to check stock level of all malaria commodities at the central level	CNM Pharmacy Unit		x	x	x	x	x	x	x	x	x	x	x	x
1.7.9 Distribute urgent supplies of malaria commodities to OD stores witnessing malaria outbreaks and/or stock outs from CNM	CNM Pharmacy Unit		x	x	x	x	x	x	x	x	x	x	x	x
1.7.10 Maintain LMIS systems at OD level	DDF	Consultant	x	x	x	x	x	x	x	x	x	x	x	x
1.7.12 Review the new MIS regularly to get information on stock levels of malaria commodities at HCs	CNM Pharmacy Unit	CNM Epidemiology & Surveillance Units			x	x	x	x	x	x	x	x	x	x

**Objective 2:** 100% parasitological diagnosis of all suspected cases and effective, efficacious treatment of all confirmed cases including mobile and migrant populations.

**Strategy 2.1. To strengthen the parasitological detection of malaria infections**

2.1.1 Procure, distribute and maintain microscopes for the peripheral level	Procurement Partner	CNM					x				x			
2.1.2 Quantify, procure, and distribute other diagnostic commodities including RDTs and supplies	Procurement Partner	CNM	x				x				x			
2.1.3 Train CNM laboratory staff on microscopy and molecular diagnosis	CNM	RITM	x											
2.1.4 Conduct TOT for referral/provincial hospitals on microscopy	CNM			x							x			
2.1.5 Train all peripheral laboratory staff (health centers) providing malaria diagnosis by microscopy	Referral/provincial hospitals, ODs	CNM			x								x	
2.1.6 Monitoring and mentoring all healthcare providers at all levels to strengthen compliance to national guidelines	PHD/OD	CNM	x	x	x	x	x	x	x	x	x	x	x	x
2.1.7 Screen all suspected malaria cases and high risk groups (e.g., pregnant women residing in endemic areas)	Health Facilities, VMWs, Private Providers	CNM and partners	x	x	x	x	x	x	x	x	x	x	x	x

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OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategy 2.2. To ensure prompt efficacious treatment of all confirmed uncomplicated and severe malaria cases including low doses Primaquine for reducing the transmissibility of Pf and radical cure for Pv														
2.2.1 Update national malaria treatment guidelines, as necessary	CNM	WHO					x							
2.2.2 Quantify, procure, and distribute antimalarial drugs	Procurement Partner	CNM	x	x	x	x	x	x	x	x	x	x	x	x
2.2.3 Train all healthcare providers on treatment of uncomplicated and severe malaria and drug resistance monitoring and response	CNM, PHD	MoH				x		x						x
2.2.4 Monitoring and mentoring all healthcare providers at all levels to strengthen compliance to national guidelines	CNM		x	x	x	x	x	x	x	x	x	x	x	x
2.2.5 Provide effective treatment of P. falciparum at all facilities and community level including low dose primaquine to reduce transmissibility	Health Facilities, VMWs, Private Providers		x	x	x	x	x	x	x	x	x	x	x	x
2.2.6 Provide effective treatment of P. vivax for radical cure at all facilities and community level	Health Facilities, VMWs, Private Providers		x	x	x	x	x	x	x	x	x	x	x	x
2.2.7 Follow-up treated cases on day 42 and monitor the re-emergence of symptoms to identify MDR parasites and place patients on second-line treatment to ensure cure	Health Facilities, VMWs		x	x	x	x	x	x	x	x	x	x	x	x
2.2.8 Update and disseminate Department of Food and Drug (DDF) regulations to ban the import and sale of antimalarial drugs not included in national treatment guidelines	DDF	CNM	x				x				x			
2.2.9 Enforce the regulation on private sector service providers	DDF	CNM, PHDs, ODs	x	x	x	x	x	x	x	x	x	x	x	x
2.2.10 Monitor the prescription and safety of antimalarial drugs	DDF	CNM	x	x	x	x		x		x	x	x		x
2.2.11 Conduct mass drug administration based on evidence and local context	CNM, Partners				x	x	x	x	x	x	x	x	x	x
Strategy 2.3: Increase availability of quality case management services among licensed private sector providers														
2.3.1 Transition Tier 1 PPM program management to CNM as per the new PPM strategy	CNM PPM Unit	PSK, URC	x	x	x		x				x			
2.3.2 Transition Tier 2 PPM program management to PSI as per the new PPM strategy	CNM PPM Unit	PSK	x			x	x							
2.3.3 Identify and map PPM private providers at start of program and on a rolling, ad hoc basis	CNM PPM Unit	PPM Partners	x				x				x			
2.3.4 Quantify, procure and deliver malaria commodities to private providers	CNM PPM Unit		x	x	x	x	x	x	x	x	x	x	x	x
2.3.5 Provide refresher training PPM providers on case management (early diagnosis, treatment, referral, and reporting) every 2 years	CNM PPM Unit								x			x		
2.3.6 Conduct bi-monthly meetings with private providers at OD level	CNM PPM Unit		x	x	x	x	x	x	x	x	x	x	x	x
2.3.7 Conduct supportive supervision and M&E visits	CNM PPM Unit		x	x	x	x	x	x	x	x	x	x	x	x
2.3.8 Scale up of electronic reporting of case data by PPs	CNM PPM Unit	PSK			x	x	x	x	x	x	x	x	x	x
2.3.9 Conduct nation-wide PPM assessment	CNM PPM Unit	Consultant, External Service Provider						x	x					

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OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategy 2.4 Village malaria worker in every village in malaria at risk areas														
2.4.1 Utilize risk stratification to identify villages and sub-villages for the allocation of VMWs and MMWs	CNM VMWs Unit		x				x				x			
2.4.2 Develop VMWs Operations Manual	CNM VMWs Unit		x							x	x			
2.4.3 Recruit VMWs/MMWs in new villages	CNM VMWs Unit		x	x	x	x	x	x	x	x				
2.4.4 All VMWs receive training on malaria, case management, counselling and health education, and reporting training	CNM VMWs Unit	PHDs, ODs, HCs	x	x	x	x	x	x	x	x	x	x	x	x
2.4.5 VMWs provide malaria case management services to resident villagers and to mobile populations in nearby areas	VMWs		x	x	x	x	x	x	x	x	x	x	x	x
2.4.6 Monitoring of VMW program management at OD and HC level	CNM VMWs Unit	PHD, ODs, HCs	x	x	x	x	x	x	x	x	x	x	x	x
2.4.7 Conduct semester supervision of VMWs performance	CNM VMWs Unit	PHD, ODs, HCs	x	x	x	x	x	x	x	x	x	x	x	x
2.4.8 Integrate VMWs with other community health services	CNM VMWs Unit	MOH					x	x	x	x	x	x	x	x
2.4.9 Monitor drug adherence (DOT), where possible	CNM VMWs Unit		x	x	x	x	x	x	x	x	x	x	x	x
2.4.10 Set up plantation malaria workers on selected plantations	CNM	PSK	x	x	x	x	x	x	x	x	x	x	x	x
Strategy 2.5: Strengthening the quality assurance and control systems for malaria diagnosis and antimalarial drugs														
2.5.1 Update, print and disseminate guidelines on quality control and assurance and the Standard Operating Procedures for the laboratory diagnosis of malaria	CNM	WHO, URC	x											
2.5.2 Accredited External Competency Assessment (ECA) of malaria microscopists at central and provincial level	ACT Malaria, WHO	CNM		x		x								
2.5.3 Train PHD/OD staff on monitoring and supervision of microscopy services (including cross-checking of slides) and share feedback on quality of microscopy on annual basis	CNM		x				x				x			
2.5.4 Establish and maintain a quality-assured national malaria slide bank at central and provincial level	CNM	WHO									x			
2.5.5 Conduct quarterly supervision of microscopy services at HCs [by OD/PHD]	OD	Referral/ Provincial Hospital		x	x	x	x	x	x	x	x	x	x	x
2.5.6 Conduct semester supervision of microscopy services in every OD [by CNM]	CNM				x		x		x		x		x	
2.5.7 Ensure quality control of inputs for the laboratory diagnosis of malaria (RDTs, microscopy)	Procurement Partner, CNM		x	x	x	x	x	x	x	x	x	x	x	x
2.5.8 Quality control for anti-malarials	US Pharmacopoeia Drug Quality		x	x	x	x	x	x	x	x	x	x	x	x
Strategy 2.6: Utilize mass drug administration in targeted communities based on evidence and local context														
2.6.1 Conduct operational research and regularly review the evidence on mass drug administration in Cambodia	CNM	Research Partners	x	x	x	x	x	x	x	x	x	x	x	x
2.6.2 Implement the strategy in targeted communities	PHD, OD, HC staff	CNM	x	x	x	x	x	x	x	x	x	x	x	x

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OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Objective 3: Protect at least 95% of all populations residing in malaria active foci with an appropriate vector control intervention.														
Strategy 3.1 Develop integrated vector management strategy for elimination														
3.1.1 Review data on entomology, vector control, and insecticide resistance	CNM Vector Control Unit	Partners	x				x				x			
3.1.2 Develop manual for vector management strategy and insecticide resistance monitoring plan	CNM Vector Control Unit	WHO, Consultant	x								x			
Strategy 3.2 Distribution of long lasting insecticide-treated Nets (LLINs) and hammock nets (LLIHNs) to all populations at risk														
3.2.1 Conduct annual village risk stratification to inform quantification and distribution strategy of LLINs/LLIHNs for populations at risk	CNM Vector Control Unit	Partners	x				x							
3.2.2 Estimate the overall quantity of LLINs/LLIHNs needed for mass and continuous distribution campaigns	CNM Vector Control Unit		x	x	x	x	x	x	x	x	x	x	x	x
3.2.3 Procure and distribute LLINs/LLIHNs and other required equipment to peripheral health facilities	Procure-ment Partner	CNM	x				x				x			
3.2.4 Distribute LLINs/LLIHNs to all at-risk populations through mass distribution campaign (2015, 2018)	CNM, PHDs, ODs, HCs and VMWs	Procurement and Distribution Partner												
3.2.5 Continuously distribute LLINs/LLIHNs to at-risk populations reporting low or no LLIN ownership	CNM, PHDs, ODs, HCs and VMWs	Procurement and Distribution Partner	x				x							
3.2.6 Distribute LLINs/LLIHNs and repellent to migrant workers via place of employment (farm/plantation/other large-scale employment sites)	CNM, PHDs, ODs, HCs and VMWs			x	x	x	x	x	x	x	x	x	x	x
3.2.7 Monitor LLIN mass distribution campaign via rapid assessment	CNM Vector Control Unit	Procurement and Distribution Partner	x									x		x
3.2.8 Conduct research on the acceptability of different net types	CNM Vector Control Unit	Partners				x								
Strategy 3.3. Indoor residual spraying (IRS) in all classified active foci to halt transmission														
3.3.3 Train OD/HC staff on IRS in targeted operational districts with active case investigation program	CNM	PHDs, ODs	x											
3.3.2 Procure insecticides and equipment according to expected foci and outbreak potential	CNM Procurement Unit		x				x				x			
3.3.3 Train OD/HC staff on IRS in targeted operational districts with active case investigation program	CNM	PHDs, ODs	x											
3.3.4 Spray all households around index case household (10-20 HH) in target operational districts with evidence of ongoing local transmission	HCs, VMWs				x	x	x	x	x	x	x	x	x	x
3.3.5 Spray all households (minimum 80%) within active focus experiencing outbreak	HCs, VMWs				x	x	x	x	x	x	x	x	x	x
3.3.6 Monitor quality and coverage of indoor residual spraying	CNM	PHDs, ODs		x	x	x	x	x	x	x	x	x	x	x
Strategy 3.4 Strengthen operational research on potential interventions to reduce residual transmission														
3.4.1 Review potential tools for reducing residual transmission	CNM Vector Control Unit	WHO, Partners			x				x				x	
3.4.2 Evaluate the safety, utilization, and impact of personal protection measures	CNM Vector Control Unit	WHO, Partners				x								

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OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategy 3.5 Utilize environmental management strategies to reduce vector breeding sites														
3.5.1 Train PHD and OD staff on basic entomology	CNM Entomology Unit		x	x		x	x				x			
3.5.2 Assess impact of potential environmental management interventions in targeted foci	CNM Entomology Unit		x	x	x	x	x	x	x	x	x	x	x	x
3.5.3 Develop policy brief for village leaders/government policy makers on specific environmental management interventions for interrupting transmission in targeted areas	CNM Entomology Unit		x	x	x	x	x	x	x	x	x	x	x	x
3.5.4 Hold local stakeholder meeting with all relevant sectors in preparation for implementation of environmental management.	CNM Entomology Unit			x				x				x		
3.5.5 Design and implement operational research project on the feasibility and impact of housing improvement in high-endemic areas	CNM Entomology Unit	Partners					x	x	x	x	x	x		
Strategy 3.6 Strengthen entomological surveillance for malaria elimination														
3.6.1 Build capacity of CNM's entomology unit	CNM Entomology Unit	WHO	x	x	x	x	x	x	x	x	x	x	x	x
3.6.2 Training of CNM entomology staff	CNM Entomology Unit	WHO			x	x			x	x			x	x
3.6.3 Collected vector samples and data at sentinel sites	CNM Entomology Unit		x	x	x		x	x	x		x	x	x	
3.6.4 Monitor receptivity and vector density in areas where transmission has been interrupted (no local cases)	CNM Entomology Unit			x	x			x	x			x	x	
3.6.5 Maintain insectary for lab study of mosquitos	CNM Entomology Unit		x	x	x	x	x	x	x	x	x	x	x	x
3.6.6 Confirm species identification and infected rate by PCR	CNM Entomology Unit		x	x	x	x	x	x	x	x	x	x	x	x
3.6.7 Map vector distribution, transmission foci and vector control interventions	CNM Entomology Unit		x				x				x			
Strategy 3.7 Routinely monitor insecticide resistance														
3.7.1 Procure supplies for insecticide resistance monitoring	CNM Procurement Unit	CNM Entomology and Vector Control Units	x	x	x	x	x	x	x	x	x	x	x	x
3.7.2 Monitor efficacy of LLINs, insecticide, and repellents on field mosquitos	CNM Entomology and Vector Control Units		x	x	x	x	x	x	x	x	x	x	x	x

OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Objective 4: Strengthen the surveillance system to immediately investigate, classify, report and respond to all cases and foci to move toward malaria elimination														
Strategy 4.1 Define system specifications for upgraded Malaria Information System (MIS)														
4.1.1 Review and define architecture of surveillance systems	CNM Epidemiology and Surveil- lance Units	Surveillance Working Group	x	x				x					x	
4.1.2 Develop system specifications with surveillance working group	CNM Epidemiology and Surveil- lance Units	Consultant, Surveillance Working Group	x	x	x	x								
4.1.3 Procure and install hardware for MIS upgrade			x											
4.1.4 Procurement, installation, and customization of software for MIS upgrade			x	x	x	x	x					x		
4.1.5 Maintain and customize MIS as required						x				x				x
Strategy 4.2 Strengthen and build capacity to implement the surveillance system for malaria elimination														
4.2.1 Develop malaria surveillance operational manual	CNM Epidemiology and Surveil- lance Units	WHO, Surveillance Working Group	x				x					x		
4.2.2 Assess human resource capacity at OD/PHD/HC level	CNM Epidemiology and Surveil- lance Units	WHO	x	x	x	x	x	x	x	x	x	x	x	x
4.2.3 Train PHD/OD/HC staff, PPM network, VMWs, military/police, and implementing partners on surveillance	CNM Epidemiology and Surveil- lance Units		x	x		x	x		x					x
Strategy 4.3 Strengthen passive case detection and routine reporting by all health care providers														
4.3.1 Mandate malaria as a notifiable disease	CNM	DPHI, CDC, Partners				x								
4.3.2 Upgrade malaria-portion of HIS in collaboration with Department of Planning and Health Information (DPHI)	CNM, DPHI													
4.3.3 Align military/police reporting with national data forms and reporting requirements	CNM, RCAF		x	x	x	x	x	x	x	x	x	x	x	x
4.3.4 Procure and distribute mobile phones/tablets with reporting application to all service providers (health facilities, VMWs, private providers) in targeted ODs	CNM Epidemiology and Surveil- lance Units	Procurement Partner	x	x	x	x	x	x	x	x	x	x	x	x
4.3.5 Upgrade real-time system to include immediate case alert and stock management features and link it with MIS	Consultant	CNM Epidemiology and Surveillance Units	x				x							
Strategy 4.4 Strengthen case detection, investigation and reporting system for all malaria infections														
4.4.1 Conduct mapping of households in every village in ODs selected for elimination to compile a household location database	VMWs	CNM VMWs, Epidemiology and Surveillance Units	x			x				x				x
4.4.2 Investigate, classify, and report all cases from health center and hospital level in ODs targeted for elimination	HCs, VMWs	CNM VMWs, Epidemiology and Surveillance Units	x	x	x	x	x	x	x	x	x	x	x	x

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OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategy 4.4 Strengthen case detection, investigation and reporting system for all malaria infections														
4.4.3 Follow-up at household level, investigate, and classify all confirmed cases reported by VMWs and PPM network through real-time case reporting system in districts targeted for elimination	HCs, VMWs	CNM VMWs, Epidemiology and Surveillance Units		x	x	x	x	x	x	x	x	x	x	x
4.4.4 Carry out reactive case detection around index cases in ODs targeted for elimination	HCs, VMWs	CNM VMWs, Epidemiology and Surveillance Units		x	x	x	x	x	x	x	x	x	x	x
4.4.5 Conduct IRS in households around the index case household in Elimination ODs	HCs, VMWs	CNM VMWs, Epidemiology and Surveillance Units		x	x	x	x	x	x	x	x	x	x	x
4.4.6 Carry out proactive case detection based on suspected transmission, increase in presence of high-risk populations, changes in receptivity/vulnerability, and to prevent outbreaks and report data to MIS	HCs, ODs	CNM VMWs, Epidemiology and Surveillance Units		x	x	x		x	x	x		x	x	x
Strategy 4.5 Strengthen investigation, classification, and appropriate response to all malaria transmission foci														
4.5.1 Investigate, classify, and map all foci in elimination targeted ODs to identify drivers of transmission	CNM Surveillance and Entomology Units						x	x	x	x	x	x	x	x
4.5.2 Respond to active foci based on results of investigation	HCs, ODs	CNM Epidemiology and Surveillance Units					x	x	x	x	x	x	x	x
4.5.3 Establish and maintain geo-referenced database for all foci	CNM Surveil- lance Unit				x	x	x	x	x	x	x	x	x	x
Strategy 4.6 Strengthen management and usage of data at all health levels														
4.6.1 Train surveillance officers at the central and peripheral level on data collection, reporting, analysis and data validation	CNM Epidemiology and Surveil- lance Units	WHO		x			x				x			
4.6.2 Establish access to central MIS for PHD/OD staff	CNM Epidemiology and Surveil- lance Units	PHDs, ODs	x	x	x	x	x	x	x	x	x	x	x	x
4.6.3 Establish feedback mechanisms on surveillance data for all health levels	CNM Epidemiology and Surveil- lance Units		x	x	x	x	x	x	x	x	x	x	x	x
Strategy 4.7 Outbreak preparedness and response														
4.7.1 Develop guidelines for outbreak preparedness and response	CNM Epidemiology and Surveil- lance Units	WHO, Surveillance Working Group	x											
4.7.2 Train all relevant staff on outbreak preparedness and response	CNM Epidemiology Unit													

OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPLE- MENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Strategy 4.7 Outbreak preparedness and response														
4.7.3 Investigate and take response in outbreak situation	CNM	Partners	x											
4.7.4 Develop outbreak early warning system in areas targeted for burden reduction	CNM Epidemiology and Surveillance Units	Surveillance Working Group	x	x			x	x			x	x		
4.7.5 Establish flexible funding mechanism for outbreak response, including buffer stock of malaria commodities	CNM	WHO and Partners	x	x	x	x	x	x	x	x	x	x	x	x
Strategy 4.8 Strengthen program monitoring and evaluation														
4.8.1 Update Monitoring and Evaluation plan and revise as necessary	CNM M&E Unit	WHO							x					
4.8.2 Train all malaria-relevant staff on Monitoring and Evaluation	CNM M&E Unit	WHO	x				x				x			
4.8.3 Conduct Cambodia Malaria Survey (2016)	Contracted Partner	CNM				x								
4.8.4 Conduct Community Survey (2018, 2020)	CNM	Contracted partner									x	x	x	x
4.8.5 Conduct Mid-Term Review of Malaria Elimination Action Framework	CNM, WHO	Partners							x	x				
4.8.6 Conduct Malaria Program Review (2019)	CNM, WHO	Partners												
4.8.7 Conduct ACTwatch Outlet Survey	PSK						x	x	x					
4.8.8 Conduct MMP Survey	CNM													
Strategy 4.9 Strengthen Operational Research for malaria														
4.9.1 Review and endorse the Policies and Guidelines to Conduct Malaria Research in Cambodia	CNM Research Network		x											
4.9.2 Assign a CNM focal point to lead on the operational research agenda	CNM Research Network		x											
4.9.3 Train CNM staff on research methodologies across core thematic areas	CNM Research Network			x							x			
4.9.4 Conduct quarterly meeting of CNM Research Network to coordinate the research agenda in an elimination setting	CNM Research Network		x	x	x	x	x	x	x	x	x	x	x	x
Strategy 4.10 Monitor drug efficacy and test new drug regimens														
4.10.1 Conduct Therapeutic Efficacy Studies (TES) on ACTs recommended in NTGs at selected sentinel sites	CNM	WHO	x	x		x		x		x		x		x
4.10.2 Conduct therapeutic studies on artesunate and piperaquine	CNM	WHO			x	x			x	x			x	x

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OBJECTIVE/STRATEGY/ACTIVITY	PRIMARY IMPL-EMENTER	SUPPORT PARTNERS	2016				2017				2018			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Objective 5: Implement comprehensive IEC/BCC approach														
Strategy 5.1 Improve quality and delivery of IEC/BCC messages for malaria elimination														
5.1.1 Review and update current national IEC/BCC strategy to align with the national elimination strategy	CNM Health Education Unit	IEC/BCC Working Group	x	x			x	x			x	x		
5.1.2 Print/disseminate malaria IEC/BCC messages for different CNM programs and partners as per the operations manual	CNM Health Education Unit		x	x	x	x	x	x	x	x	x	x	x	x
5.1.3 Train PHD/OD health staff on IEC/BCC guidelines	CNM Health Education Unit		x	x	x	x	x	x	x	x	x	x	x	x
5.1.4 Deliver health education using VMWs/MMWs/PMWs and other methods of mass media as per national IEC/BCC strategy	VMWs	CNM VMWs and Health Education Units	x	x	x	x	x	x	x	x	x	x	x	x
5.1.5 Coordinate with partners on IEC/BCC activities	CNM Health Education Unit	Partners	x				x				x			
5.1.6 Conduct KAPB survey	CNM Health Education Unit	IEC/BCC Working Group, Contract Partner									x			
5.1.7 Monitoring and supervision of IEC/BCC activities in selected ODs (government and partner implementation) to identify barriers, challenges and discuss potential solutions	CNM Health Education Unit	Partners, PHDs, ODs	x	x	x	x	x	x	x	x	x	x	x	x
Strategy 5.2 Strengthen community mobilization for increased uptake of malaria interventions														
5.2.1 Build community networks and organize sensitization workshops in selected villages for community mobilization	CNM Health Education Unit, HCs, VMWs	Village stakeholders		x	x			x	x			x	x	
5.2.2 Evaluate the current/future pilot projects on improving the quality and delivery of malaria education to general population, and/or focused on MMPs, and include them in IEC/BCC strategy if found effective	CNM Health Education and Technical Bureau Units	Partners	x				x				x			
5.2.3 Utilize the community mobilization approach to improve awareness about malaria risk, prevention and diagnosis and treatment among MMPs	CNM Health Education and VMW units		x	x	x	x	x	x	x	x	x	x	x	x

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## 5.1 STRATIFICATION

At present, the strata have been identified utilizing quantitative characteristics of malaria transmission. The primary value for categorizing the strata is malaria incidence, specifically incidence of *P. falciparum* and mixed infections in 2014 as reported by public health facilities, VMWs, and private sector facilities. This is compared against a province level map indicating where there is evidence of multidrug resistance measured through sentinel site surveillance and previously designated as Tier 1 areas. With the lack of available data on mobile/migrant populations, historical incidence data was analyzed to determine the stability of transmission in ODs bordering high malaria burden areas.

**Evidence of Drug Resistance (via TES)**

- Above 10
- Between 1 - 10
- Under 1

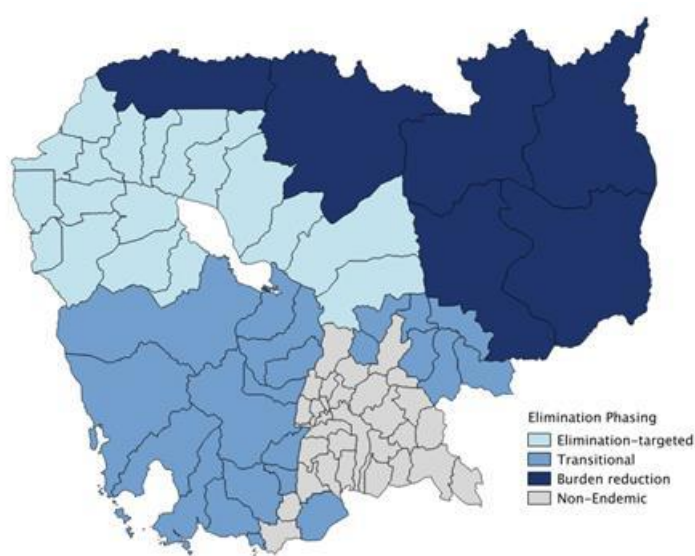
**Incidence per 1000 pop.**

Map showing the incidence of drug resistance in *Salmonella enterica* serovar Enteritidis (S. Enteritidis) by region in 2010. The map is color-coded and pattern-coded to show three levels of evidence of drug resistance: Above 10 (dark red), Between 1 - 10 (orange with diagonal lines), and Under 1 (light green). Numerical values for incidence per 1000 population are provided for each region.

Combining these defined characteristics above, specific ODs were placed into four strata for operationalization and targeting of the strategy:

- **Elimination-targeted ODs:** cluster of ODs with API under 1 per 1000 population including neighboring ODs with API at the lower threshold of 1-10 per 1000 population chosen because of operational feasibility due to them being part of the same province, low absolute number of infections, and/or their multidrug resistance status. The ODs bordering high burden areas were assessed for their stability of malaria transmission.
- **Transitional ODs:** cluster of ODs with average API higher than the elimination-targeted ODs, with available evidence of multidrug resistance. These are positioned for elimination targeting in the subsequent year.
- **Burden Reduction ODs:** API over 10 per 1000 population, regardless of evidence of multidrug resistance
- **Malaria Free ODs:** Historically considered to be without local transmission

Figure 14. 2016 Operational Stratification



## 5.2 Phasing

Under this action framework, elimination activities will be brought to national scale as transitional areas and higher burden areas reduce their burden to make it operationally feasible to follow-up with cases, investigate focal areas, and develop a targeted response. In the first malaria elimination phase in 2016, the elimination activities will be concentrated in 18 ODs in the northwest of the country, where surveillance activities will be intensified to guide a targeted response to interrupt transmission. In this elimination-targeted stratum, all confirmed cases reported at the health facility, VMW, and PPM network level will be subject to an epidemiological investigation. All cases will be classified to identify the likely source and reason for infection. Case investigation, along with reactive case detection and foci investigation, will inform the response to each specific foci.

In the transitional and burden reduction stratum, where there are still many cases of malaria and it is not possible to investigate each malaria case individually (above 10 malaria infections per 1000 population at risk per year), efforts will be made to aggressively scale up and improve the quality of preventative interventions, as well as access to diagnosis and treatment.

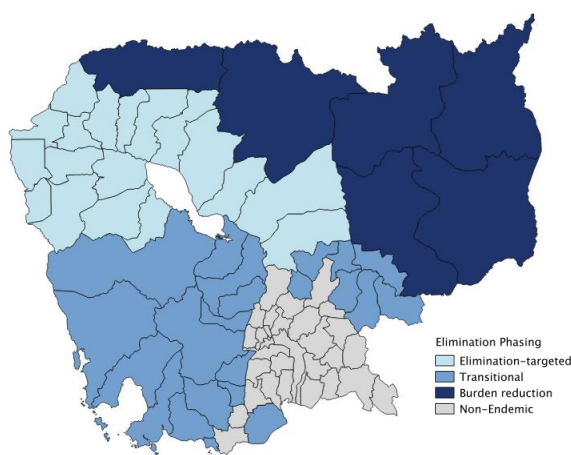
In Phase 2 in 2017, the elimination-targeted area will then include the 21 ODs currently in the Transitional stratum, while three of the ODs in the Burden Reduction strata will move into the stage, leaving 3 remaining ODs still in this stratum. In Phase 3 in 2018, the elimination-targeted area will then cover 44 of the ODs currently considered endemic, with the highest 3 ODs shifting to the transitional stage. By 2019, the entire country will be targeted for elimination. See Table 4 describing this phased continuum. Based on available surveillance information and changes in the epidemiological context, this phased approach may be updated in the future.

The revision of surveillance system and other approaches to address the new elimination challenges will be initiated before areas enter into the elimination phase. As the parasite reservoir decreased and became possible to track every case, it is rational to phase in/initiate case and foci-based surveillance and other relevant elimination activities. The transition of ODs from Burden Reduction to Elimination-targeted requires changes of responsibilities according to the revised job definitions of program personnel, revising surveillance and information systems including relevant practical guidelines, reorienting cross-border collaboration with neighboring countries, strengthening inter-sectoral cooperation and adapting monitoring and evaluation procedures to malaria elimination. The unique intervention strategies by stratum are presented in Table 4.



Table 4: Phased Approach to Elimination in Cambodia

### Phase 1 - 2016



#### Elimination-targeted

Number of ODs Included: 18  
Estimated 2014 Population: 3,981,313  
2014 Pf + Mixed Infections: 5,083

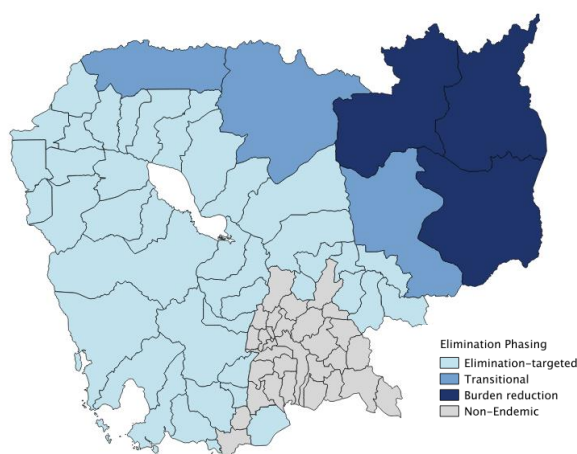
#### Transitional

Number of ODs Included: 21  
Estimated Population: 3,900,711  
2014 Pf/mixed infections: 7,853

#### Burden Reduction

Number of ODs Included: 6  
Estimated Population: 1,071,112  
2014 Pf/mixed infections: 23,956

### Phase 2 - 2017



#### Elimination-targeted

Number of ODs Included: 39  
Estimated Population: 7,887,024

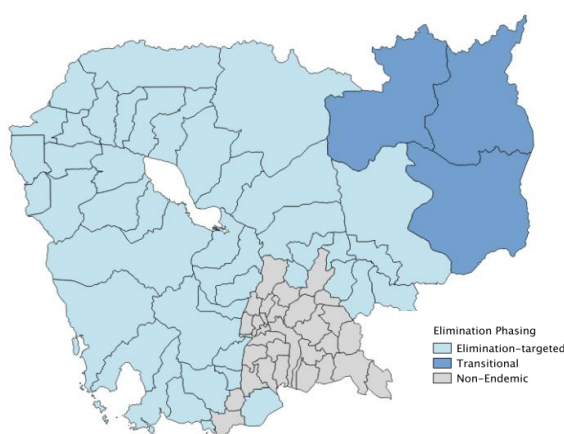
#### Transitional

Number of ODs Included: 3  
Estimated Population: 673,163

#### Burden Reduction

Number of ODs Included: 3  
Estimated Population: 397,949

### Phase 3 - 2018



#### Elimination-targeted

Number of ODs Included: 42  
Estimated Population: 8,555,187

#### Transitional

Number of ODs Included: 3  
Estimated Population: 397,949

Table 5: Intervention Strategies by Strata

Operational Strata	Objective 2 (Diagnosis and Treatment)	Objective 3 (Vector Control)	Objective 4 (Surveillance)	Objective 5 (IEC/BCC)
<b>Elimination Districts</b>	<ul style="list-style-type: none"> <li>• Quality services through public health facilities, VMWs, and PPM providers</li> <li>• Quality assured diagnosis with RDT and microscopy</li> <li>• Treatment with effective ACT + primaquine</li> <li>• Training and supervision of all healthcare staff</li> <li>• Ban on all unlicensed private providers</li> <li>• Treatment follow-up to ensure cure</li> </ul>	<ul style="list-style-type: none"> <li>• Mass and continuous LLIN distribution in transmission hotspots</li> <li>• IRS in identified foci where appropriate</li> <li>• Environmental management of vector breeding sites</li> <li>• Entomological surveillance</li> </ul>	<ul style="list-style-type: none"> <li>• Immediate case-based reporting via cell phone from HCs, VMWs and PPs</li> <li>• Case investigation and immediate reporting via tablets at HCs</li> <li>• Reactive case detection around confirmed cases in transmission areas</li> <li>• Foci investigation and response</li> <li>• Continual analysis to identify and mitigate drivers of transmission</li> <li>• All data entered and managed in MIS</li> </ul>	<ul style="list-style-type: none"> <li>• Health education via VMWs</li> <li>• Community mobilization</li> </ul>
<b>Transitional Districts</b>	<ul style="list-style-type: none"> <li>• Quality services through public health facilities</li> <li>• Extension of VMW and PPM providers in remaining hotspots</li> <li>• Quality assured diagnosis with RDT and microscopy</li> <li>• Treatment with effective ACT + primaquine</li> <li>• Training and supervision of all healthcare staff</li> <li>• Ban on all unlicensed private providers</li> <li>• Therapeutic efficacy studies</li> </ul>	<ul style="list-style-type: none"> <li>• Mass and continuous LLIN distribution in transmission hotspots</li> <li>• Environmental management of vector breeding sites</li> <li>• Entomological surveillance</li> </ul>	<ul style="list-style-type: none"> <li>• Case-based reporting via tablets at HCs on monthly basis</li> <li>• Proactive case detection</li> <li>• All data entered and managed in MIS</li> <li>• Outbreak preparedness and response</li> </ul>	<ul style="list-style-type: none"> <li>• Health education via VMWs</li> <li>• Community mobilization</li> <li>• MMP focused health education campaigns</li> </ul>
<b>Burden Reduction Districts</b>	<ul style="list-style-type: none"> <li>• Quality services through public health facilities</li> <li>• Extension of VMWs to all villages</li> <li>• Extension of PPM to all remaining hotspots</li> <li>• Quality assured diagnosis with RDT and microscopy</li> <li>• Treatment with effective ACT + primaquine</li> <li>• Training and supervision of all healthcare staff</li> <li>• Therapeutic efficacy studies</li> </ul>	<ul style="list-style-type: none"> <li>• Mass LLIN distribution to all at-risk populations</li> <li>• Continuous LLIN distribution</li> <li>• Environmental management of vector breeding sites</li> <li>• Entomological surveillance</li> </ul>	<ul style="list-style-type: none"> <li>• Case-based reporting via tablets at HCs on monthly basis</li> <li>• Proactive case detection</li> <li>• All data entered and managed in MIS</li> <li>• Outbreak preparedness and response</li> </ul>	<ul style="list-style-type: none"> <li>• Health education via VMWs</li> <li>• Community mobilization</li> <li>• MMP focused health education campaigns</li> </ul>



## 6 Monitoring and Evaluation

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To ensure continual progress toward the malaria elimination goal, strategies, the implementation of all intervention areas must be regularly monitored and critically evaluated. The purpose of the monitoring and evaluation system is to track the execution of the MEAF (2016-2020), measure whether the set objectives are being met according to the proposed timelines, and enable the effective oversight of the malaria program. Monitoring the framework's objectives on a routine basis will allow CNM to identify which activities are successfully implemented and which require additional support (financial or technical). By allowing managers and implementers to understand the impact, outcomes and outputs of the implemented interventions, the M&E system promotes evidence-based decision-making. Through proper interpretation of the collected data, corrective action can be taken to improve ineffective practices, and best practices can be implemented across multiple intervention areas. The M&E component of the MEAF (2016-2020) will be the joint responsibility of CNM and the implementing partners.

Several indicators have been identified to monitor the impact, outcomes and coverage of the national strategy. The table below shows the indicator framework from the Monitoring and Evaluation Plan (2016-2020) by which the implementation of the MEAF (2016-2020) will be assessed. It outlines the key indicators to monitor and evaluate the progress on specific objectives in MEAF (2016-2020).

Reporting under the M&E plan will be the joint responsibility of CNM and implementing partners. The main source of data for indicators will be routine data collection systems, real-time case-based and entomological surveillance systems to be managed under the Health Information System (HIS) upgraded MIS (2016 onward), the Cambodia Malaria Survey (CMS, 2016) and community surveys (2018 and 2020). A Mid-Term Evaluation of the Strategic Plan will be conducted in 2018 and a MPR will be conducted in 2020.

Key data from the implementing partners for indicators in the M&E plan will be collected through the MIS which would be linked with surveillance system of implementing partners. Based on the indicator, data collection and reporting will occur on a daily, monthly, quarterly, and annual basis. Targets for the indicator framework in the M&E Plan are set on an annual basis and are not cumulative. The M&E Indicator Framework for the MEAF (2016-2020) is described in Table 6.

## Cambodia Malaria Elimination Action Framework - Key Indicators For Monitoring And Evaluation

Impact Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>GOAL: Reduce the incidence of malaria to less than 1 infection per 1000 people at risk in each operational district and eliminate Plasmodium falciparum including multidrug resistance by 2020</b>					
Number of confirmed malaria cases per 1,000 per mid-year population, reported across sectors (Health Facilities, VMWs, PPMs and Military)	4.78 (2014)	1.5	HMIS, MIS	Monthly	CNM Epidemiology/Data Management Unit
Number of confirmed P. falciparum and mixed infections malaria cases per 1,000 per mid-year population, reported across sectors (Health Facilities, VMWs, PPMs and Military)	2.50 (2014)	1.6 (2017) 0 (2020)	HMIS, MIS	Monthly	CNM Epidemiology/Data Management Unit
Number of confirmed severe malaria cases per 1,000 per mid-year population	0.099 (2014)	0.040	HMIS, MIS	Monthly	CNM Epidemiology/Data Management Unit
Number of deaths due to confirmed malaria per 100,000 mid-year population	0.001 (2014)	0	HMIS, MIS	Monthly	CNM Epidemiology/Data Management Unit
Number of parasitological tests carried out per 100 persons	2.4% in whole country; 6.1% in endemic ODs (2014)	10% in endemic ODs	HMIS, MIS	Monthly	CNM Epidemiology/Data Management Unit
Percentage of falciparum and mixed malaria cases among all parasitologically confirmed malaria cases	46% (2013)	0%	HMIS, MIS	Monthly	CNM Epidemiology/Data Management Unit
Percentage of local cases by classification	Not available	0% indigenous Pf cases by 2020. 0% indigenous Pv cases by 2025	HMIS, MIS (to be captured in the future)	Monthly	CNM Epidemiology/Data Management Unit
Percentage of ODs out of the 47 endemic ODs that have reached the API (falciparum + mixed; health facilities, VMWs and PPM) threshold (<1/1000) for entering the elimination phase	38% (18/47) (2014)	100% (47/47)	HMIS, MIS	Annually	CNM Epidemiology/Data Management Unit
Percentage of ODs out of the 47 endemic ODs in 2015 that have no malaria transmission (zero locally acquired falciparum + mixed cases)	Not available	100% (47/47)	HMIS, MIS (to be captured in the future)	Annually	CNM Epidemiology/Data Management Unit

Table 6: Monitoring and Evaluation Indicator Framework (2016-2020)

Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>1</b> <b>OBJECTIVE 1:</b> Providing effective program management and coordination at all levels by 2017 to efficiently deliver a combination of targeted interventions for malaria elimination					
<b>Percentage of health facilities with no stock-out of RDTs lasting more than 1 week at any time during the past 3 months.</b> [This indicator will be disaggregated according to type of health facility and also according to whether the health facilities are in control or elimination ODs]	100% (264/264) (Q2 2015)	100%	PUDR reports for GFATM PR	Quarterly	CNM Procurement Unit
<b>Percentage of health facilities with no stock-out of first-line antimalarials lasting more than 1 week at any time during the past 3 months.</b> [This indicator will be disaggregated according to type of health facility and also according to whether the health facilities are in control or elimination ODs]	100% (264/264) (Q2 2015)	100%	PUDR reports for GFATM PR	Quarterly	CNM Procurement Unit
<b>2</b> <b>OBJECTIVE 2:</b> Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases					
<b>Percentage of successful parasitological tests for malaria that are positive (includes both microscopy and rapid diagnostic tests).</b>	19.9% (2014)	5%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of malaria cases treated in the public sector that are confirmed by a parasitological diagnosis.</b>	96% (2014)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of malaria cases treated at community level that are confirmed by a parasitological diagnosis.</b>	100% (2014)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of malaria cases treated in the private sector that are confirmed by a parasitological diagnosis.</b>	100% (2014)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of designated microscopy points participating in QA/QC management system (all positive slides and 10% of negative slides sent for retesting and the blind proficiency test completed each year).</b>	Not available	100%	TBD	TBD	CNM Microscopy QA/QC Team

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Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>2 OBJECTIVE 2:</b> Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases					
Percentage of microscopists achieving both sensitivity and specificity greater than 90% during blind proficiency tests.	Not available	100%	Microscopy QA database (to be developed)	TBD	CNM Microscopy QA/QC Team
Percentage of malaria product samples tested that met international or equivalent national QC standards.	100% (11/11) (2014)	100%	DDF	Quarterly	DDF
Percentage of sampled antimalarials that are unregistered, fake, substandard or degraded (disaggregated by sector - public/private).	All - 0% (0/86) Private - 0% (0/73) HFs - 0% (0/13) (Q1+Q2, 2015)	0%	DDF	Quarterly	DDF
Percentage of anti-malarial drug lots/batches which failed quality control tests that were removed from sale in the ODs where they were detected (in target provinces).	Not applicable (no failed batch in Jan-Jun 2015)	100%	DDF	Quarterly	DDF
Percentage of private sector outlets in endemic provinces not selling artemisinin monotherapy.	99.4% (2013)	100%	ACT Watch Survey	Every 2 years	ACT Watch
Percentage of private practitioners with adequate case management practices and supply of quality-assured diagnostics and medicines.	Not available	90%	MIS (to be captured in the future)	Annually	CNM PPM/Data Management Unit
Percentage of target villages with VMW.	63% (2014)	100% (by 2018)	VMW Database	Annually	CNM VMW/Data Management Unit
Percentage of VMWs with adequate case management practices and supply of quality-assured diagnostics and medicines.	Not available	90%	VMW Database (to be captured in the future)	Annually	CNM VMW/Data Management Unit
Percentage of people from the mobile population with fever in the last 3 months that accessed parasite-based diagnosis [disaggregated by category of mobile/migrant person]	Not available	TBD	MMP Survey (to be conducted in future)	Every 2 years	CNM/Implementing agency
Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy at public sector health facilities	100% (21,309/21,309) (2013)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit

Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>2 OBJECTIVE 2:</b> Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases					
Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy in the community	100% (20,611/20,611) (2013)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy from private providers	99% (15,775/15,894) (2013)	100%	MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>3 OBJECTIVE 3:</b> 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 (risk categories 1-3) who slept under an insecticide-treated net (ITN) during the previous night. [Where an ITN is an LLIN/LLIHN/insecticide treated conventional bednet]	59.9% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of children under 5 years old living in target villages (risk categories 1-3) who slept under an ITN during the previous night.	63.3% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of pregnant women living in target villages (risk categories 1-3) who slept under an ITN during the previous night	61.5% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of forest visitors in targeted villages (risk categories 1-3) who reported sleeping under an insecticide-treated net the last time they slept in the forest.	48.5% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of travelling population in targeted areas (risk categories 1-4) who slept under an ITN the last time they slept in a transmission area. [Travellers: People who travel and sleep away from the home during the past 6 months]	31.8 (2013)	80%	CMS	Every 3 years	CNM/ Implementing agency

Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>1</b> <b>OBJECTIVE 1:</b> Providing effective program management and coordination at all levels by 2017 to efficiently deliver a combination of targeted interventions for malaria elimination					
<b>Percentage of health facilities with no stock-out of RDTs lasting more than 1 week at any time during the past 3 months.</b> [This indicator will be disaggregated according to type of health facility and also according to whether the health facilities are in control or elimination ODs]	100% (264/264) (Q2 2015)	100%	PUDR reports for GFATM PR	Quarterly	CNM Procurement Unit
<b>Percentage of health facilities with no stock-out of first-line antimalarials lasting more than 1 week at any time during the past 3 months.</b> [This indicator will be disaggregated according to type of health facility and also according to whether the health facilities are in control or elimination ODs]	100% (264/264) (Q2 2015)	100%	PUDR reports for GFATM PR	Quarterly	CNM Procurement Unit
<b>2</b> <b>OBJECTIVE 2:</b> Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases					
<b>Percentage of successful parasitological tests for malaria that are positive (includes both microscopy and rapid diagnostic tests).</b>	19.9% (2014)	5%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of malaria cases treated in the public sector that are confirmed by a parasitological diagnosis.</b>	96% (2014)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of malaria cases treated at community level that are confirmed by a parasitological diagnosis.</b>	100% (2014)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of malaria cases treated in the private sector that are confirmed by a parasitological diagnosis.</b>	100% (2014)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>Percentage of designated microscopy points participating in QA/QC management system (all positive slides and 10% of negative slides sent for retesting and the blind proficiency test completed each year).</b>	Not available	100%	TBD	TBD	CNM Microscopy QA/QC Team

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Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>2 OBJECTIVE 2:</b> Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases					
Percentage of microscopists achieving both sensitivity and specificity greater than 90% during blind proficiency tests.	Not available	100%	Microscopy QA database (to be developed)	TBD	CNM Microscopy QA/QC Team
Percentage of malaria product samples tested that met international or equivalent national QC standards.	100% (11/11) (2014)	100%	DDF	Quarterly	DDF
Percentage of sampled antimalarials that are unregistered, fake, substandard or degraded (disaggregated by sector - public/private).	All - 0% (0/86) Private - 0% (0/73) HFs - 0% (0/13) (Q1+Q2, 2015)	0%	DDF	Quarterly	DDF
Percentage of anti-malarial drug lots/batches which failed quality control tests that were removed from sale in the ODs where they were detected (in target provinces).	Not applicable (no failed batch in Jan-Jun 2015)	100%	DDF	Quarterly	DDF
Percentage of private sector outlets in endemic provinces not selling artemisinin monotherapy.	99.4% (2013)	100%	ACT Watch Survey	Every 2 years	ACT Watch
Percentage of private practitioners with adequate case management practices and supply of quality-assured diagnostics and medicines.	Not available	90%	MIS (to be captured in the future)	Annually	CNM PPM/Data Management Unit
Percentage of target villages with VMW.	63% (2014)	100% (by 2018)	VMW Database	Annually	CNM VMW/Data Management Unit
Percentage of VMWs with adequate case management practices and supply of quality-assured diagnostics and medicines.	Not available	90%	VMW Database (to be captured in the future)	Annually	CNM VMW/Data Management Unit
Percentage of people from the mobile population with fever in the last 3 months that accessed parasite-based diagnosis [disaggregated by category of mobile/migrant person]	Not available	TBD	MMP Survey (to be conducted in future)	Every 2 years	CNM/Implementing agency
Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy at public sector health facilities	100% (21,309/21,309) (2013)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit



Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>2</b> <b>OBJECTIVE 2:</b> Achieve universal coverage of case management services by 2016 to ensure 100% parasitological diagnosis of all suspected cases and effective treatment of all confirmed cases					
Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy in the community	100% (20,611/20,611) (2013)	100%	HMIS/MIS	Monthly	CNM Epidemiology/Data Management Unit
Percentage of confirmed malaria cases that received first-line antimalarial treatment according to national policy from private providers	99% (15,775/15,894) (2013)	100%	MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>3</b> <b>OBJECTIVE 3:</b> 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 (risk categories 1-3) who slept under an insecticide-treated net (ITN) during the previous night. [Where an ITN is an LLIN/LLIHN/insecticide treated conventional bednet]	59.9% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of children under 5 years old living in target villages (risk categories 1-3) who slept under an ITN during the previous night.	63.3% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of pregnant women living in target villages (risk categories 1-3) who slept under an ITN during the previous night	61.5% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of forest visitors in targeted villages (risk categories 1-3) who reported sleeping under an insecticide-treated net the last time they slept in the forest.	48.5% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of travelling population in targeted areas (risk categories 1-4) who slept under an ITN the last time they slept in a transmission area. [Travellers: People who travel and sleep away from the home during the past 6 months]	31.8 (2013)	80%	CMS	Every 3 years	CNM/ Implementing agency

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Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>3 OBJECTIVE 3:</b> Protect at least 90% of all populations at risk of malaria with an appropriate vector control intervention by 2017					
Percentage of population living in target, at-risk areas potentially covered by the long-lasting insecticidal nets (LLINs) distributed in last three years	>90% (2015)	98%	MIS	Annually	CNM/ Implementing agency
Percentage of households in target areas with at least one ITN and/or covered by indoor residual spraying (IRS) in the last 12 months.	51.9% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of households in targeted, at-risk villages (risk categories 1-4) with at least one ITN	77.8% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of households in targeted, at-risk villages (risk categories 1-4) with at least one ITN for every two or less number of people	53.5% (2013)	80%	CMS	Every 3 years	CNM/ Implementing agency
<b>4 OBJECTIVE 4:</b> Enhance the surveillance system to detect, immediately notify, investigate, classify and respond to all cases and foci by 2017 to move toward malaria elimination					
Percentage of targeted Health Facilities submitting timely MIS reports according to national guidelines	100% in 2013 (reported through ODs)	100%	MIS	Monthly	CNM Data Management Unit
Percentage of VMW reports submitted timely into MIS during reporting period according to national guidelines	>90% (2014)	100%	MIS	Monthly	CNM Data Management Unit
Percentage of PPs reporting PPM data timely into MIS according to national guidelines	Not available	100%	MIS	Monthly	CNM Data Management Unit
Percentage of confirmed malaria cases detected by all healthcare providers in target ODs notified through real-time.	Not available	100%	MIS	Monthly	CNM Data Management Unit
Percentage of confirmed falciparum and mixed cases in elimination ODs investigated at health facilities at point of care or at household level (if detected by VMWs and PPM) and classified	Not available	100%	MIS (to be captured in the future)	Monthly	CNM Data Management Unit

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Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>3 OBJECTIVE 3:</b> Protect at least 90% of all populations at risk of malaria with an appropriate vector control intervention by 2017					
Percentage of population living in target, at-risk areas potentially covered by the long-lasting insecticidal nets (LLINs) distributed in last three years	>90% (2015)	98%	MIS	Annually	CNM/ Implementing agency
Percentage of households in target areas with at least one ITN and/or covered by indoor residual spraying (IRS) in the last 12 months.	51.9% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of households in targeted, at-risk villages (risk categories 1-4) with at least one ITN	77.8% (2013)	90%	CMS	Every 3 years	CNM/ Implementing agency
Percentage of households in targeted, at-risk villages (risk categories 1-4) with at least one ITN for every two or less number of people	53.5% (2013)	80%	CMS	Every 3 years	CNM/ Implementing agency
<b>4 OBJECTIVE 4:</b> Enhance the surveillance system to detect, immediately notify, investigate, classify and respond to all cases and foci by 2017 to move toward malaria elimination					
Percentage of targeted Health Facilities submitting timely MIS reports according to national guidelines	100% in 2013 (reported through ODs)	100%	MIS	Monthly	CNM Data Management Unit
Percentage of VMW reports submitted timely into MIS during reporting period according to national guidelines	>90% (2014)	100%	MIS	Monthly	CNM Data Management Unit
Percentage of PPs reporting PPM data timely into MIS according to national guidelines	Not available	100%	MIS	Monthly	CNM Data Management Unit
Percentage of confirmed malaria cases detected by all healthcare providers in target ODs notified through real-time.	Not available	100%	MIS	Monthly	CNM Data Management Unit
Percentage of confirmed falciparum and mixed cases in elimination ODs investigated at health facilities at point of care or at household level (if detected by VMWs and PPM) and classified	Not available	100%	MIS (to be captured in the future)	Monthly	CNM Data Management Unit

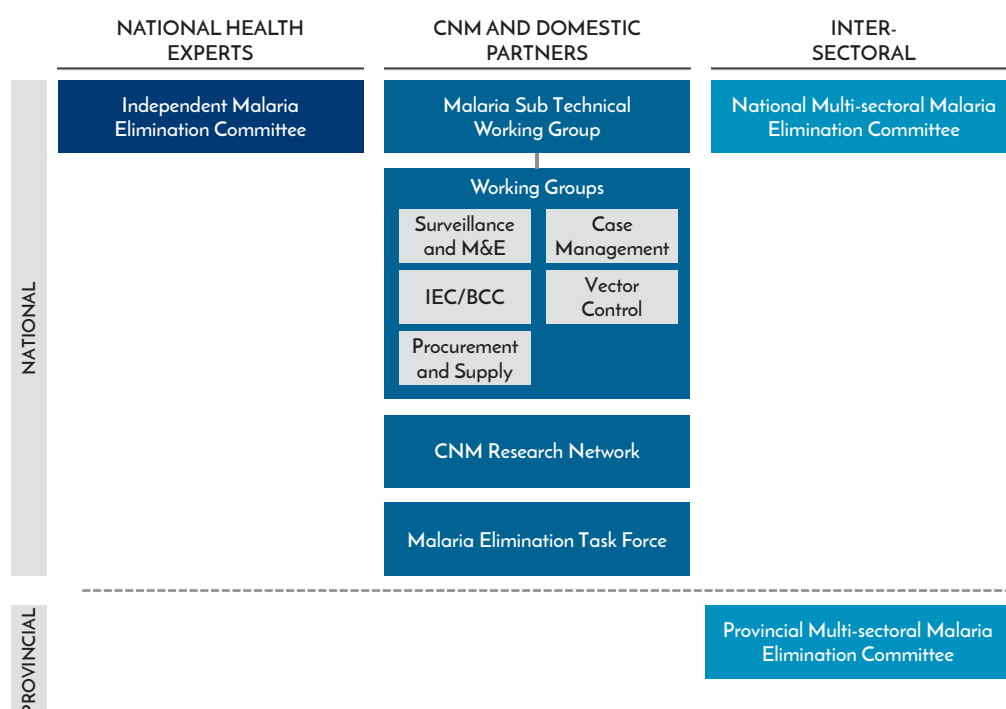
Outcome/Coverage Indicators	Baseline	2020 Target	Data Source	Frequency	Responsible
<b>4</b> <b>OBJECTIVE 4:</b> Enhance the surveillance system to detect, immediately notify, investigate, classify and respond to all cases and foci by 2017 to move toward malaria elimination					
Percentage of confirmed falciparum and mixed cases in elimination ODs suspected to be locally acquired, fully investigated onsite within 3 days of detection	Not available	100%	MIS	Monthly	CNM Epidemiology/Data Management Unit
Percentage of foci fully investigated and registered within 7 days of detection (including malaria focus investigation form, entomological investigation form and focus geo-referencing and mapping).	Not available	100%	MIS	Monthly	CNM Epidemiology/Data Management Unit
Percentage of confirmed active foci investigated in which an appropriate response was initiated within 7 days of detection.	Not available	100%	MIS	Monthly	CNM Epidemiology/Data Management Unit
<b>5</b> <b>OBJECTIVE 4:</b> Implementing comprehensive IEC/BCC approach that facilitates at least 90% of people seeking treatment for fever within 24 hours at a health facility or with a qualified care provider and at least 85% of at-risk population utilizing an appropriate protection tool by 2017					
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]	41.80% (2013)	75%	CMS	Every 3 years	CNM/ Implementing agency

## 7 COORDINATION MECHANISMS

The MEAF (2016-2020) is planned to be implemented jointly by CNM and all implementing partners with necessary support from MOH, donors and other important stakeholders. While each implementing partner may have separate or same funding sources, it is strongly recommended and expected that their partners will align their malaria programs with the national strategy and fill any gaps in collaboration with national program where necessary. CNM will play the leading role in the coordination of activities essential for malaria elimination with the partners. CNM will also work with other ministries and health departments under MoH to ensure a multi-sectoral effort is in place to achieve malaria elimination in Cambodia in next decade. New structures for collaboration with international experts will be formed to regularly review the progress on malaria elimination.

CNM will revise the terms of reference for the existing Malaria Sub-technical Working Group (SWTG) to align with the objectives of and drive forward the strategies of malaria elimination. The malaria STWG chaired by CNM will hold bi-monthly meetings with implementing and other partners to share and evaluate program results, facilitate technical discussions, discuss matters related to policy-making and ensure activities are coordinated. The meetings will be convened as needed for different thematic areas including case management, surveillance, IEC/BCC, vector control, and procurement and supply management. All the domestic partners with a stake in malaria elimination will be asked to be part of the relevant working group. CNM will also establish a National Malaria Elimination Task Force comprising of partners providing strategic and technical support to the national program on day-to-day basis for oversight of implementation, facilitate communication with external stakeholders, help resolve any bottlenecks needing quick action and participate in discussion-making on regular basis. All malaria research projects in Cambodia will be approved and overseen by the recently incorporated CNM Research Network (CNMRN). Research protocols and evidence generated from the research will be reviewed by the steering committee of CNMRN to ensure that the objectives of the proposed research are aligned with the national strategy and results are used in policy-making.

Figure 15. Coordination Structures to be implemented for malaria elimination



To obtain strategic support and gain further political will on malaria elimination from senior leadership in other ministries and departments, CNM will organize bi-annual meetings of National Multi-sectoral Malaria Elimination Committee. Meetings under this committee will offer the platform to develop multi-sectoral partnerships with other health and non-health ministries and government departments including ministries of finance, agriculture, environment, defense, DDF, CMS, etc. A similar mechanism for inter-sectoral partnerships, currently existing, will be continued to be implemented at provincial levels through quarterly meetings. The major focus of these coordination mechanisms at these levels is on planning, resource mobilization and ensuring high coverage of malaria services and surveillance across sectors.

The implementation of this plan and monitoring of the overall goal of elimination will require the establishment of an Independent National Malaria Elimination Committee comprised of international malaria experts and Cambodian health specialists who are not involved in the national malaria response, but who can participate in a bi-annual review of program progress and are able to provide recommendations as necessary. This independent committee will issue reports on progress that will be utilized to inform program implementation and provide evidence for the elimination certification evaluation process.

Figure 16. Composition of Different Malaria Coordination Committees and Task Forces

	ORGANIZING BODIES	CNM	OTHER GOV. MINISTRIES/ DEPARTMENTS	PARTNERS	FREQ- UENCY	MANDATE
NATIONAL	Independent Malaria Elimination Committee		-	National health experts	Bi-annual	Evaluate elimination progress
	Malaria Sub-Technical Working Group (will have thematic area-specific working groups: Surveillance, Case Management, IEC/BCC, Vector Control, Procurement and Supply)	<ul style="list-style-type: none"> <li>• Director</li> <li>• Deputy Directors</li> <li>• Technical Bureau Chief</li> <li>• Technical Unit Heads</li> </ul>	<ul style="list-style-type: none"> <li>• DDF</li> <li>• CMS</li> <li>• Defense</li> <li>• Police</li> </ul>	Domestic Partners	Bi-monthly	Program results, technical discussions, policy-making and partner coordination
	Malaria Elimination Task Force	<ul style="list-style-type: none"> <li>• Deputy Directors</li> <li>• Technical Bureau Chief</li> <li>• Technical Unit Heads</li> <li>• Functional Unit Heads</li> </ul>	-	Partners providing strategic and technical support to CNM on day-to-day basis	Monthly/ Ad hoc	Strategic and operational planning; facilitation and guidance for quick action and problem solving,
	CNM Research Network	<ul style="list-style-type: none"> <li>• CNM appointed Steering Committee</li> </ul>		Selected by CNM	Bi-monthly	Coordinate with partners for elimination-oriented research and use research evidence for policy making
	National Multi-sectoral Malaria Elimination Committee	<ul style="list-style-type: none"> <li>• Director,</li> <li>• Deputy Directors,</li> <li>• Technical Bureau Chief</li> </ul>	Senior-level participation from: <ul style="list-style-type: none"> <li>• Finance</li> <li>• Health</li> <li>• Agriculture</li> <li>• Environment</li> <li>• Military/Police</li> <li>• DDF</li> <li>• CMS</li> </ul>	-	Bi-annual	Law and policy making at the national level
PROVINCIAL	Provincial Multi-sectoral Malaria Elimination Task Force	<ul style="list-style-type: none"> <li>• Provincial and OD Malaria Supervisor</li> </ul>	<ul style="list-style-type: none"> <li>• Governor's office, Health, Agriculture, Environment, Military/Police, etc.</li> </ul>	-	Quarterly	Law enforcement at the provincial level



# 8 Budget and Financial Plan

## 8.1 Costing Methodology

An activity-based costing approach was carried out to provide a robust estimate of the resources required to achieve elimination utilizing the Malaria Elimination Action Framework. A costing methodology was implemented to identify the resources required to implement each strategy down to the sub-activity level, standardize unit cost inputs and adjust for inflation over the course of the MEAF, and determine the quantity required 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.

## 8.2 Estimated Budget

The estimated cost of the MEAF over the next five years is approximately \$141,350,000. The largest component of the budget is Objective 3 (Vector Control), which accounts for an estimated 35% (\$49.6MM) of the budget. The majority of the costs for Objective 3 are LLIN commodity costs (Strategy 3.2 Distribution of long lasting insecticide-treated Nets (LLINs) and hammock nets (LLIHNS) to all populations at risk) which account for \$47.1MM.

The second largest estimated cost is for Objective 4 (Surveillance), which accounts for 28% (\$39.8MM) of the total budget. The 3 highest spend strategies are:

- Strategy 4.2- Strengthen and build capacity to implement the surveillance system for malaria elimination : \$10.9 MM
- Strategy 4.4- Strengthen case detection, investigation and reporting system for all malaria infections- \$16.6MM

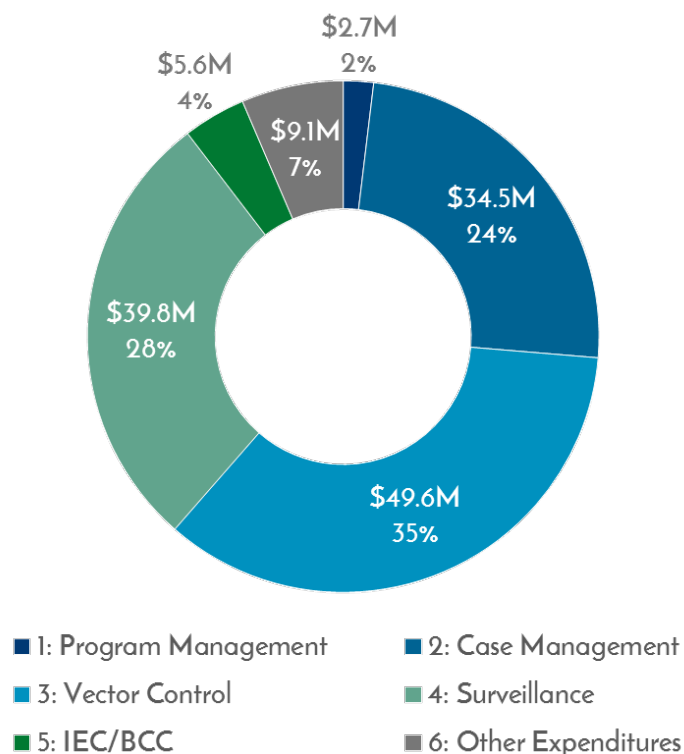
Objective 2 (Case management) accounts for ~24% (\$34.5MM) of the total budget spend. The spend within this objective is spread out fairly evenly across all strategies:

- Strategy 2.1. To strengthen the parasitological detection of malaria infections - \$5.5MM
- Strategy 2.2. To ensure prompt efficacious treatment of all confirmed uncomplicated and severe malaria cases including low doses Primaquine for reducing the transmissibility of Pf and radical cure for Pv - \$5.2MM
- Strategy 2.3: Increase availability of quality case management services among licensed private sector providers - \$6.0MM
- Strategy 2.4 Village malaria worker in every village in malaria at risk areas - \$9.4MM
- Strategy 2.5: Strengthening the quality assurance and control systems for malaria diagnosis and antimalarial drugs - \$1.2MM
- Strategy 2.6: Utilize mass drug administration in targeted communities based on evidence and local context - \$7.3MM

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The remaining two objectives, Objective 5 (IEC BCC - \$6.0MM) and Objective 1 (Program Management - \$2.7MM) account for a combined \$8.3MM (5.9%). Other program expenditures are estimated at \$9.1MM (6.4%), mostly driven by Salaries and Incentives. The total estimated budget by objective is depicted in Figure 17.

Figure 17: Total Spend by Objective



Almost one third (29%) of costs are incurred in 2018 (\$40.6MM), driven by mass distribution of LLINs in that year, which accounted for \$47.1MM in total, \$22.5MM of which is incurred in 2018. The year 2015 only accounts for 3% (\$4.7MM) of total spend because the budget only contains information for activities implemented in Q4 of 2015. Normalizing spend by only examining annual budgets between 2016 to 2020 and by removing the costs of Mass Distribution of LLINs in 2018, the average spend per year would be ~\$24MM per year, or \$6MM per quarter.

With the exception of 2015 and the mass distribution of LLINs in 2018, costs for most objectives slightly increase between 2016 and 2018. The most significant increases occur in Objective 2 (Case Management) and Objective 5 (IEC/BCC), driven by the scale up of VMWs. Spending by year and objective is described in Table 7 below.

Table 7: Annual Spend by Year and Objective

	2015	2016	2017	2018	2019	2020	Total
1 Program Management	\$180,994	\$559,714	\$460,201	\$497,474	\$470,945	\$511,844	\$2,681,171
2 Case Management	\$1,922,488	\$5,657,743	\$5,659,956	\$7,103,231	\$7,330,561	\$7,206,013	\$34,879,992
3 Vector Control	\$86,811	\$6,293,800	\$6,376,088	\$22,925,913	\$6,833,263	\$7,116,453	\$49,632,328
4 Surveillance	\$1,193,669	\$6,891,409	\$8,389,181	\$7,397,525	\$8,841,642	\$7,124,424	\$39,837,851
5 IEC/BCC	\$130,032	\$915,876	\$936,263	\$1,173,891	\$1,204,994	\$1,233,938	\$5,594,994
6 Other Expenditures	\$1,225,219	\$1,480,582	\$1,574,140	\$1,577,547	\$1,600,393	\$1,624,380	\$9,082,261
<b>Total Spend</b>	<b>\$4,739,214</b>	<b>\$21,799,124</b>	<b>\$23,395,828</b>	<b>\$40,675,581</b>	<b>\$26,281,799</b>	<b>\$24,817,053</b>	<b>\$141,708,598</b>

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All activities were categorized by the most related intervention area. The greatest intervention cost is LLINs (\$47.1MM, 33.3%), which falls under Objective 3 (Vector Control), followed by Active Surveillance (\$15.5MM, 10.8%) under Objective 4, Capacity Building (\$11.3MM), primarily within Surveillance, and Diagnosis and Treatment through VMWs (\$11.2MM) which is split between Objective 2 (Case Management) and health education represented under Objective 5 (IEC/BCC). Costs by intervention for the entire MEAF are summarized in Table 8.

Table 8. Costs by Intervention, MEAF (2015-2020)

Intervention/Activity Area	Total (\$)	Total (%)
LLIN/LLIHNS	\$47,063,406	33.3%
Active Surveillance	\$15,311,959	10.8%
Capacity Building	\$11,300,322	8.0%
Diagnosis and Treatment through VMWs	\$11,160,368	7.9%
Diagnosis and Treatment through public HF Management	\$8,427,254	6.0%
Mass Drug Administration	\$7,262,774	5.1%
Diagnosis and Treatment through PPM	\$7,239,637	5.1%
Quality Control and Assurance	\$5,955,572	4.2%
Monitoring and Evaluation	\$5,623,348	4.0%
Passive Surveillance	\$4,761,789	3.4%
Community Mobilization	\$4,248,101	3.0%
IRS	\$2,731,282	1.9%
Mass Media	\$2,422,565	1.7%
Planning and Coordination	\$2,147,567	1.5%
Entomological Surveillance	\$1,742,447	1.2%
Outbreak Response	\$1,225,440	0.9%
Personal Protection Measures	\$1,174,582	0.8%
Foci Investigation and Response	\$737,852	0.5%
Environmental Management	\$550,735	0.4%
Diagnosis and Treatment through Military/Police	\$175,473	0.1%
Procurement and Supply Management	\$56,915	0.0%
Total	\$31,997	0.0%
	<b>\$141,351,385</b>	<b>100.0%</b>

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## 8.3 Resource Mobilization

### Financial Partners Mapping

The key sources of contributions to the MEAF over the next three years include: the Cambodian government, Global Fund – New Funding Model (GFNFM) grant, Global Fund – Regional Artemisinin Initiative (RAI) grant, 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 MEAF and new resources are allocated for implementation of the MEAF. As described under Strategy 1.5, annual meetings with financial partners will be coordinated by CNM to align resources to ensure impactful utilization of funding for malaria elimination

### Resource Mobilization

To successfully implement the MEAF, the Ministry of Health and CNM will continue to develop relationships with current financial partners, while exploring new potentially sources and mechanisms for sustainable resources necessary for malaria elimination. The CNM will increase dialogue with the Ministries of Finance and Parliament to understand how to increase domestic resources for malaria. Furthermore, the MOH and CNM will continue to emphasize the importance of ensuring transparency, accountability, and efficiency in resource disbursement to ensure effective collaboration with the Cambodian government and with financial partners.

# 9 ANNEX

## Annex 1. Process for MEAF Development

Dates/Time Periods	Timeline	
	Meeting/Consultation	Description
May 4 - 5	Second Country Consultative Workshop on GMS and National Strategy hosted by WHO	CNM/partners reviewed five objectives in EAFM based on guidance from GMS Regional Strategy
May 18 - June 5	CNM internal meetings	CNM technical units worked in detail on all five objectives
May 27	Gates Foundation Partner Convening	Discussion between CNM and partners on key strategic areas in Objectives 1, 2 and 4
June 4	Consultative workshop on Surveillance for Malaria Elimination in Cambodia	CNM, WHO and partners discussed surveillance systems
June 10 - 19	Review by MEAF by Core Writing Team	CNM, WHO and CHAI teams in group reviewed all the objectives and strategies, as well as updating other sections in the document
June 21	First Draft of MEAF disseminated for Review	First draft of MEAF disseminated within CNM and technical experts for comments
Jun 22	Microplanning and costing initiated with different CNM teams	CNM worked with implementing units and key partners to develop the micro-plans for the strategy and complete the costing
Jun 25 - Jul 1	Review by MEAF Writing Team	Consolidated and incorporated the initial feedback received from CNM staff and experts on First Draft
Jul 21 - Jul 23	Microplanning workshop with CNM	CHAI worked with different CNM teams for microplanning of surveillance, VMWs, and program management strategies and activities
July 27	Microplanning with DDF	Microplanning of DDF activities
August 28	Second Draft of MEAF Reviewed	MEAF draft shared by CNM with all by partners for comments
September 14-17	Review by MEAF Writing Team	Consolidated and incorporated the initial feedback received from CNM staff and experts on Second Draft
September 18	MEAF budget and preliminary gap analysis completed	Based on microplan, unit costs, and existing funding, first version of budget and gap analysis completed
September - November	Monitoring and Evaluation Framework for MEAF finalized	Indicators, baseline, and targets for MEAF finalized
October 5	Update MEAF with WHO MPAC Recommendations	Recommendations on MDA from WHO MPAC included in updated MEAF

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