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Thailand, Lao PDR, and Regional Malaria Operational Plan FY 2023

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This FY 2023 Malaria Operational Plan has been approved by the Acting U.S. Global Malaria Coordinator and reflects collaborative discussions with national malaria control programs and other partners. Funding available to support outlined plans relies on the final FY 2023 appropriation from U.S. Congress. Any updates will be reflected in revised postings.

This document was prepared in the early months of 2022 as the COVID-19 pandemic continued to evolve worldwide, including in PMI-focus countries. The effects of the pandemic on malaria control and elimination work in 2023 are difficult to predict. However, because U.S. Congressional appropriations for PMI are specific to work against malaria and any appropriations for work against the COVID-19 pandemic are specific for that purpose and planned through separate future U.S. Government planning processes, this FY 2023 MOP will not specifically address the malaria-COVID-19 interface and will reassess any complementary work through timely reprogramming in countries.

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ABBREVIATIONS

AFRIMS	Armed Forces Research Institute of Medical Sciences
AL	Artemether-lumefantrine
ANC	Antenatal Care
CMPE	Center for Malariology, Parasitology, and Entomology
DHA-PIP	Dihydroartemisinin-piperaquine
DHIS2	District Health Information System 2
DVBD	Division of Vector Borne Disease
FY	Fiscal Year
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GMS	Greater Mekong Subregion
iDES	Integrated Drug Efficacy Surveillance
IPTf	Intermittent Preventive Treatment for Forest Goers
ITN	Insecticide-treated Mosquito Net
Lao PDR	Lao People's Democratic Republic
LLINs	Long-lasting Insecticidal Nets
MMP	Migrant and Mobile Population
MOP	Malaria Operational Plan
MOPH	Ministry of Public Health (Thailand)
NMCP	National Malaria Control Program
NSP	National Strategic Plan
OR	Operational Research
PMI	U.S. President's Malaria Initiative
RAI3E	Global Fund Regional Artemisinin Initiative 3 Elimination Grant
RAI4E	Global Fund regional Artemisinin Initiative 4 Elimination Grant
RDMA	Regional Development Mission for Asia
RDT	Rapid Diagnostic Test
SBC	Social and Behavior Change
TA	Technical Assistance
TDA	Targeted Drug Administration
TES	Therapeutic Efficacy Study
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

To review specific country context for [Thailand](#) and Lao People's [Democratic Republic \(PDR\)](#), please refer to the country malaria profiles for Thailand and Lao PDR, which provide an overview of the malaria situation, key indicators, the National Malaria Control Program (NMCP) strategic plan, and the partner landscape.

U.S. President's Malaria Initiative

Launched in 2005, the [U.S. President's Malaria Initiative \(PMI\)](#) supports implementation of malaria prevention and treatment measures as well as cross-cutting interventions. PMI's 2021–2026 strategy, [End Malaria Faster](#), envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in sub-Saharan Africa and three programs across the Greater Mekong Subregion (GMS) in Southeast Asia to control and eliminate malaria. PMI has been a partner in the GMS since 2011 and began implementation in Thailand and Lao PDR in fiscal year (FY) 2011.

Rationale for PMI's Approach in the Greater Mekong Subregion

Despite tremendous progress in the reduction of malaria morbidity and mortality in the GMS over the past decade, there still remain recalcitrant active foci and risks of resurgences and outbreaks in Thailand and Lao PDR. The Global Fund to Fight AIDS, Tuberculosis, and Malaria's (Global Fund) Regional Artemisinin Initiative 3 Elimination (RAI3E) malaria grant meets the majority of programming needs, including key malaria commodities. Though this will end in 2023, a follow-on RAI4E grant is anticipated to ensure that GMS countries sustain the gains made thus far and accelerate toward malaria elimination. In support of the regional goal of malaria elimination by 2030, PMI's support focuses on strengthening malaria programming at national and subnational levels through improved use of strategic information, providing limited commodity support and technical assistance (TA) for improved surveillance (in particular drug resistance) and response, capacity strengthening, and supply chain management systems.

Overview of Planned Interventions

The proposed FY 2023 PMI funding for the Regional Development Mission for Asia (RDMA) is \$3 million. This Malaria Operational Plan (MOP) outlines planned PMI activities in Thailand, Lao PDR, and regionally using FY 2023 funds. Developed in consultation with NMCPs and key malaria stakeholders, proposed activities reflect national and PMI strategies, draw on best-available data, and align with the country

context and health system. Proposed PMI investments support and build on those made by the relevant GMS governments as well as other donors and partners. PMI will support the following intervention areas with these funds:

1. Vector Monitoring and Control

PMI will support the NMCPs in Thailand and Lao PDR, working with key stakeholders and partners on entomological aspects of foci investigation and strengthening entomological capacity through training and cross-border TA.

PMI will procure insecticide-treated mosquito nets (ITNs) to fill gaps among the at-risk target populations in Thailand and Lao PDR, based on NMCP estimation of needs for migrant and mobile populations (MMPs) and active foci of transmission.

2. Malaria in Pregnancy

PMI will support malaria in pregnancy interventions (ITNs and case management) to reach pregnant women through procurement of ITNs distributed to vulnerable MMPs as well as strengthening overall case management, including ensuring commodities are available to diagnose and manage cases of malaria in pregnancy.

3. Drug-based Prevention

PMI does not support seasonal malaria chemoprevention or other drug-based prevention in Thailand or Lao PDR.

4. Case Management

Although Global Fund and domestic resources are expected to meet most case management procurement needs through 2023, there are uncertainties of a potential RAI4E for continued support. PMI will plan to help prioritize and fill any gaps to ensure access to malaria testing and treatment in remote areas in case of unanticipated outbreaks or natural disasters, or during the transition between Global Fund grants.

With the Global Fund, PMI will continue to support TA for the implementation of therapeutic efficacy studies (TES) and integrated drug efficacy surveillance (iDES), and to monitor drug efficacy in the GMS. With regional funding, PMI will co-fund TA to all GMS countries for TES/iDES and will also continue to support microscopy training and regional slide banks.

5. Health Supply Chain and Pharmaceutical Management

As malaria cases continue to decrease and malaria becomes increasingly focal, PMI will support NMCPs to improve supply chain coordination and management by developing and improving the availability of logistics data to ensure continuous availability of commodities and rationalizing the amount of strategically stocked commodities that will

expire. PMI will continue to support strengthening the quality of the logistics management information systems data and reporting while also ensuring commodity data are incorporated into the malaria information systems in both Thailand and Lao PDR.

6. Social and Behavior Change

No social and behavior change (SBC) activities are planned for PMI funding. PMI in-country staff will continue to support the NMCPs with implementation of their SBC strategies.

7. Surveillance, Monitoring, and Evaluation

Thailand continues to scale up nationally its 1-3-7 strategy (i.e., each malaria case is notified within 24 hours, investigated within 72 hours, and appropriately responded to within seven days), with marked improvements to date in reporting and completeness. However, as malaria services transition from vertical malaria clinics/posts to integrated health promotion hospitals providing broader general health services, the quality of malaria services and data visibility need to be ensured. PMI will continue to support strengthening the transition and integration of malaria services reporting from malaria clinics to the general health services (health promotion hospitals). PMI will also aim to support the roll-out of subnational prevention of re-introduction strategies.

With an updated risk stratification and national elimination strategy, Lao PDR is intensifying case-based surveillance activities in all elimination districts. The malaria module of the District Health Information System 2 (DHIS2) has expanded to include private–public mix data, elimination data (case notification, case investigation, case classification, focus investigation, and response), iDES, vector control interventions, and entomological surveillance. PMI will continue to support use of DHIS2 data to inform decision-making at all levels, particularly capacity-strengthening at the district level.

8. Operational Research and Program Evaluation

Global Fund and Bill & Melinda Gates Foundation funding currently support key operational research (OR) questions for Thailand and Lao PDR. Although PMI does not plan to support any OR with FY 2023 funding, PMI will closely monitor the outcomes of these OR projects to inform potential roll-out of promising approaches in the near future.

9. Capacity Strengthening

PMI supports strengthening national program capacity as a key priority. Depending on need and evolving epidemiology, PMI will continue to support national and regional capacity-building and training efforts in program management, malaria elimination, quality assurance/quality control for diagnostics, supply chain, surveillance, monitoring and evaluation, and entomology.

I. CONTEXT AND STRATEGY

1. Introduction

The Regional Development Mission for Asia (RDMA) began implementation as a U.S. President's Malaria Initiative (PMI) regional program in fiscal year (FY) 2011. This FY 2023 Malaria Operational Plan (MOP) presents a detailed implementation plan for Thailand, Lao People's Democratic Republic (PDR), and a modest regional component, based on the strategies of PMI and the National Malaria Control Programs (NMCPs). It was developed in consultation with the NMCPs and with the participation of national and international partners. PMI is proposing activities that build on partner investments to improve and expand malaria-related services, including investments by the Global Fund to Fight AIDS, Tuberculosis, and Malaria (Global Fund). This document provides an overview of the strategies and interventions in Thailand, Lao PDR, and the region, where relevant, describes progress to date, identifies challenges and relevant contextual factors, and describes activities that are planned with FY 2023 funding. For more detailed information on the country context, please refer to the Country Malaria Profiles for Thailand and Lao PDR, which provide overviews of the malaria situation, key indicators, the NMCP strategic plan, and the partner landscape.

2. U.S. President's Malaria Initiative

The U.S. President's Malaria Initiative (PMI) is led by the U.S. Agency for International Development (USAID) and implemented together with the U.S. Centers for Disease Control and Prevention. Launched in 2005, PMI supports implementation of malaria prevention and treatment measures—insecticide-treated mosquito nets (ITNs), indoor residual spraying, accurate diagnosis and prompt treatment with artemisinin-based combination therapies, intermittent preventive treatment of pregnant women, and drug-based prevention—as well as cross-cutting interventions such as surveillance, monitoring and evaluation; social and behavior change; and capacity strengthening. PMI's 2021–2026 strategy, [End Malaria Faster](#), envisions a world free of malaria within our generation with the goal of preventing malaria cases, reducing malaria deaths and illness, and eliminating malaria in PMI partner countries. PMI currently supports 24 countries in sub-Saharan Africa and three programs in the Greater Mekong Subregion (GMS) in Southeast Asia to control and eliminate malaria. Over the next five years, PMI aims to save lives, reduce health inequities, and improve disease surveillance and global health security.

Under the strategy, and building upon the progress to date in PMI-supported countries, PMI will work with NMCPs and partners to accomplish the following objectives by 2026:

1. Reduce malaria mortality by 33 percent from 2015 levels in high burden PMI partner countries, achieving a greater than 80 percent reduction from 2000.
2. Reduce malaria morbidity by 40 percent from 2015 levels in PMI partner countries with high and moderate malaria burden.
3. Bring at least 10 PMI partner countries toward national or subnational elimination and assist at least one country in the GMS to eliminate malaria.

These objectives will be accomplished by emphasizing five core areas of strategic focus:

1. **Reach the unreached:** Achieve, sustain, and tailor deployment and uptake of high-quality, proven interventions with a focus on hard-to-reach populations.
2. **Strengthen community health systems:** Transform and extend community and frontline health systems to end malaria.
3. **Keep malaria services resilient:** Adapt malaria services to increase resilience against shocks, including COVID-19 and emerging biological threats, conflict, and climate change.
4. **Invest locally:** Partner with countries and communities to lead, implement, and fund malaria programs.
5. **Innovate and lead:** Leverage new tools, optimize existing tools, and shape global priorities to end malaria faster.

3. Rationale for PMI's Approach in Thailand, Lao PDR, and the Region

3.1. Malaria Overview

Thailand: Thailand has made rapid progress in reducing the number of reported confirmed malaria cases, from 43,939 in FY 2011 to 2,898 in FY 2021. In particular, the number of active foci of transmission in the country decreased 58 percent over the last five years, from 1,108 in FY 2016 to 469 in FY2021; and the number of *Plasmodium falciparum* cases plummeted from 3,348 to 55 during the same period—a 98 percent reduction. Thailand aims to eliminate all indigenous malaria cases by 2024.

For more detailed information on malaria indicators, please refer to the FY 2023 Country Malaria Profile for Thailand.

Lao PDR: In Lao PDR, the intensity of malaria transmission varies among different ecological zones: from very low transmission in the plains along the Mekong River and in areas of high altitude, to higher transmission (annual parasite incidence > 30) in remote, forested areas of the south. *Plasmodium falciparum* had been the predominant species but has significantly decreased, accounting for only 34 percent of all recorded malaria cases in 2021, with *P. vivax* accounting for nearly the entire remainder of cases (65 percent). Though both *P. falciparum* and *P. vivax* are found concentrated in

the southern part of the country, 85 percent of *P. falciparum* malaria cases are reported from only seven districts. The primary vectors in Lao PDR are *Anopheles dirus*, *An. minimus* s.l., and *An. maculatus*, all of which can be found in forested areas. Total malaria cases have declined from 9,328 in 2017 to 3,930 in 2021. Compared to the previous year, Lao PDR experienced a slight increase in malaria cases in 2021 due to isolated outbreaks in two districts in Savannakhet. Lao PDR had reported zero malaria deaths since 2019, but recorded one malaria death in 2021. Lao PDR aims to eliminate all indigenous malaria cases by 2030.

For more detailed information on malaria indicators, please refer to the FY 2023 Country Malaria Profile for Lao PDR.

3.2. Key Challenges and Contextual Factors

Thailand: Despite the tremendous progress in reducing the number of active foci and residual non-active foci to cleared foci, 2 provinces (Phuket and Chaiyaphum) out of a total of 35 nationwide that were declared as malaria-free in 2018 reverted their status to active-foci provinces in 2019 due to reported indigenous cases. Another province, Phitsanulok, despite not having reported malaria cases for several years, reverted to an active-foci province in 2020 due to an influx of migrants from Burma working in rubber tapping plantations. Remaining active foci are clustered in three border areas: in the west with Burma and in the east with Cambodia, where high population mobility associated with importation of malaria parasites complicates surveillance; and in the south with Malaysia, where civil unrest disrupts service delivery.

Since February 2021, the political coup in Burma and the potential influx of refugees across the Thai border pose logistical and geopolitical challenges to provide adequate malaria services to these populations. Malaria incidence has increased in some Thai districts along the Thai-Burma border, and provincial health offices are on alert to ensure adequate malaria services and responses.

Lao PDR: A wide variety of mobile and static population groups at risk of malaria in endemic areas drives the varying local epidemiology, which requires different malaria control strategies adapted to risk group behaviors, local cultural and traditional practices, local health infrastructure, and environmental conditions. The level of malaria risk for each of these groups varies according to several location-dependent factors including degree of endemicity, accessibility, health system strength, and poverty. Villages located within the high-risk forested areas of Lao PDR belong to a broad range of ethnic minority groups with 240 distinct languages spoken, challenging health messaging and communication. Poverty in these communities is often extreme.

3.3. PMI's Approach

Thailand: Four strategies guide Thailand's elimination goal and objectives: scaling up malaria elimination activities; developing technology, innovation, measures, and models that are appropriate for malaria elimination; developing partnerships among stakeholders at national and international levels to enable malaria elimination; and promoting/empowering the community to take an active role in malaria prevention. To this end, the Division of Vector Borne Disease (DVBD) has focused on a robust and integrated surveillance system that can rapidly and efficiently respond to the malaria situation; increase capacity and coverage of services in diagnosis and treatment at all levels and sectors and for all populations at risk of malaria based on the principle of equity; scale up detection of symptomatic and asymptomatic malaria patients, including submicroscopic parasitemia cases; scale up malaria prevention through vector surveillance, vector control, and personal protection among the target populations; and develop a system to follow up each malaria case to ensure cure and elimination of drug-resistant malaria parasites. PMI supports the DVBD's goals and objectives by supporting the strengthening of malaria programming at national and subnational levels and using strategic information, providing limited commodity support and technical assistance (TA) for improved surveillance and response, capacity-strengthening, and pharmaceutical management systems.

In light of the Global Fund Regional Artemisinin Initiative 3 Elimination (RAI3E) grant support as well as Thailand's socio-economic improvements over the past decade, PMI support to Thailand has generally focused on expanding the role of malaria surveillance and response, improving existing supply chain management systems, and ensuring informed decision-making based on evidence at all levels. With RAI3E ending in December 2023 and uncertainties of a fully resourced RAI4E grant, PMI's support in Thailand will shift toward increasing domestic resource mobilization and advocacy for malaria elimination at national and subnational levels—leveraging partnerships and resources from domestic local government sources, private and corporate sectors, and other non-health sectors.

Lao PDR: Lao PDR conducted a Malaria Program Review in October 2019 to review the progress achieved under the previous National Strategic Plan (NSP) (2016–2020) and guide the development of the next NSP. The overall review indicated that Lao PDR is on track to achieve its malaria elimination targets by 2030. The key recommendations from the review included: 1) strengthening data use at all levels; 2) intensifying and improving service delivery for high-risk groups; 3) ensuring availability of commodities; 4) strengthening subnational staff capacity to conduct operational malaria elimination strategies; and 5) introducing radical cure for *P. vivax* at the health center level.

The majority of programming needs, including commodities (rapid diagnostic tests [RDTs], artemisinin-based combination therapies, and long-lasting insecticidal nets [LLINs]) and social and behavior change (SBC) activities, are met by the country's Global Fund RAI3E malaria grant, although it is uncertain whether there will be continued support through a RAI4E. PMI supports working with the national malaria program and in-country partners to assist the country to reach elimination nationally by 2030. PMI provides limited technical support to Lao PDR to improve technical and programmatic capacity for strategic information and to strengthen national malaria surveillance, monitoring, and evaluation systems for malaria control and elimination.

3.4. Key Changes in this MOP

Thailand: There are no significant changes in strategy, activities, or budget levels compared to the previous MOP.

Lao PDR: There are no significant changes in strategy, activities, or budget levels compared to the previous MOP.

II. OPERATIONAL PLAN FOR FY 2023

1. Vector Monitoring and Control

1.1. PMI Goal and Strategic Approach

Thailand: The Thai DVBD NSP (2017–2026) targets one ITN for every 1.8 residents, while a ratio of 1:1 is used for migrant populations and military personnel based in malaria-endemic villages. ITNs are to be replaced every three years.

The Global Fund procures long-lasting insecticide-treated hammock nets (LLIHNs), which are distributed in endemic villages of targeted provinces where ITNs cannot be used (e.g., migrants and soldiers spending nights in the forest and on the Thai–Cambodia border). Domestic resources support procurement of repellents, insecticides for indoor residual spraying, and net retreatment. PMI supports the procurement of the majority of LLINs targeting migrant and mobile populations (MMPs) for Thailand and the Global Fund supports the distribution of these commodities to the communities, civil society organizations, and refugee camps. DVBD aims to strengthen entomology networks in regional, provincial, and district levels for vector surveillance and prevention of reintroduction. DVBD identified TA gaps in guideline development and capacity building on vector surveillance for the next generation of entomologists; mosquito surveillance equipment for improving foci management; and new tools to reach outdoor-biting malaria vectors.

Lao PDR: The Lao NSP (2021–2025) has set out to protect 100 percent of targeted high-risk populations with appropriate vector control interventions, including ITNs. Current strategies include delivery of family-size LLINs every three years to targeted high-risk populations (based on risk strata) through mass distribution; annual continuous distribution of family-size LLINs to pregnant women at antenatal care (ANC); and single-size LLINs to MMPs as well as the military and other formal sector forest-goers such as forest and wildlife protection personnel.

Additional strategies to expand coverage of LLINs include increasing the number of single nets for MMPs through continuous distribution channels (e.g., village malaria workers), and using a bottom-up approach in consultation with provinces, districts, and civil society organizations to estimate the number of nets for this cohort; establishing a stockpile of emergency nets centrally and in key provinces for active foci response, outbreak response, and public health emergencies (e.g., flooding and displacements); and providing LLINs for all beds in health facilities in high-transmission risk settings.

PMI supports the procurement of ITNs targeted to areas with ongoing malaria transmission, primarily in the south of the country, and to at-risk vulnerable populations including forest-goers, remote ethnic minority groups, and pregnant women. PMI also

supports training related to comprehensive, integrated epidemiological and entomological foci investigations, coordinating closely with key stakeholders in the region including the World Health Organization (WHO) and the Asia Pacific Malaria Elimination Network Vector Control Working Group. However, due to challenges with limited human resources, the Center for Malariology, Parasitology, and Entomology (CMPE) has identified the need to increase strengthening capacity for entomology at national, provincial, and district levels.

1.2. Recent Progress (between March 2021 and March 2022)

Thailand

- In coordination with Global Fund resources for distribution, PMI supported the procurement of 50,000 LLINs targeting migrants and other vulnerable groups in malaria foci areas.
- Provided support to DVBD on the distribution plan of LLINs to target high-risk groups, including allocation of LLINs for migrant camps along the Thai-Burma border.

Lao PDR

- In coordination with Global Fund and domestic contributions from the Government of Lao PDR, PMI supported the procurement of 220,314 LLINs to contribute towards a national mass LLIN campaign in early 2022. The target populations are at-risk populations including forest-goers, migrant and remote, ethnic minority populations, and pregnant women.

1.3. Plans and Justification for FY 2023 Funding

To build entomological capacity in Lao PDR, PMI plans to provide TA support for provincial-level entomologic training that emphasizes foci investigations, mosquito resistance monitoring techniques, and deployment of appropriate vector control measures.

The FY 2023 funding tables contain a full list of activities that PMI proposes to support in Thailand and Lao PDR with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

1.3.1. Entomological Monitoring

Malaria transmission in the GMS is complex. Various *Anopheles* species in the *dirus* complex, *minimus* complex, and the *maculatus* group are recognized as malaria vectors in the region and can range from primary vectors to secondary/suspected vectors or non-vectors.

Thailand: From the *minimus* complex, *An. minimus* s.s. is the primary vector across Thailand, followed by *An. dirus* and *An. maculatus* complex mosquitoes. Along the Thai-Burma border, two members of the *An. dirus* complex appear to be primary vectors: *An. dirus* s.s. occurring east of the Thai-Burma border and *An. baimaii* occurring west of the Thai-Burma border. More recently *An. baimaii* has also been identified in southern Thailand. Members of the *An. maculatus* complex are also found throughout Thailand, especially along the Thai-Burma border. From the *An. maculatus* complex, considered primary vectors are *An. maculatus* s.s. and to a lesser extent *An. sawadwongporni*, with the latter identified as a vector in southern Thailand. A number of secondary vectors identified include *An. epiroticus* and *An. aconitus*. Several suspected vectors found include *An. barbirostris*, *An. campestris*, *An. philippinensis*, *An. anularis*, *An. culicifacies*, and *An. kochi*. The abundance and biting behavior of these vectors varies both geographically and seasonally. The widely distributed *An. minimus* s.s. tends to be zoophilic when there are animal host options for feeding and a preference for outdoor biting. Members of the *An. maculatus* complex are mainly zoophilic with preference for outdoor feeding. *An. dirus* predominantly inhabit forest and forest-fringe regions and show a preference for feeding on humans and outdoor biting.

Lao PDR: As part of the Lao NSP 2016–2020, CMPE established entomological surveillance in 13 sentinel districts from eight provinces, three from the north (Huaphanh, Luang Prabang, and Xiengkhuang) and five (Attapeu, Champassak, Saravane, Savanakheth, and Sekong) from the southern part of the country (Figure 1). Vector surveillance was also carried out in malaria active foci as part of malaria response. WHO funded vector surveillance in the 13 sites. *Anopheles* mosquitoes collected from 2018–2020 represented 15 different species or species complexes. The primary malaria vectors, in order of abundance, were *An. dirus* s.l., *An. maculatus* s.l. and *An. minimus* s.l. However, this may not accurately reflect the actual primary vectors, as not all sibling species may be vectors. *An. maculatus* s.l. and *An. minimus* s.l. were found in all provinces, while *An. dirus* s.l. was found only in the southern provinces. The most abundant secondary malaria vector species was *An. barbirostris*, followed by *An. aconitus*, *An. Nivipes*, and *An. philippinensis*. The primary and secondary vectors are highly zoophilic. *An. dirus* s.l. was the most anthropophilic of the primary vectors and was mostly captured in the forest. Thirty-two percent of the primary vectors were collected outdoors before 10pm or after 5am, coinciding with times when people were active in the hours before midnight and in the early hours of the morning.

Figure 1. Map of mosquito collection sites in Lao PDR (2018–2020)

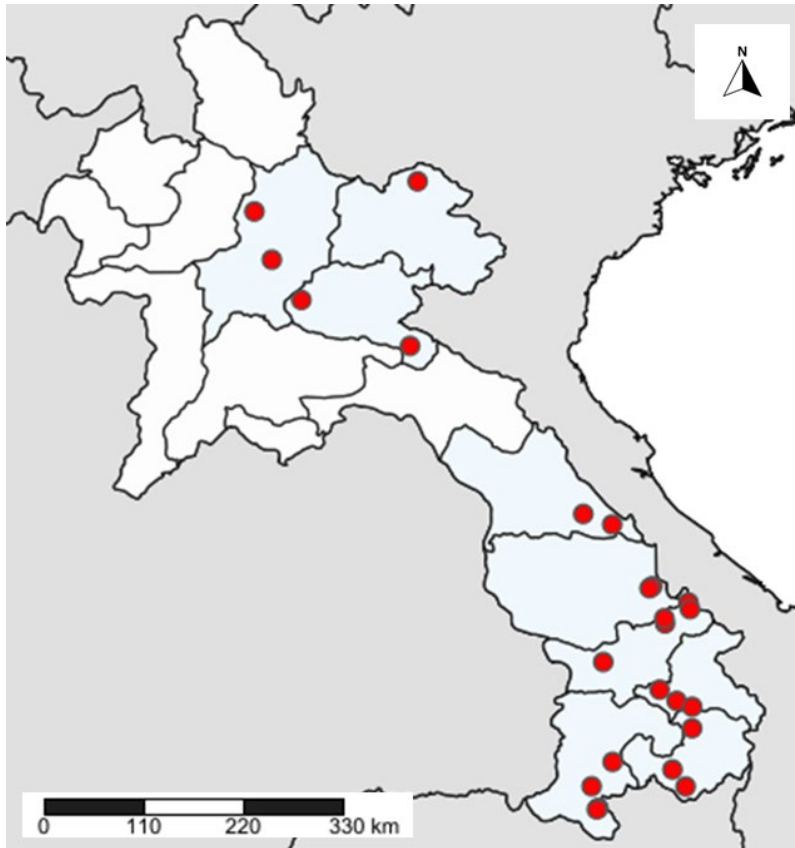


Table 1. Summary of Distribution and Bionomics of Malaria Vectors in the Greater Mekong Subregion¹

District, province, country	Ecotype	% Access to LLIN	% Use of LLIN	Human exposure to malaria vectors
Eastern region: Borkeo & O'Chum districts, Rattanakiri province	Forest plots and villages	68.4% (Ratanakiri)	70.7% (forest workers)	Early human-biting proportion of <i>Anopheles dirus</i> s.l. in villages: 39%–48%; <i>Anopheles minimus</i> s.l./ <i>Anopheles aconitus</i> and <i>Anopheles maculatus</i> s.l.: 54.4% and 56.6% (in Rattanakiri)
Western region: Pailin & Pursat provinces				
Cambodia	Forest plots	69.2% (Pailin); 81.8% (Pursat)	66.3% (forest workers)	Early human-biting proportion of <i>Anopheles dirus</i> s.l. in forest: 24%–26% (Pursat;

¹ Hii, J. et al. Residual malaria transmission in select countries of the Asia-Pacific region: Old wine in a new barrel. JID 2021:223 (Suppl 2) (2021).

District, province, country	Ecotype	% Access to LLIN	% Use of LLIN	Human exposure to malaria vectors
				<i>Anopheles minimus</i> s.l./ <i>Anopheles aconitus</i> and <i>Anopheles maculatus</i> s.l.: 26.9% and 32.9% (villages in Pailin and west Pursat), respectively
Ma Noi and Phuoc Binh communes, Ninh Thuan province, south-central Vietnam	Village	NA	85%	Highest biting activity of <i>Anopheles</i> vectors occur in the evening, with 6% of bites by 7pm, 25% by 8pm, and 50% before 10pm
	Forest plots	NA	53%	Local farmers at the forest fields are exposed to mosquito bites mainly owing to low LLIN use; while half (52%) of Ra-glai respondents were asleep by 7pm, only 58% would regularly be protected by LLINs
Tha Song Yang, Tak province, Thailand	Village	78%	80%	Indoor exposure: 88%–93% for LLIN nonuser and 33%–45% for user Indoor users of LLINs during median sleep time: 45%–67%
	Hamlets	100%	75–95%	
	Farm huts	NA	NA	
Son Thai commune, Khan Hoa province, central Vietnam	Village	78%	95%	Outdoor biting in the forest and indoor biting at the farm hut were highest during 8–11pm Long-lasting insecticidal net; 48% of biting by mosquitoes occurred before 9pm in the farm huts: 45% of <i>A. dirus</i> (s.l.) and 100% of <i>A. maculatus</i> (s.l.) biting)
	Farm huts	NA	62.7%	
	Forest	NA	25%	

Status of Insecticide Resistance

Thailand: Between 2019–2021, insecticide resistance surveillance was carried out in one to two provinces each year in one site per province. A number of pyrethroids (alpha-cypermethrin, deltamethrin, permethrin, bifenthrin, and cyfluthrin) and organophosphates (malathion and fenitrothion) were tested in one to three districts per province. Not all the insecticides were tested at all the sites. *An. dirus* in Parchin Buri province showed possible resistance to alpha-cypermethrin but was susceptible to the other pyrethroids and the organophosphates. In Uthai Thani Province, *An. minimus* was susceptible to the three pyrethroids tested (alpha-cypermethrin, bifenthrin, and deltamethrin). No testing was carried out with organophosphates. There was possible

resistance of *An. barbirostris* to deltamethrin in Uthai Thani. *An. minimus* in Prachuab Kiri Kan province was susceptible to deltamethrin but possibly resistant to permethrin, and *An. barbirostris* was resistant to deltamethrin. In Chachoengsao province, *An. barbirostris* showed high levels of resistance to all pyrethroids (except permethrin, which was not tested) and the two organophosphates. In this province, *An. epiroticus* was also highly resistant to deltamethrin.

Lao PDR: Historically, insecticide resistance surveillance for malaria vectors has been carried out sporadically in Lao PDR. In 2014–2015, resistance testing was carried out in 10 provinces in Lao PDR along a north-south transect. In general, no resistance to pyrethroids (deltamethrin and permethrin) was detected in the primary vectors from the *An. dirus*, *An. minimus*, and *An. maculatus* complexes. Reduced susceptibility to permethrin was detected in two sites. No pyrethroid resistance was detected in secondary vectors. DDT resistance was found in primary and secondary as well as non-vector species in several provinces.

1.3.2. Insecticide-treated Nets

In collaboration with partners such as the Global Fund for distribution costs, PMI will continue to support procurement of LLINs for continuous distribution for Thailand and Lao PDR. At-risk populations including forest-goers, migrant and remote populations, ethnic minorities, and pregnant women will be targeted. Where possible, PMI also supports SBC TA to improve use and care of ITNs and to mitigate against misuse.

ITN Distribution

Thailand: Thailand currently conducts only continuous distribution of LLINs annually targeting MMPs and other risk groups including forest-goers and refugee camps. With several provinces reverting back to having local transmission, along with the current conflict in Burma, the forecasted requirements of LLINs may not be sufficient. PMI is working with DVBD to ensure that any unanticipated gaps are covered through Global Fund reprogramming or other sources.

Lao PDR: The Lao NSP (2021–2025) aims to protect 100 percent of targeted high-risk populations with appropriate vector control interventions, including ITNs. PMI is working with CMPE to ensure that any unanticipated gaps are covered through Global Fund reprogramming or other sources.

Please refer to the **ITN Gap Analysis Table** in the [annex](#) for more detail on planned quantities and distribution channels.

2. Malaria in Pregnancy

2.1. PMI Goal and Strategic Approach

Given the very low overall prevalence of malaria, intermittent preventive treatment for pregnant women to prevent malaria is not recommended and has not been implemented in GMS countries. Instead, Thailand and Lao PDR provide LLINs to households in high-risk areas and ensure prompt diagnosis and treatment of malaria cases during pregnancy.

ANC attendance is generally high in all GMS countries; however, there are barriers related to accessibility and cost of services, particularly among vulnerable populations, including MMPs and populations residing in geographically remote, isolated areas. Thailand follows the focused ANC guidance, including promoting five ANC visits during pregnancy. The Ministry of Public Health (MOPH) is aware of the updated 2016 WHO ANC guidance and is considering how to incorporate the recommendations for Thailand. In Lao PDR, the Ministry of Health has adopted the 2016 WHO ANC guidance including the recommended eight ANC contacts during pregnancy.

In Thailand, pregnant women with suspected malaria are referred to the district hospitals for malaria diagnosis and treatment. First-line treatment for *P. falciparum* is quinine in the first trimester and artesunate + mefloquine in the second and third trimesters. *Plasmodium vivax* is treated with chloroquine in all trimesters. There is no policy to prevent *vivax* relapses during pregnancy.

In Lao PDR, the NSP supports procurement of small batches of LLINs for continuous distribution via health centers primarily for pregnant women and MMPs, for replacement of damaged LLINs, and for new residents in high-risk areas. Malaria treatment guidelines advise the use of oral quinine in the first trimester of pregnancy, but this is rarely found in hospital outpatient departments or ANCs, nor is clindamycin widely available. Artemether-lumefantrine is first-line for management of malaria in the second and third trimesters for both *vivax* and *falciparum* malaria. Similar to most countries in the GMS, Lao PDR has no policy or strategy to prevent *vivax* relapses during pregnancy.

For Thailand and Lao PDR, PMI supports a two-pronged approach to prevent malaria infection among pregnant women, including provision of LLINs and early effective case management of malaria and anemia.

2.2. Recent Progress (between March 2021 and March 2022)

PMI procured LLINs in Thailand and Laos for distribution to vulnerable populations such as mobile and migrant populations, including pregnant women.

2.3. Plans and Justification for FY2023 Funding

The FY 2023 funding tables contain a full list of activities that PMI proposes to support in Thailand and Lao PDR with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

PMI will continue to support procurement of LLINs provided to vulnerable populations such as MMPs and including pregnant women.

3. Drug-based Prevention

PMI does not support seasonal malaria chemoprevention or other drug-based prevention in Thailand or Lao PDR.

3.1. Other Drug-Based Prevention

In Lao PDR, with support from the Global Fund and TA from WHO, targeted drug administration (TDA) and intermittent preventive treatment for forest-goers (IPTf) with Pyramax are being piloted as strategies for accelerating progress on *Plasmodium falciparum* malaria elimination in residual hot spots and will be expanded to other areas of active transmission. Lao PDR will implement two rounds of TDA one month apart for all populations 7–49 years of age in targeted communities. Three rounds of IPTf with one month between rounds to prevent reinfection, will target the same population (male and females 7–49 years of age) who are considered at high risk (i.e., those sleeping overnight in the forest or field). The targeted populations are identified through a village-based census as well as active fever screening carried out by village health workers every two weeks.

3.2. PMI Goal and Strategic Approach

Since the proposed accelerator strategies (TDA and IPTf) are supported by Global Fund with TA from WHO in Lao PDR, PMI does not currently have plans to support these activities.

3.3. Recent Progress (between March 2021 to March 2022)

No seasonal malaria chemotherapy/drug-based prevention activities were supported with PMI funding.

Plans and Justification for FY 2023 Funding

No seasonal malaria chemotherapy/drug-based prevention activities are proposed with FY 2023 funding.

4. Case Management

4.1. PMI Goal and Strategic Approach

PMI supports gap-filling for malaria case management commodities, integrated drug efficacy surveillance (iDES)/therapeutic efficacy studies (TES) to monitor drug efficacy, and quality microscopy. While PMI does not directly implement activities such as supervision and training at the facility or community level, PMI does provide TA and support to the DVBD and CMPE in strengthening and improving health facility and community-level case management service delivery implementation in Thailand or Lao PDR. This includes supporting the NMCPs on improving and sustaining their service delivery implementation, including enhancing supervision and training of providers and improving surveillance and M&E in the context of achieving their elimination goals.

Thailand: To achieve malaria elimination by 2024, the NMCP's Malaria Strategic Plan aims to: 1) increase capacity and coverage of malaria case management at all levels, all sectors, and all population groups based on equity, 2) scale up detection of asymptomatic and low-parasitemic patients through active case detection in malaria transmission areas and among populations at risk, military bases, and refugee camps by using microscopy and molecular technique, and 3) scale up an integrated drug efficacy surveillance system for patient follow-up to ensure cure and to eliminate drug-resistant parasites.

In non-transmission areas, diagnosis and treatment only occurs in hospitals (not in the community). In transmission areas, diagnosis and treatment occurs both in the community (RDTs and microscopy) and in hospitals (microscopy only).

As malaria incidence has declined over the years in Thailand and throughout the GMS, it has become increasingly difficult to enroll patients for the standard WHO TES studies to monitor drug efficacy and resistance. Through PMI support, WHO has provided TA to DVBD to implement iDES throughout the country, which relies on the routine malaria surveillance system to track, follow up, and ensure effective treatment outcomes for every malaria case.

Lao PDR: To eliminate *P. falciparum* by 2023 and all malaria by 2030, the Lao NSP 2021–2025 has a strategic objective of maintaining universal access to quality malaria diagnosis, increasing testing to reach national annual blood examination rate targets, and providing effective treatment to 100 percent of cases. Malaria control and elimination in Lao PDR has embraced a comprehensive service delivery model. In addition to providing services in public facilities, the program works closely with a network of community-based health care providers through village malaria workers and with selected private outlets through a public–private partnership.

The testing algorithm initiated in 2018 calls for testing of all febrile cases and high-risk populations. Quality assurance of pharmaceuticals is conducted in collaboration with the Food and Drug Department twice a year. A national slide bank was initiated in 2016 but was not maintained due to limited samples. For external quality assessments, slides are sent to Lao PDR twice a year for reading; and for internal assessment, the districts and provinces send their slides to CMPE for parasite count validation and assessment.

Providing malaria services to the MMPs has been a challenge as it is in other countries in the region. Potential strategies include expanding the roles and responsibilities of the village malaria worker to conduct outreach work during risk periods (rice and crop harvesting); conducting targeted testing of high-risk forest-going populations through village-based focal test and treat and/or reactive screening around index cases; placing mobile malaria workers at key travel routes for high-risk populations; conducting active fever surveillance; and ensuring access to quality case management for migrant workers at high-risk work sites. Although PMI does not provide direct implementation support for these activities, PMI provides targeted commodities support and technical assistance to the NMCP to enhance and accelerate these efforts. For instance, PMI supports TA to enhance quality, analysis, and use of data from the malaria surveillance system to better identify, target, and plan for responses to emerging malaria hotspots.

4.2. Recent Progress (between March 2021 to March 2022)

Thailand

- Procured 3,000 vials of injectable artesunate, 2,000 blister packs of dihydroartemisinin-piperaquine (DHA-PIP), 35,000 tablets of 7.5 mg formulation of primaquine, and 12,500 RDTs and personal protective equipment in 2021.
- Supported finalization, printing, and distribution of standard operating procedures (SOPs), including microscopy quality assurance/quality control, glucose-6-phosphate dehydrogenase, and RDT QA quality assurance SOPs.
- Developed standardized malaria microscopy training curriculum for training of trainers.
- Co-funded the procurement of 25 malaria microscopes to support National Reference Laboratory capacity strengthening.
- Supported iDES roll-out, drug policy reviews, and related meetings. PMI also supported the development of a dashboard, standard operating procedures, analytics, and presentations to improve iDES and routine use of generated data.

Lao PDR

- Procured and delivered 500,000 RDTs, 14,070 treatment doses of AL, and 200,000 tablets of primaquine.

- Supported monitoring of TES in three sites and iDES pilot in two provinces; expansion of coverage to 121 elimination districts in northern and central provinces; drug policy reviews; and related meetings.
- Developed data quality and supervision checklists in collaboration with CMPE and partners.
- Supported CMPE to conduct supervision visits to 11 districts in Savannahket province.
- Supported the updating of the National Treatment Guidelines to include artesunate + mefloquine as a second-line treatment for uncomplicated *Plasmodium falciparum* and *Plasmodium vivax*.

Regional

- Annual Regional TES/iDES meeting held virtually in September 2021 to share updates on therapeutic efficacy and drug resistance.
- Supported Vietnam to pilot iDES in three provinces and expanded to malaria hotspot areas in south and central Vietnam.
- Eight national malaria laboratories from Cambodia, Lao PDR, Burma, Thailand, and Vietnam participated in the 10th WHO regional External Quality Assurance Program of malaria laboratories (two rounds of panel testing).
- Refresher microscopy trainings conducted in Cambodia, Lao PDR, and Vietnam.
- Maintenance of the WHO Regional Malaria Slide Bank (Research Institute for Tropical Medicine-WHO Collaborating Center).

Please note that recent progress with monitoring antimalarial efficacy and the TES approach is presented in the **Plans and Justification for FY 2023 Funding** section below.

4.3. Plans and Justification for FY 2023 Funding

The FY 2023 funding tables contain a full list of activities that PMI proposes to support in Thailand and Lao PDR with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

As described in the Recent Progress section (4.2), PMI will continue to support gap-filling for malaria case management commodity procurement, TA for drug efficacy monitoring through TES or iDES, and strengthening microscopy diagnostic capacity in the region through in-country refresher trainings, regional training of trainers for microscopy, and external quality assessments for microscopists and labs.

Please refer to the **artemisinin-based combination therapy, RDT, injectable artesunate, and primaquine Gap Analysis Tables** in the [annex](#) for additional details on planned quantities and distribution channels.

Monitoring Antimalarial Efficacy

Table 2. Ongoing and Planned Therapeutic Efficacy Studies or Integrated Drug Efficacy Surveillance

Ongoing TES or iDES (funded or co-funded)			
Year	Site name	Treatment arm(s)	Plan for laboratory testing of samples
2021–2022	Thailand (iDES)	DHA-PIP for Pf (except AS-PYR for Ubon Ratchatani and Sisaket provinces)	DVBD-MOPH, Thailand (PCR, molecular genotyping and K13 assays)
2021–2022	Lao PDR 1. Attapeu 2. Savannakhet 3. Sekong	AL for Pf	Institute Pasteur Cambodia (PCR, molecular genotyping and K13 assays)
2021–2022	Vietnam 1. Binh Phouc 2. Gia Lai 3. Phu Yen	AS-PYR for Pf CQ+PQ for Pv	Institute Pasteur Cambodia (PCR, molecular genotyping and K13 assays)
Planned TES*/iDESS (funded/co-funded with previous or current MOP)			
2022–2023	Thailand (iDES)	DHA-PIP for Pf (except Pyramax for Ubon Ratchatani and Sisaket provinces)	DVBD-MOPH, Thailand (PCR, molecular genotyping and K13 assays)
2022–2023	Lao PDR (iDES in 121 elimination districts)	AL for Pf	Institute Pasteur Cambodia (PCR, molecular genotyping and K13 assays)
2022–2023	Vietnam (iDES in three provinces)	DHA-PIP for Pf (except Pyramax in four provinces)	Institute Pasteur Cambodia (PCR, molecular genotyping and K13 assays)

* TES sites for 2022-2023 have not been selected

AL – artemether + lumefantrine; AS-PYR – artesunate + pyronaridine ; CQ – chloroquine; DHA-PIP – Dihydroartemisinin + piperaquine; ; K13 – Kelch 13; iDES – integrated drug efficacy surveillance; Pf – *Plasmodium falciparum*; PCR – polymerase chain reaction; PQ – Primaquine; Pv – *Plasmodium vivax*.

5. Health Supply Chain and Pharmaceutical Management

5.1. PMI Goal and Strategic Approach

In addition to the procurement of malaria commodities, PMI supports strengthening pharmaceutical management and supply chain systems in the region through the provision of TA in supply chain management. PMI supports improving system performance and visibility to ensure that malaria commodities are available when and where they are needed, strengthening in-country supply systems, and enhancing capacity for effective management of the malaria commodity supply chain.

Thailand: To support Thailand’s goal of malaria elimination by 2024, DVBD aims to expand the functionality of the malaria surveillance system and other relevant databases to reflect the malaria situation in each area. To this extent, they are in the process of rolling out a malaria-specific logistic and supply chain management application system for pharmaceuticals, insecticides, and other non-drug supplies to augment the malaria surveillance system, with longer-term plans for most malaria commodities to be incorporated into the general health care system of the MOPH.

Lao PDR: To support Lao PDR’s goal of malaria elimination by 2030, CMPE has set as an objective to establish effective program management and coordination at all levels of the health system to efficiently deliver a combination of targeted interventions for malaria burden reduction and elimination. Their aim is to manage procurement and in-country supply chain management for pharmaceuticals and other malaria commodities to ensure continuous supply for all interventions.

5.2. Recent Progress (between March 2021 and March 2022)

Thailand

- Executed and supported the processes for the procurement of malaria commodities to contribute to national needs.
- Assisted in the development of a 2020–2022 supply plan for malaria commodities as an output of support given toward the annual forecasting and supply planning exercise.
- Conducted quarterly analysis of central stock levels, commodity procurements, and supply plans.
- Continued to provide technical support to DVBD to strengthen the county’s capacity in supply chain management for malaria elimination and rapid response of any resurgences or outbreaks.
- Further improved commodity data visibility at the central level, management of logistics transactions, and expiry tracking through the initial development of a paper-based and online data reporting platform for use at service delivery points and higher management points to augment the Malaria Information System.

Lao PDR

- Executed and supported the processes for the procurement of malaria commodities for vector control and case management.
- Continued to provide TA to CMPE for supply chain management, support for supply chain coordination, and strengthened stock management and reporting at sub-national levels.

- Assisted in the development of a 2020–2022 supply plan for malaria commodities as an output of support given toward the annual forecasting and supply planning exercise.
- Conducted quarterly analysis of central stock levels, commodity procurements, and supply plans.

5.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of activities that PMI proposes to support in Thailand and Lao PDR with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

PMI will continue to support health supply chain and pharmaceutical management activities in Thailand and Lao PDR as described in the Recent Progress section (5.2).

6. Social and Behavior Change

6.1. PMI Goal and Strategic Approach

Thailand: Thailand’s national malaria elimination strategy (2017–2026) includes an objective to promote and empower communities to prevent and control malaria themselves. To this end, the national strategy calls on communities and individuals to participate in malaria control activities.

With Global Fund and domestic support, Thailand provided comprehensive SBC, community mobilization, and access to health services for both Thai people and migrants residing in malaria transmission zones in the 44 provinces in Thailand that border neighboring countries. Thailand’s Royal Princess Project also supports some community and school-based activities along the border, including health education and malaria screening. The Global fund supports community-based organizations that are implementing SBC activities targeting displaced Burmese MMPs along the Thai–Burma border and other migrant populations in Thailand along border provinces.

Lao PDR: The Lao NSP (2021–2025) supports a comprehensive SBC strategy and includes a strategic objective calling for the implementation of a comprehensive SBC approach for malaria elimination through behavior change communication, community mobilization, and advocacy. The program works with the national Ministry of Health Center for Information, Education and Health, implementing partners, and communities to educate target groups on malaria and its prevention and support improved access to malaria services.

6.2. Recent Progress (between March 2021 and March 2022)

In both Thailand and Lao PDR, PMI provided limited and targeted TA for SBC to improve access to and use of malaria interventions. PMI provided TA to ensure SBC materials are translated into the appropriate languages of the targeted populations and to integrate SBC messaging with malaria case management services, including for pregnant women and forest-goers.

6.3. Plans and Justification with FY 2023 Funding

With support for SBC provided through the Global Fund grants and domestic resources, no specific PMI funding is planned to support SBC activities in Thailand and Lao PDR over the next 12 months; however, PMI RDMA and Lao Country Office staff continue to stay engaged at the national level and provide TA and support to the DVBD and CMPE for their SBC efforts as needed.

Priorities

While PMI supports integrated SBC activities that promote the uptake and maintenance of all key malaria interventions, TA for the following two behaviors will be prioritized leveraging Global Fund and other resources:

Table 3. Priority Behaviors to Address

Behavior	Target Population	Geographic Focus	Programming to Address Behavior
Personal protection and prompt care-seeking for fever among ethnic minority groups in Lao PDR	Forest-goers	Malaria hotspots	Provide TA to understand risk behaviors of ethnic minority groups Develop targeted strategies to prevent malaria infection and improve care-seeking behaviors
Adherence to case management guidelines in Thailand	Health facility providers	Nationwide	Advocate for training of private hospital and Health Promotion Hospital staff to ensure adherence to case management guidelines

Additional Support Activities

Thailand has observed an increase in malaria among school-aged children (i.e., 5–14 years of age), particularly in some provinces near the Thai–Burma border. More data are needed on the specific behavioral factors that contribute to increased risk of malaria infection among school-aged children in Thailand. PMI will provide TA, as needed, in the analysis and use of epidemiological data to better understand these risk factors to develop more targeted interventions for this population.

7. Surveillance, Monitoring, and Evaluation

7.1. PMI Goal and Strategic Approach

Thailand: PMI supports DVBD's goal for malaria elimination by 2024 and will focus TA to the national program in the following areas: 1) ensuring the collection and use of quality, standardized routine data that feed into a comprehensive national surveillance system, particularly linking the data flow between the vertical malaria system and the general health systems; 2) supporting DVBD in expanding and improving the various modules of the Malaria Information System, including capacity for routine case follow-up and monitoring treatment outcomes, foci investigations, and supply chain management; and 3) supporting DVBD to document and disseminate lessons learned to the wider malaria community. PMI prioritizes the need to prepare provinces for subnational elimination and to strengthen subnational capacity to develop and implement prevention of reintroduction strategies.

Lao PDR: Recognizing the heterogeneity of malaria transmission in the country, two surveillance and response guidelines have been developed: surveillance and response in burden reduction areas (southern provinces), and surveillance and response in elimination areas (northern provinces). In burden reduction areas, case reporting is based upon aggregated numbers that are reported monthly into the District Health Information System 2 (DHIS2) system, and response is provided at the population level. In elimination areas, the low volume of confirmed cases allows for an individual-level case response. PMI supports surveillance strengthening nationally but is focused on individual case reporting and response using the 1-3-7 approach (i.e., each malaria case is notified within 24 hours, investigated within 72 hours, and appropriately responded to within seven days) in malaria elimination districts.

7.2. Recent Progress (between March 2021 and March 2022)

Thailand

- PMI supported DVBD to standardize Thailand's malaria-free verification process for the province level. As part of the subnational verification process, DVBD, with PMI support, conducted the first data review workshop for 34 regional and provincial officers to analyze and use their surveillance and response data.
- PMI published three key peer-review publications on malaria elimination in Thailand:

- Implementation and success factors from Thailand's 1-3-7 surveillance strategy for malaria elimination.² This paper was the first of two papers describing implementation and outcomes of the 1-3-7 approach in Thailand.
- A foci cohort analysis to monitor successful and persistent foci under Thailand's malaria elimination strategy.³ This paper analyzed and identified key factors that contribute to persistent foci, including proximity to international borders and forest disturbance.
- Progress and challenges of integrated drug efficacy surveillance for uncomplicated malaria in Thailand.⁴ This paper documented how Thailand uses routine data through the integrated drug efficacy surveillance system to monitor drug efficacy.

Lao PDR

- In coordination with the Global Fund, WHO, and the national malaria program, PMI supported the training of health staff in 125 malaria elimination districts on the updated National Surveillance Guidance for Malaria Elimination and Response, which focuses on case investigation, foci investigation, and response.
- PMI conducted an assessment and a dissemination workshop of the 1-3-7 approach to identify technical, operational, and programmatic gaps for effective implementation of this strategy.

7.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of activities that PMI proposes to support in Thailand and Lao PDR with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Thailand has been scaling up its 1-3-7 strategy nationally with significant improvements noted. Although data reporting has high rates of completeness, the quality of the data (in particular consistency, accuracy, and validity) needs to be ensured, especially as malaria services provision and reporting transition from vertical malaria clinics/posts to integrated health promotion hospitals providing broader services. PMI will strengthen

² Lertpiriyasuwat, C., Sudathip, P., Kitchakarn, S. et al. Implementation and success factors from Thailand's 1-3-7 surveillance strategy for malaria elimination. *Malar J* 20, 201 (2021).

<https://doi.org/10.1186/s12936-021-03740-z>

³ *Ibid.*, p. 118.

⁴ *Ibid.*, p. 261.

support on effective integration of malaria services and reporting from the general health services (e.g., health promotion hospitals).

With an updated risk stratification and national elimination strategy, Lao PDR is intensifying its case-based surveillance activities in all elimination districts using the 1-3-7 approach. Through support from the Global Fund and other partners, the malaria module of the DHIS2 has expanded to include private–public mix data, elimination data (case notification, case investigation, case classification, focus investigation, and response), iDES, vector control interventions, and entomological surveillance. PMI will contribute to strengthening implementation of a streamlined 1-3-7 approach and support use of DHIS2 data to inform decision-making at all levels, particularly capacity strengthening at the district level.

Table 4. Malaria Surveillance Sources in Thailand

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Malaria Surveillance and Routine System Support	Integrated Drug Efficacy Surveillance	X	X [†]	P	P	P	P
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System	X [†]	X [†]	P	P	P	P
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System	X [†]	X [†]	P	P	P	P
Other	Knowledge, Attitudes, and Practices Survey; Malaria Behavior Survey	X*					

*Non-PMI funded activities

†Co-funded activities

X denotes completed activities

P denotes planned activities

Table 5. Malaria Surveillance Sources in Lao PDR

Source	Data Collection Activity	2020	2021	2022	2023	2024	2025
Malaria Surveillance and Routine System Support	Therapeutic Efficacy Studies	X	X [†]	X [†]	X [†]	P	P
Malaria Surveillance and Routine System Support	Integrated Drug Efficacy Surveillance		X [†]	P	P	P	P
Malaria Surveillance and Routine System Support	Support to Parallel Malaria Surveillance System	X [†]	X [†]	P	P	P	P
Malaria Surveillance and Routine System Support	Electronic Logistics Management Information System	X [†]	X [†]	P	P	P	P

*Non-PMI funded activities

†Co-funded activities

X denotes completed activities

P denotes planned activities.

8. Operational Research and Program Evaluation

8.1. PMI Goal and Strategic Approach

Thailand: To support the vision of a malaria-free Thailand by 2024, DVBD aims to conduct research to develop knowledge, technology, innovation, interventions, and guidelines for surveillance, prevention, and elimination of malaria to fit with local situations.

Lao PDR: The Lao NSP for Malaria Control and Elimination 2021–2025 aims to eliminate malaria by 2030 and includes a strategic intervention area to expand operational research (OR) to guide strategic decisions, to use technology to address bottlenecks, and to innovative ways to address residual malaria transmission and effectively deliver services to hard-to-reach populations.

PMI keeps abreast of the evolving country and regional OR priorities, OR results from studies in the region, and development of promising highly sensitive point-of-care diagnostics or outdoor transmission measures to plan accordingly. In addition, PMI participates in the Global Fund’s RAI3E OR subcommittee to guide its OR investment decisions for the region.

8.2. Recent Progress (between March 2021 to March 2022)

PMI did not support any OR activities in Thailand or Lao PDR in the last 12–18 months.

PMI-funded Operational Research/Program Evaluation Studies

No PMI-supported OR/PE is ongoing or has been recently completed.

Table 6. Non-PMI-funded Operational Research/Program Evaluation Studies Planned/Ongoing in Thailand

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
RAI2E/3E (Regional)	UCSF	Targeting high-risk populations with enhanced reactive case detection: A study to assess the effectiveness and feasibility of reducing <i>P. falciparum</i> and <i>P. vivax</i> malaria in Southern Lao PDR and Thailand	Extended through August 2022
U.S. Department of Defense (DMAP)/ Armed Forces Research Institute of Medical Sciences (AFRIMS)	UCSF/Royal Thai Army (RTA)	Understand and target drivers of malaria transmission and burden reduction among the RTA and local civilian populations in Sisaket and Yala Provinces (qualitative study)	Ongoing
MMV	PATH	Feasibility study to assess introduction of quantitative glucose-6-phosphate dehydrogenase testing before tafenoquine administration	Ongoing

Table 7. Non-PMI-funded Operational Research/Program Evaluation Studies Planned/Ongoing in Lao PDR

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
RAI2E/3E (Regional)	UCSF	Targeting high-risk populations with enhanced reactive case detection: A study to assess the effectiveness and feasibility of reducing <i>P. falciparum</i> and <i>P. vivax</i> malaria in Southern Lao PDR and Thailand	Extended through August 2022
U.S. Department of Defense	AFRIMS	Evaluation of permethrin-treated uniforms and spatial repellents in the military population	Extended through August 2022

Table 8. Ongoing Regional Program Evaluation and Operational Research in the Greater Mekong Subregion

Funding Source	Implementing Institution	Research Question/Topic	Status/Timeline
RAI3E (Regional)	MORU, Asia Pacific Malaria Elimination Network, UCSF, AHEAD	Sustaining village health worker programs with expanded roles in the GMS (Cambodia, Thailand, and Vietnam)	Jan. 2021–Dec. 2022
RAI3E (Regional)	Institute Pasteur Cambodia, AFRIMS, PATH	<i>Plasmodium vivax</i> elimination in the GMS: targeting the hypnozoite reservoir, expanding access to radical cure treatments, and enhancing safe and effective case management (Cambodia)	Jan. 2021–Dec. 2022
RAI3E (Regional)	Burnet Institute, Health Poverty Action	Personal protection packages for reducing residual malaria transmission in forest-going mobile and migrant populations in the Greater Mekong Subregion: Stepped-wedge trials with nested mixed methods study (Burma, Cambodia, Vietnam, and Lao PDR)	Jan. 2021–Dec. 2022
RAI3E (Regional)	Burnet Institute, HPA	Optimizing 1-3-7 surveillance and response strategies to achieve malaria elimination across the Greater Mekong Subregion (Burma, Cambodia, Lao PDR, Thailand, and Vietnam)	Jan. 2021–Dec. 2022

8.3. Plans and Justification with FY 2023 Funding

No OR/PE activities are proposed with FY 2023 funding.

9. Capacity Strengthening

9.1. PMI Goal and Strategic Approach

Strengthening national program capacity is a critical area of strategic focus within the PMI strategy. Depending on need and evolving epidemiology, PMI will continue to

support national and regional capacity-building and training efforts on program management, malaria elimination, quality assurance/quality control for diagnostics, supply chain, surveillance, monitoring and evaluation, and entomology.

9.2. Recent Progress (between March 2021 to March 2022)

Regional

- PMI supported a virtual country program managers meeting in April 2021 in which 10 of the 11 member countries participated to review the countries' malaria situation and challenges of getting to zero malaria, and to identify priority capacity building needs common among the countries.

9.3. Plans and Justification with FY 2023 Funding

The FY 2023 funding tables contain a full list of activities that PMI proposes to support in Thailand and Lao PDR with FY 2023 funding. Please visit www.pmi.gov/resources/malaria-operational-plans-mops for these FY 2023 funding tables.

Strengthening capacity for subnational malaria elimination remains a priority for the region. PMI will aim to continue support for a (virtual) cascade training for malaria elimination, including emphasis on new WHO guidance documents, and preparing and conducting subnational verification/certification.

10. Staffing and Administration

The single interagency team led by the USAID Mission Director or their designee consists of a Resident Advisor representing USAID and two locally hired experts known as Foreign Service Nationals based in Thailand and Lao PDR, respectively. The PMI interagency team works together to oversee all technical and administrative aspects of PMI, including finalizing details of the project design, implementing malaria prevention and treatment activities, monitoring and evaluation of outcomes and impact, reporting of results, and providing guidance and direction to PMI implementing partners.

ANNEX: GAP ANALYSIS TABLES

Table A-1. ITN Gap Analysis Table [Thailand]

Calendar Year	2022	2023	2024
Total country population	69,661,169	69,842,288	70,023,878
Total population at risk for malaria	547,254	475,373	388,719
PMI-targeted at-risk population	547,254	475,373	388,719
Population targeted for ITNs	547,254	475,373	388,719
Continuous Distribution Needs			
Channel 1: ANC	0	0	0
Channel 1: ANC Type of ITN			
Channel 2: EPI			
Channel 2: EPI Type of ITN			
Channel 3: School			
Channel 3: School Type of ITN			
Channel 4: Community- Thai population in A1 and A2 foci areas	216,724	195,052	156,042
Channel 5: Community- Non-Thai refugees in 9 camps	1,900	10,000	10,000
Channel 6: Migrants (M1 & M2 accessing ACD and PCD)	36,523	25,000	25,000
Channel 7: Forest goers	46,812	42,131	33,705
Channel 8: Emergency/outbreak		2,000	2,000
Channel 8: Type of ITN	Single Pyrethroid	Single Pyrethroid	Single Pyrethroid
Estimated Total Need for Continuous Channels	255,148	232,052	193,042
Mass Campaign Distribution Needs			
Mass distribution campaigns	0	0	0
Mass distribution ITN type			
Estimated Total Need for Campaigns	0	0	0
Total ITN Need: Continuous and Campaign	255,148	232,052	193,042
Partner Contributions			
ITNs carried over from previous year	170,074	123,759	96,240
ITNs from Government	30,000	30,000	30,000
ITNs from Global Fund	0	0	0
ITNs from other donors	0	0	0
ITNs planned with PMI funding	50,000	80,300	80,000
Total ITNs Contribution Per Calendar Year	250,074	234,059	206,240
Total ITN Surplus (Gap) LLINs only; LLHIN for forest goers excluded	(5,073)	2,007	13,198
Total ITNs Contribution Per Calendar Year	0	0	0
Total ITN Surplus (Gap) LLIHNs for forest goers	(46,812)	(42,131)	(33,705)

Table A-2. RDT Gap Analysis Table [Thailand]

Calendar Year	2022	2023	2024
Total country population	69,661,169	69,842,288	70,023,878
Population at risk for malaria	547,254	475,373	388,719
PMI-targeted at-risk population	547,254	475,373	388,719
RDT Needs			
Total number of projected suspected malaria cases	67,640	29,760	29,760
Percent of suspected malaria cases tested with an RDT	100%	100%	100%
RDT Needs (tests)	101,460	44,640	44,640
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tests)			
RDTs from Government	0	0	0
RDTs from Global Fund	144,925	121,750	0
RDTs from other donors	0	0	0
RDTs planned with PMI funding	0	0	0
Total RDT Contributions per Calendar Year	144,925	121,750	0
Stock Balance (tests)			
Beginning Balance	28,070	71,535	148,645
- Product Need	101,460	44,640	44,640
+ Total Contributions (received/expected)	144,925	121,750	0
Ending Balance	71,535	148,645	104,005
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	50,730	22,320	22,320
Total Surplus (Gap)	20,805	126,325	81,685

Table A-3. ACT Gap Analysis Table [Thailand]

Calendar Year	2022	2023	2024
Total country population	69,661,169	69,842,288	70,023,878
Population at risk for malaria	547,254	475,373	388,719
PMI-targeted at-risk population	547,254	475,373	388,719
ACT Needs			
Total projected number of malaria cases	1,074	537	215
Total ACT Needs (treatments)	5,009	5,009	5,009
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	5,000	5,000	5,000
ACTs from Global Fund	0	0	0
ACTs from other donors	0	0	0
ACTs planned with PMI funding	0	0	0
Total ACTs Contributions per Calendar Year	5,000	5,000	5,000
Stock Balance (treatments)			
Beginning Balance	0	4,994	4,985
- Product Need	5,009	5,009	5,009
+ Total Contributions (received/expected)	5,000	5,000	5,000
Ending Balance	(9)	4,985	4,976
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	0	0	0
Total Surplus (Gap)	(9)	4,985	4,976

Table A-4. Inj. Artesunate Gap Analysis Table [Thailand]

Calendar Year	2022	2023	2024
Injectable Artesunate Needs			
Projected number of severe cases	30	15	9
Projected number of severe cases among children	0	0	0
Average number of vials required for severe cases among children			
Projected number of severe cases among adults	30	15	9
Average number of vials required for severe cases among adults	15	15	15
Total Injectable Artesunate Needs (vials) for treatment	450	225	135
Needs Estimated based on HMIS Data			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	0	0	0
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	3,000	3,000	3,000
Total Injectable Artesunate Contributions per Calendar Year	3,000	3,000	3,000
Stock Balance (vials)			
Beginning Balance	4,825	7,825	7,847
- Product Need	450	225	135
+ Total Contributions (received/expected)	3,000	3,000	3,000
Estimated/projected expiries	1,210	2,753	2,883
Ending Balance	6,165	7,847	7,829
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	4,454	4,454	4,454
Total Surplus (Gap)	1,711	3,393	3,375

Table A-5. Primaquine 7.5 mg Gap Analysis Table [Thailand]

Calendar Year	2022	2023	2024
Total Country Population	0	0	0
Total population at risk for malaria	0	0	0
PMI-targeted at-risk population	0	0	0
Primaquine Needs			
Total projected number of malaria cases	0	0	0
Total projected number of Pf cases (children <15 y/o)	8	8	8
Total projected number of Pv cases (children <15 y/o)	788	709	638
Total projected number of mixed cases (Pf + Pv)	0	0	0
Tablets required to treat Pf cases (children <15 y/o)	14	14	14
Tablets required to treat Pv cases (children <15 y/o)	19,689	17,715	15,941
Total Primaquine 7.5mg Needs (tablets) for treatment	19,703	17,729	15,955
Needs Estimated based on HMIS Data			
Partner Contributions (tablets)			
Primaquine from Government	0	0	0
Primaquine from Global Fund	0	0	0
Primaquine from other donors	0	0	0
Primaquine planned with PMI funding	90,000	100,000	100,000
Total Primaquine Contributions per Calendar Year	90,000	100,000	100,000
Stock Balance (tablets)			
Beginning Balance	35,000	105,297	178,181
- Product Need	19,703	17,729	15,955
+ Total Contributions (received/expected)	90,000	100,000	100,000
Estimated/projected expiries	0	9,387	62,964
Ending Balance	105,297	178,181	199,262
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	98,253	98,253	98,253
Total Surplus (Gap)	7,044	79,928	101,009

Table A-6. Primaquine 15 mg Gap Analysis Table [Thailand]

Calendar Year	2022	2023	2024
Total Country Population	69,661,169	69,842,288	70,023,878
Total population at risk for malaria	547,254	475,373	388,719
PMI-targeted at-risk population	547,254	475,373	388,719
Primaquine Needs			
Total projected number of malaria cases	1,074	537	215
Total projected number of Pf cases >15 y/o	16	16	16
Total projected number of Pv cases >15 y/o	213	191	162
Total projected number of mixed cases (Pf + Pv)	0	0	0
Total Primaquine 15mg Needs (tablets)	148,850	148,850	148,850
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tablets)			
Primaquine from Government	0	150,000	150,000
Primaquine from Global Fund	0	0	0
Primaquine from other donors	0	0	0
Primaquine planned with PMI funding	0	0	0
Total Primaquine Contributions per Calendar Year	0	150,000	150,000
Stock Balance (tablets)			
Beginning Balance	4,000	0	147,291
- Product Need	148,850	148,850	148,850
+ Total Contributions (received/expected)	0	150,000	150,000
Ending Balance	(144,850)	1,150	148,441
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	0	0	0
Total Surplus (Gap)	(144,850)	1,150	148,441

Table A-7. ITN Gap Analysis Table [Lao PDR]

Calendar Year	2022	2023	2024
Total country population	7,442,796	7,545,729	7,646,725
Total population at risk for malaria	1,676,410	1,701,556	1,727,079
PMI-targeted at-risk population	1,676,410	1,701,556	1,727,079
Population targeted for ITNs	1,676,410	1,701,556	1,727,079
Continuous Distribution Needs			
Channel 1: ANC	0	50,000	42,181
Channel 1: ANC Type of ITN		Single Pyrethroid	Single Pyrethroid
Channel 2: EPI	0	0	0
Channel 2: EPI Type of ITN			
Channel 3: School	0	0	0
Channel 3: School Type of ITN			
Channel 4: Community - MMPs in stratum 3 and 4	49,923	50,647	51,153
Channel 4: Community Type of ITN	Single Pyrethroid	Single Pyrethroid	Single Pyrethroid
Channel 5: Community - Military in all strata	50,000	50,000	50,000
Channel 5: Type of ITN			
Channel 6: Emergency, foci response and outbreak response)	20,000	20,000	20,000
Channel 6: Type of ITN	Single Pyrethroid	Single Pyrethroid	Single Pyrethroid
Estimated Total Need for Continuous Channels	119,923	170,647	163,334
Mass Campaign Distribution Needs			
Mass distribution campaigns	922,100	0	0
Mass distribution ITN type	Single Pyrethroid		
Estimated Total Need for Campaigns	922,100	0	0
Total ITN Need: Continuous and Campaign	1,042,023	170,647	163,334
Partner Contributions			
ITNs carried over from previous year	189,386	3,808	3,808
ITNs from Government	0	0	0
Type of ITNs from Government			
ITNs from Global Fund	636,131	100,647	TBD
Type of ITNs from Global Fund	Single Pyrethroid	Single Pyrethroid	
ITNs from other donors			
Type of ITNs from other donors			
ITNs planned with PMI funding	220,314	70,000	70,000
Type of ITNs with PMI funding	Single Pyrethroid	Single Pyrethroid	Single Pyrethroid
Total ITNs Contribution Per Calendar Year	1,045,831	174,455	73,808
Total ITN Surplus (Gap)	3,808	3,808	(89,526)

Table A-8. RDT Gap Analysis Table [Lao PDR]

Calendar Year	2022	2023	2024
Total country population	7,442,796	7,545,729	7,646,725
Population at risk for malaria	1,676,410	1,701,556	1,727,079
PMI-targeted at-risk population	1,676,410	1,701,556	1,727,079
RDT Needs			
Total number of projected suspected malaria cases	675,516	709,292	728,649
Percent of suspected malaria cases tested with an RDT	84%	85%	86%
RDT Needs (tests)	684,564	664,788	656,068
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tests)			
RDTs from Government	400,000	480,000	TBD
RDTs from Global Fund	295,960	182,618	TBD
RDTs from other donors	0	0	0
RDTs planned with PMI funding	0	0	0
Total RDT Contributions per Calendar Year	695,960	662,618	0
Stock Balance (tests)			
Beginning Balance	414,866	426,262	424,092
- Product Need	684,564	664,788	656,068
+ Total Contributions (received/expected)	695,960	662,618	0
Ending Balance	426,262	424,092	(231,976)
Desired End of Year Stock (months of stock)	6	6	6
Desired End of Year Stock (quantities)	342,282	332,394	328,034
Total Surplus (Gap)	83,980	91,698	(560,010)

Table A-9. ACT Gap Analysis Table [Lao PDR]

Calendar Year	2022	2023	2024
Total country population	7,442,796	7,545,729	7,646,725
Population at risk for malaria	1,676,410	1,701,556	1,727,079
PMI-targeted at-risk population	1,676,410	1,701,556	1,727,079
ACT Needs			
Total projected number of malaria cases	2,864	2,177	1,641
Total ACT Needs (treatments)	20,967	20,534	20,000
Needs Estimated based on Other (specify in comments)			
Partner Contributions (treatments)			
ACTs from Government	0	0	0
ACTs from Global Fund	7,319	20,742	817
ACTs from other donors	0	0	0
ACTs planned with PMI funding	0	0	0
Total ACTs Contributions per Calendar Year	7,319	20,742	817
Stock Balance (treatments)			
Beginning Balance	14,414	7,319	25,884
- Product Need	20,967	20,534	20,000
+ Total Contributions (received/expected)	7,319	20,742	817
Ending Balance	766	7,527	6,701
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	0	0	0
Total Surplus (Gap)	766	7,527	6,701

Table A-10. Inj. Artesunate Gap Analysis Table [Lao PDR]

Calendar Year	2022	2023	2024
Injectable Artesunate Needs			
Projected number of severe cases	6	5	4
Projected number of severe cases among children			
Average number of vials required for severe cases among children			
Projected number of severe cases among adults	6	5	4
Average number of vials required for severe cases among adults	10	10	10
Total Injectable Artesunate Needs (vials)	2,660	2,650	2,640
Needs Estimated based on Other (specify in comments)			
Partner Contributions (vials)			
Injectable artesunate from Government	0	0	0
Injectable artesunate from Global Fund	1,534	0	0
Injectable artesunate from other donors	0	0	0
Injectable artesunate planned with PMI funding	0	0	0
Total Injectable Artesunate Contributions per Calendar Year	1,534	0	0
Stock Balance (vials)			
Beginning Balance	25	1,499	0
- Product Need	2,660	2,650	2,640
+ Total Contributions (received/expected)	1,534	0	0
Ending Balance	(1,101)	(1,151)	(2,640)
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	0	0	0
Total Surplus (Gap)	(1,101)	(1,151)	(2,640)

Table A-11. Primaquine Gap Analysis Table [Lao PDR]

Calendar Year	2022	2023	2024
Total Country Population	7,442,796	7,545,729	7,646,725
Total population at risk for malaria	1,676,410	1,701,556	1,727,079
PMI-targeted at-risk population	1,676,410	1,701,556	1,727,079
Primaquine Needs			
Total projected number of malaria cases	2,864	2,177	1,641
Total projected number of Pf cases	170	65	131
Total projected number of Pv cases			
Total projected number of mixed cases (Pf + Pv)	2,694	2,112	1,510
Total Primaquine Needs (tablets)	116,570	97,649	78,852
Needs Estimated based on Other (specify in comments)			
Partner Contributions (tablets)			
Primaquine from Government	0	0	0
Primaquine from Global Fund	0	98,630	0
Primaquine from other donors	0	0	0
Primaquine planned with PMI funding	0	0	0
Total Primaquine Contributions per Calendar Year	0	98,630	0
Stock Balance (tablets)			
Beginning Balance	93,372	0	981
- Product Need	116,570	97,649	78,852
+ Total Contributions (received/expected)	0	98,630	0
Ending Balance	(23,198)	981	(77,871)
Desired End of Year Stock (months of stock)	0	0	0
Desired End of Year Stock (quantities)	0	0	0
Total Surplus (Gap)	(23,198)	981	(77,871)