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CAMBODIA MALARIA ELIMINATION PROJECT 2

Cambodia Malaria Elimination Project 2

Annual Progress Report
Project Year One
(September 1 2021 to September 30 2022)

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ACRONYMS

AFS	active fever screening
AHEAD	Action for Health Development
AOP	annual operational plan
BKN	Bakan
BTB	Battambang
CHK	Chhouk
CMEP2	Cambodia Malaria Elimination Project 2
CSO	civil society organization
CNM	National Center for Parasitology, Entomology and Malaria Control
COP	chief of party
DDF	department of drug and food
DSMET	district special malaria elimination team
EMMP	environmental mitigation and monitoring plan
G6PD	glucose 6 phosphate dehydrogenases
HF	health facility
IPTf	intermittent preventive treatment for forest goers
ITN	insecticide-treated net
KPT	Kampot
KRK	Krakor
LLIN / LLIHN	long lasting insecticidal net/hammock net
MIS	malaria information system
MMP	mobile/migrant populations
MMW	mobile malaria worker
MOA	memorandum of agreement
MOH	ministry of health
MOU	memorandum of understanding
NTG	national treatment guidelines
OD	operational health district
<i>Pf</i>	<i>Plasmodium falciparum</i>
PFDA	Partners for Development in Action
PHD	provincial health department
PKV	Phnom Kravanh
PLN	Pailin
<i>Pm</i>	<i>Plasmodium malariae</i>
PMI	US President's Malaria Initiative
PMS	provincial malaria supervisor
POR	prevention of re-introduction
PQ	primaquine
PSMET	provincial special malaria elimination team
PST	Pursat
<i>Pv</i>	<i>Plasmodium vivax</i>
PY1	Project Year 1
RACD	reactive case detection
RDT	rapid diagnostic test
RH	referral hospital
SAB	Srae Ambel
SIG	social inclusion and gender

SOP	standard operating procedure
SPL	Sampov Loun
SPM	Sampov Meas
TDA	targeted drug administration
USAID	United States Agency for International Development
VMW	village malaria worker
WHO	World Health Organization

1. EXECUTIVE SUMMARY

The United States Agency for International Development (USAID) | U.S. President's Malaria Initiative (PMI) Cambodia Malaria Elimination Project 2 (CMEP2) was launched on September 1, 2021 to support the Cambodian National Center for Parasitology, Entomology and Malaria Control (CNM) in its efforts to reduce malaria morbidity and mortality and contribute towards malaria elimination goals nationwide by 2025.

To reach this goal, the project has three strategic objectives:

Objective 1: Detect, effectively and safely treat, and follow-up all malaria cases, and provide effective personal protection to at least 90% of the high-risk population.

Objective 2: Strengthen national malaria surveillance, monitoring and evaluation (M&E)¹ systems appropriate for malaria elimination and control activities as well as prevention of re-introduction.

Objective 3: Build capacity of the ministry of health (MOH) to manage, intensify and sustain malaria control and elimination efforts, particularly at the provincial and operational district (OD) level.

During fiscal year (FY) 2022, CMEP2 continued project-supported activities at OD levels. CNM and CMEP2 signed a memorandum of agreement (MOA) on March 21, 2022. A memorandum of understanding (MOU) was also signed with the ministry of foreign affairs on August 26. The MOU is currently pending signatures at the ministry of health (MOH).

CMEP2 notable achievements in project year (PY)¹² are:

- **114,394** suspected cases were tested for malaria, **626** of which were confirmed positive and received correct treatment according to the national treatment guidelines (NTG).
 - In the CMEP2 target areas, **114** *Plasmodium falciparum* (*Pf*) cases, **466** *Plasmodium vivax* (*Pv*) cases, and **46** *Plasmodium malariae* (*Pm*) and *Plasmodium knowlesi* (*Pk*) cases were detected³ (See Table 1).
- Of the **466** *Pv* cases in CMEP2 areas, **434** (93.1%) were eligible for glucose 6 phosphate dehydrogenase (G6PD) testing, 386 of which (88.9%) were tested. A total of 275 (59.0% of all *Pv* cases, and 100% of normal G6PD patients) completed radical treatment. Of all eligible *Pv* cases, 84.7% were referred by VMWs to the HF, and 83.7% of those referred (70.9% of the total eligible) reached a health facility (HF).
- Among all species, 536/626 (85.62%) cases were notified within one day according to the MIS (see additional explanation in task 1.1), 625/626 (99%) were investigated and classified and

¹ CMEP2 henceforth refers to MEL, monitoring, evaluation and learning, to reflect more accurately the purpose of these activities.

² Data presented in this report are for PY1. The PITT table submitted with the report presents disaggregated data by quarter.

³ RDT currently used in Cambodia do not detect *Pm* species; however, patients suspected of having malaria who test negative by RDT are confirmed using microscopy. In health centers with trained microscopists, they prepare a smear, read the slide and send it to the referral hospital for confirmation. In case the health center does not have a trained microscopist, patients are referred to the referral hospital. If the microscopist at the RH is uncomfortable making the diagnosis, the slide and a dried blood spot (DBS) are sent to CNM for confirmation of diagnosis.

125/131 (95%) were responded to within 1-3 days.⁴ All foci investigations (1/1) were completed within 7 days.

- Based on malaria information system (MIS) data, **66,419** insecticide-treated nets (ITNs) – including **45,058** long-lasting insecticidal net (LLINs) and **21,361** long-lasting insecticidal hammock nets (LLIHNs) – were distributed through continuous distribution and targeting mobile migrant populations (MMPs).
- A reported **180,317** people received health education through malaria screening and testing and during ITN monitoring and distribution.⁵

The CMEP2 team participated in several events convened by the national program. This included the National Malaria Annual Conference, various meetings and workshops related to the midterm technical review of the malaria elimination action framework (MEAF2), the M&E plan and national treatment guidelines revision workshop, World Malaria Day activities in various ODs, CNM partner meetings, CNM technical working groups meetings, a meeting on ‘certification for malaria elimination’, and the ‘Sustaining Cambodia’s Malaria Response: An Assessment of Donor Transition Readiness and Budget Advocacy Opportunities’ workshop. During the partner meetings at CNM, CMEP2 presented its management of the sudden and significant increase in *Pf* cases in Phnom Kravanh (PKV) in Pursat province.

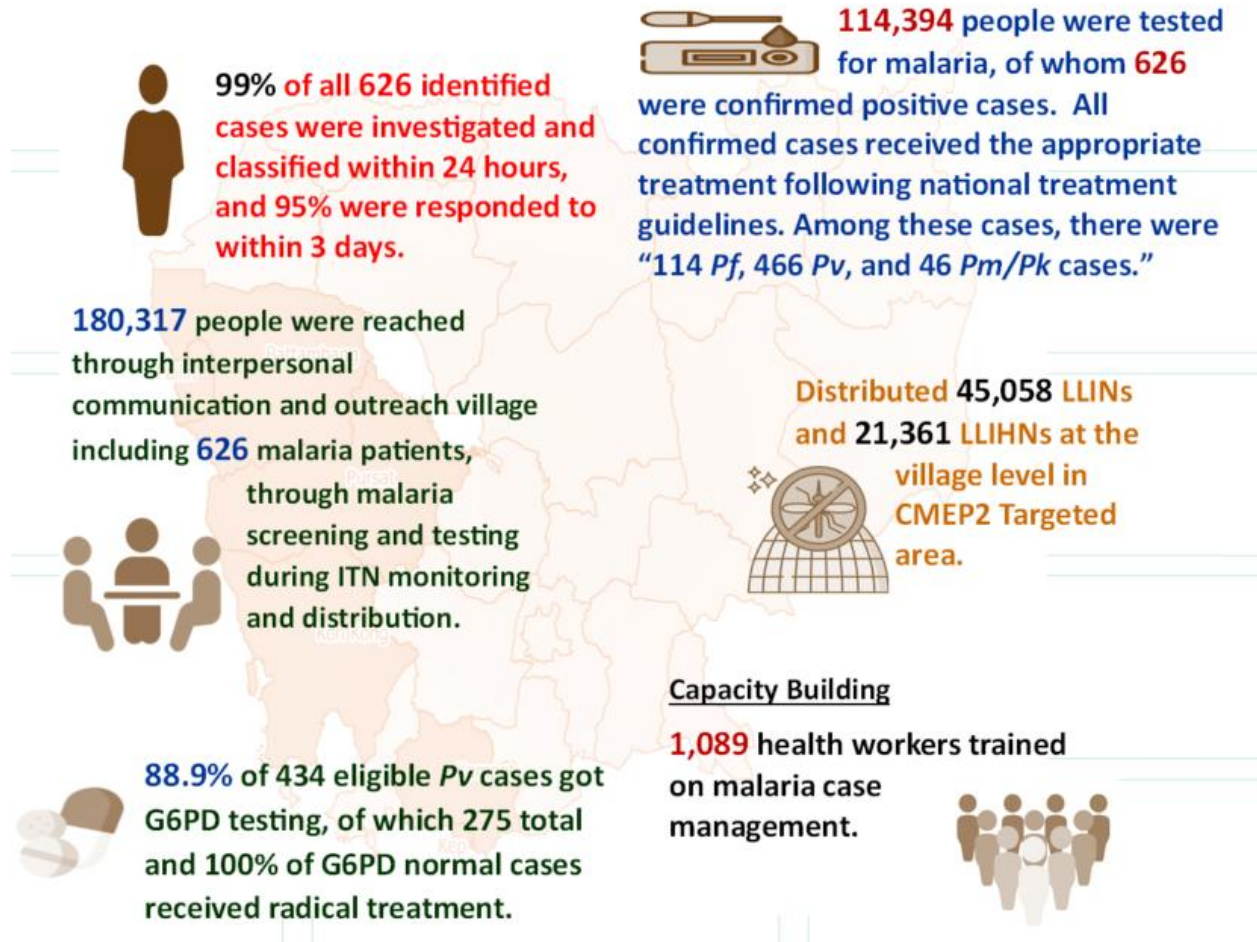
The national program at both central and cluster levels engaged actively with CMEP2. CNM, including its director, participated in the annual operational plan (AOP) development workshop in Kampot, and CNM technical units conducted supportive supervision to operational districts (OD), HF and village malaria workers (VMWs); they also supported training activities. CNM conducted a training on intermittent preventive treatment for forest goers (IPTf) for provincial health department (PHD), OD and CMEP2 teams from PKV to prepare for its implementation in response to the *Pf* case increase.

Grants under contract between CMEP2 and the civil society organizations (CSOs) Action for Health Development (AHEAD) and Partners for Development in Action (PFDA) were fully executed on May 24th, 2022. The CSOs provide services to vulnerable populations in hard-to-reach locations by promoting early diagnosis and treatment, distributing ITNs, conducting health education, referring suspected cases to VMWs/mobile malaria workers (MMWs) and HFs and by providing case follow up and other community engagement for improved health seeking.

⁴ Please refer to footnote 13.

⁵ The reported achievement is based on a proxy indicator and assumes that all people tested and all recipients of an ITN also received health education.

Figure 1: Overall Results from CMEP2 Year 1



2. PROGRESS TOWARD ACHIEVING CMEP2 OBJECTIVES

2.1 Objective 1: Early detect and effectively and safely treat 100% of cases and provide effective personal protection to at least 90% of the high-risk population.

Objective 1: Deliverables and Results

The following results were achieved:

Test positivity rate: 0.55% (626/114,394) *100, Target: 1%

Annual blood examination rate: 4.93 (114,394/ 2319611) *100, Target: 4

Percentage of cases that received treatment as per the national treatment guidelines:
100% (626/626), Target: 100%

Percentage of confirmed cases notified within 24 hours: 85.62% (536/626) Target: 100%

Rapid diagnostic tests (RDTs) procured by United States Government (USG) funds distributed: 16,190, Target: 108,527

RDTs procured by other partners, distributed with USG funds: 82,302, Target: 19,921

Task 1.1 Early detection, treatment and strengthening day 1 notification

In the 14 ODs 114,394 suspected malaria cases were tested with a total of 626 malaria cases confirmed (114 *Pf*, 466 *Pv*, and 46 *Pm/Pk*) (See Table 1).⁶ The percentage of confirmed cases notified within 24 hours was 85.62% (536/626). The relatively low score is due to edits made following an incorrect initial entry in the MIS whereby the system shows the last edited entry as notification date. This incorrectly suggests that the notification was delayed. In addition, if a case is diagnosed in the evening hours and the entry is made the next morning, it shows as 'late' in the MIS, even though it is within 24 hours. Importantly, 99% of all cases were investigated and classified within 24 hours. Therefore, 'late' notification as per the MIS does not mean that cases are not timely investigated, classified and responded to.

Table 1: Malaria Cases by OD for FY22

Province	District	Tests	Positive Malaria Cases			Total
			Pf	Pv	Pm/Pk	
Battambang	Battambang	11,220	5	9	3	17
	Maung Russei	3,614	0	10	0	10
	Sampov Luon	7,474	0	1	0	1
	Thma Koul	1,103	0	1	1	2

⁶ An individual referred by a VMW to the HF is given the same case ID number in the MIS if they test positive with both providers, and all calculations made within the MIS (e.g., number of cases, treatment, follow-up) are calculated based on these ID numbers. The HF+VMW summary data in the MIS report the number of tests and results independent of the case ID number (i.e., the number of tests rather than the number of people tested) and report the number of VMW referrals in each health facility. Therefore, a discrepancy exists. For purposes of this report, we use case ID numbers and numbers for test and case numbers are the same as presented in the table.

Province	District	Positive Malaria Cases				Total
		Tests	Pf	Pv	Pm/Pk	
Kampot	Chhouk	8,643	3	34	0	37
	Kampot	5,353	0	4	0	4
Kep	Kep	850	0	1	0	1
Koh Kong	Smach Mean Chey	3,179	0	10	0	10
	Srae Ambel	1,936	1	58	0	59
Pailin	Pailin	8,082	0	5	1	6
Pursat	Bakan	11,069	2	4	0	6
	Krakor	20,571	1	124	4	129
	Kravanh ⁷	24,157	99	190	36	325
	Sampov Meas	7,143	3	15	1	19
Total		114,394	114	466	46	626

Task 1.2 Enhance capacity and ensure quality services

Table 2 below presents the number and locations of supervision visits. In project year 1 (PY1), the percentages of actual vs. planned visits by the PHD to OD/HF, OD to HF, and HF to VMW/MMW were 47%, 81%, and 69%, respectively. HF staff visits to VMWs in PKV/Krakor (KRK) exceed those planned due to a revision of the target by the OD mid-year, from two to four per year. CMEP2 adjusted this back to two visits per year starting in Q4. HF staff conduct the visits to strengthen data quality, ensure adequate malaria stock, and provide mentoring and coaching on updated case management and surveillance to improve VMW/MMW performance. Not all VMWs are participating in supportive supervision during each quarter, but each VMW is visited once every six months according to CNM guidelines.

Table 2: Planned and Actual Supervision Visits during PY1

ODs/Cluster/Provinces	Planned Visits from PHD to OD/HF	Actual result	Planned visits from OD to HF	Actual result	Planned visits from HF to VMW/MMW	Actual result
PKV & KRK	4	4 (100%)	64	64 (100%)	323	254 (127%)
BTB, MRS, TMK	0	0 (100%)	248	186 (75%)	263	108 (41%)
SPM, BKN	4	4 (100%)	96	96 (100%)	161	160 (99%)
PLN, SPL	8	8 (100%)	10	10 (100%)	304	271 (89%)
SMC, SAB	6	2 (33%)	6	4 (67%)	92	68 (74%)
KPT, CHK, KEP	16	0 (0%)	19	1 (5%)	272	4 (1%)
6 provinces	38	18 (47%)	443	361 (81%)	1346	934 (69%)

⁷ CNM modified a case in PKV from Pm to Pf/mixed due to PCR results becoming available upon submission of the report.

Task 1.3 Strengthen and enhance laboratory capacity

In PY1, supervision by provincial laboratory supervisors to referral hospitals (RHs) and some health centers where malaria microscopy is available was conducted in eight ODs: PKV, KRK, Bakan (BKN), Battambang (BTB), MRS, Thmar Koul, Sampov Loun (SPL) and Chhouk (CHK). As per schedule, the CNM lab unit conducted one supervision visit to each of seven ODs: MRS, Pailin (PLN), SMC, KRK, PKV, BKN and Sampov Meas (SPM).

Achievements included supporting identification of proper management of malaria diagnosis at HF levels both by RDT and microscopy testing, providing regular feedback and on-the-job training. Challenges included microscopy diagnosis being affected due, in some cases, to laboratory reagents and consumables not available - CMEP2 then fills the gaps – and in other cases, it was due to confusion among local government staff on microscopy policy. Some state that microscopy is required only for RH, and others suggest that any HF with equipped microscope should conduct microscopy. This requires clarification from the national level

Task 1.4 Ensure quality treatment and compliance

All 626 confirmed malaria cases were treated as per NTG and followed up. No side effects of treatment by artesunate + mefloquine or primaquine (PQ) were reported in PY1 . According to the MIS, four severe cases occurred during FY22.

To ensure successful treatment for *Pf* malaria, microscopy slides were collected on D28 for all cases, none with a positive reading. DBS for *Pf* cases were collected for D0 and few at D42; these are sent for PCR analysis in FY23. Slides and DBS of *Pm/Pk* have been collected regularly and were sent to CNM for microscopy and PCR confirmation. When iDES starts early PY2, microscopy slides and DBS will be collected for: 1) *Pf/Pm/Pk* on D0, D28 and D42; and 2) *Pv/Pmix/Po* on D0, D28, & D90”.

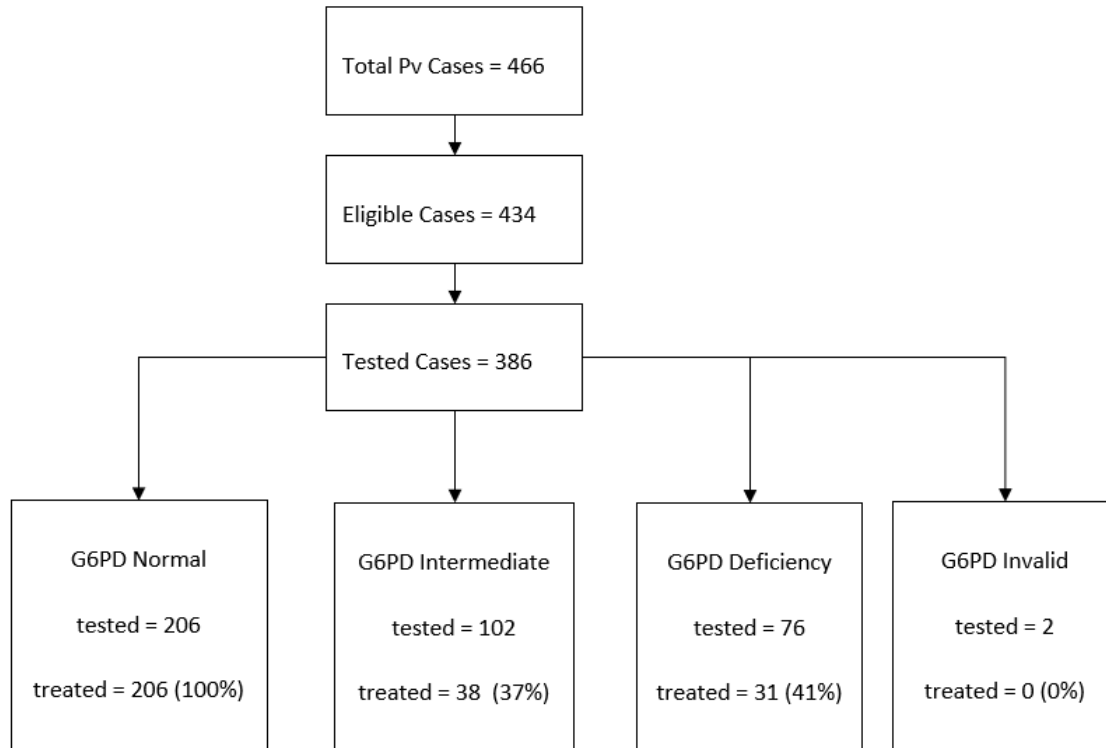
Task 1.5 Strengthen, implement and support *Pv* radical cure

Among the 466 *Pv* cases detected, 434 (93.1%) were eligible for G6PD testing (See Figure 2). Of the eligible cases, 386 (88.9%) underwent G6PD testing. A main reason for a patient decision not to test is their preference to return to their hometown for additional testing and treatment. Often, they do not have the luxury to stay around either. Sometimes patients live up to 100km distance from the nearest HC, such as in SAB OD.

A total of 275 cases (244 male, 31 female) completed radical treatment which included all G6PD normal cases.⁸ All 275 received D3, D7, and D14 follow-up, and no adverse effects were reported. The reasons for ineligibility were ‘weight below 20 kg’ and ‘pregnancy/breastfeeding’. CMEP2 started treating G6PD intermediate cases in May 2022, which explains that only 37% of intermediate cases were treated during PY1. The CSO Health and Social Development (HSD) conducted a pilot study on treatment for G6PD deficient patients from October 2021 - June 2022 during which 31 *Pv* cases in PKV and KRK were treated. In addition, MORU treated 55 normal cases. All cases treated by HSD and MORU are included in the total 275 cases.

⁸ G6PD levels are determined in cut offs using units/gram of hemoglobin. For females >6 is normal, 4-6 is intermediate, and <4 is deficient. For males, >=4 is normal, and <4 is deficient. These are the new G6PD cutoffs. The previous G6PD intermediate level for male (4-6) has been acknowledged as normal starting May 2022.

Figure 2: Flowchart of *Pv* cases



Task 1.6 Ensure system set up for pharmacovigilance and support hospitalization

During the monthly *Pv* radical treatment meetings, participants discussed the application of the adverse drug reaction (ADR) form introduced by the department of drug and food (DDF) of the MOH to CNM and partners. CNM and partners requested DDF to closely monitor and collect the completed forms for analysis and to support pharmacovigilance activities in the malaria program. During this year, no malaria cases with ADR were reported.

Task 1.7 Sustain and strengthen universal coverage of ITN in targeted villages

A total of 66,419 ITNs (LLINs: 45,058; LLIHNs: 21,361) were distributed in CMEP2-supported areas, including top-up through continuous distribution and net distribution to MMPs. This was done during VMW outreach activities and during case response activities. ITN mass campaigns were conducted in CHK OD in Kampot (KPT), in Kep OD in Kep, in SMC and Srae Ambel (SAB) ODs in Koh Kong during PY1.

The CMEP2 team introduced changes to its ITN tracking system to ensure that the project can track all ITNs received by or transferred to different levels in the clusters⁹ (quantity, batch numbers, type, expiry date, and the donor which procured the nets are recorded in the tracking system). At the provider level, CMEP2 MEL assistants placed emphasis on better tracking and

⁹ A CMEP2 cluster refers to regional teams which operates in one or more provinces covering a number of ODs. During FY22, CMEP2 operated five clusters covering 14 ODs in six provinces.

recording within the monthly reports and electronic reporting in MIS while attending monthly meetings and supervision visits. In addition, the project requires weekly reporting from all providers to ensure that CMEP2 has up to date information on the movements of nets within supported areas. CMEP2 worked with the Global Health Supply Chain - Procurement and Supply Management project (GHSC-PSM) to review the new tracking system and ensure that expiry dates for all ITNs in stock are available. All LLIHNs that were expiring by August 2022 were distributed prior to their expiry date.

In addition to ensuring better tracking of ITNs, CMEP2 worked with CNM and stakeholders to develop distribution strategies that fit within national guidelines (guidelines have not been updated for several years)¹⁰. CMEP2 continues to measure how the projections match with actual distribution and whether reallocations of ITNs from areas with low demand to areas where additional nets are required.

Task 1.8 Intensify interventions for high-risk population

From April 11th - 31st, 10 *Pf* cases were reported in Phnom Kravanh OD in Pursat province, double the amount reported during the previous three months. It also marked a significant increase compared with the same period in the previous year. CMEP2 immediately developed a package of interventions to respond. These intensive interventions focused on the catchment areas of two HFs – PKV and Samrong in PKV OD – where potential hotspots of malaria transmission were identified and population movements into the forest occur on significant scale. Interventions started April 26th, 2022 and included: 1) Village census to timely identify forest goers for AFS, health education, ITN top up and screening and treatment in villages with *Pf* cases; and 2) establishing stationary teams to screen, treat and provide prevention materials near the entry/exit point of forest sites that are associated with the malaria cases (e.g., Sre Bon and Pich Sla). As most forest goers travel in the evening/night hours and movements are frequent, we made the touchpoints operational 24/7. CMEP2 teams from other clusters and six VMWs from other communities were mobilized to support the operation that started on May 23rd. All interventions actively engaged relevant commune councils and commune/village chiefs/vice chiefs, and approximately one third of our current VMWs/MMWs are VHGS. All local stakeholders are routinely mobilized for any intervention, including the district governor.

Following discussions at the CNM partners meeting of June 13th, CMEP2 committed to implementing targeted drug administration (TDA) with Pyramax in one village with an identified L1 case. TDA started on July 22nd in Chamkar Phnom, a sub-village of Kset Borey, and compliance to the treatment regimen reached 98%; one targeted individual left the village after one dose had been administered. The second round of TDA on August 22 also reached 98% .

At the meeting, CMEP2 also committed to IPTf in three villages that had *Pf* cases reported by individuals who had traveled to the forest (e.g., LC cases) for two successive months. CMEP2 carefully considered the application of IPTf while weighing risks associated with doing so [adverse

¹⁰ CMEP2 implements the following strategy: 1) For **LLIN** distribution, CMEP 2 follows Annex 7 of CNM's ITN distribution guidelines and forecasts the need to be 15% of the mass distribution per year. 2) For **LLIHN** distribution, CMEP2 distributes one hammock net to each forest goer in need at both the VMW and HC levels, and one to each HH visited by VMWs/MMWs that have no net, a damaged net, or new members/forest going MMPs. CMEP2 forecasts this need as one new LLIHN/year for each MMP who travels to the forest and sleeps overnight (5.1% from the Cambodia Malaria Survey, 2013) in villages receiving mass distribution.

effects; using a first line drug (ASMQ) for chemoprophylaxis; and related adherence and coverage concerns] against the risks of *Pf* transmissions spiraling out of control. When Pyramax became available and was accepted at a national level as the drug for use with IPTf, preparations for IPTf started in the three most affected villages (Mol Rokat, Veal, Veal Vong) on July 5th. In both TDA and IPTf locations, the work involved training for local authorities and health teams, community engagement (CE) sessions, a population census, and active fever screening (AFS). OD/HF/CMEP2 assigned 19 additional VMWs to support this work, including both newly recruited and reassigned volunteers.

IPTf started on August 2nd. First round coverage among the target population was 95% in Veal, 93% in Mol Rokat, and 89% in Veal Vong. The second round started September 1st and coverage reached 68% in Veal, 72% in Mol Rokat, and 55% in Veal Vong.¹¹ In addition to these three villages, IPTf is also applied for forest goers at touch points and by the recently established mobile teams. No malaria infections were identified in individuals who received TDA/IPTf .

In the last week of August, we observed an increase of cases in an area surrounding Ampil. In response, we established a third touch point at O'Chrov that became operational 24/7 on September 3rd. Two MMWs were also reactivated. On September 3rd, we sent a mobile team into the forest around Ampil, followed by teams on September 10th and September 19th. In response to the continued transmission in PKV and the expansion of potential infection sites into new areas, CMEP2 maintains all current interventions and is expanding the activation of mobile teams inside the forest around the clock. This requires recruiting 18 additional volunteers (VMW or MMW) to mobilize six teams of three volunteers each. For security reasons, teams consist of at least three individuals. They rotate weekly and operate out of three locations (Ampil, Kanom, O'da) where most recent cases had traveled. CMEP2 assigns teams flexibly to areas based on need as demonstrated through transmission data.

As requested by CNM, CMEP2 prepared for implementation of IPTf in the eight locations that saw the highest numbers of *Pf* cases since January 2022 (Veal and Veal Ampos, Mol Rokat, Veal Vong, Kset Borey, Preak Pi, Ou Preal, Kol Totueng, Paen). IPTf is being rolled out at all touch points, by mobile teams and in additional villages where we see cases detected continuously, contingent on the availability of Pyramax. If Pyramax is limited in quantity, IPTf will be administered at the touchpoints and inside the forest (by mobile teams) as this is expected to have the most direct impact on active forest goers. CMEP2 monitors the provision of IPTf and records the dates of all doses (round 1 and round 2) given to forest goers both on paper (by volunteer) and then electronically (by the CMEP2 MEL team). IPTf cards are kept by the forest goer with records of the drugs administered. To date, no adverse effects associated with IPTf using Pyramax have been recorded. An internal (CMEP2) assessment on the use of IPTf in PKV is planned following two months of implementation (in October 2022). Findings on uptake and impact on the malaria burden will be shared and inform decisions on the continuation of IPTf.

Task 1.9 Strengthen, sustain and build the VMW/MMW network

During the year, CMEP2 supported cascade training on VMW integration to relevant HF staff and VMWs in 9 ODs (BKN, SPM, KPT, KEP, SMC, SAB, PKV, KRK, CHK). Of the 502 VMWs/MMWs villages in CMEP2 areas, 254 villages were included in the VMW integration plan developed by

¹¹ Low coverage rate during subsequent rounds is due to reporting against the first-round target. However, targets must be reset for subsequent rounds as only self-identified *active* forest goers are eligible for IPTf during those rounds. With the census having identified both active and inactive forest goers between the ages of 15 – 49 being eligible, the actual targets for eligible forest goers for subsequent rounds will always be lower.

CNM and VMWs join meetings quarterly (See Annex 2). The other 248 villages continue to attend meetings monthly. Based on monthly tracking data, 92% of VMWs/MMWs in high-risk villages attended monthly meetings; 95% of VMWs/MMWs in low-risk villages attended quarterly meetings. Furthermore, HF/OD staff conducted 69% of planned supportive supervision visits to VMWs/MMWs to assess performance and provide technical support in their coverage areas. This is a signal for CMEP2 to continue working with counterparts to plan *and* conduct supervision visits at an adequate level to maintain progress made and prevent reintroduction. A total of 738 individuals (including one or two individuals from each village with VMWs) (385 females and 353 males) were trained on malaria case management.

Task 1.10 Improve uptake of malaria interventions through SBC

In PY1, 114,394 people received health education through malaria screening and testing and during VMW household visits.¹² Household visits are planned three days a month on average, in which VMWs screen household members with malaria symptoms, provide health education, check ITN availability and top up ITNs as needed. CMEP2 plans to intensify monitoring of the process through spot checks at VMW level during VMW monthly meeting visits and technical supervision.

Materials on *Pv* radical cure availability, accessibility, safety and acceptance were produced as both printed materials and sound recordings. During the coming year(s), CMEP2 plans to invest in more innovative SBC approaches.

CMEP2 works closely with the Promoting Healthy Behaviors (PHB) project. The teams meet regularly to ensure that the teams work complementarily and avoid or minimize any overlap. The projects' leaderships discussed this with PMI, and it is our respective position that the collaboration between CMEP2 and PHB in Pursat specifically is an example of how projects can work effectively together and leverage USAID funding.

Leveraging support from CSOs

On May 24th, CMEP2 signed sub-grants with two community-based organizations - AHEAD and PFDA to implement key malaria activities in the hard-to-reach areas in eight ODs. AHEAD implements activities in BTB, MRS, SMC and SAB, whereas PFDA implements in PKV, KRK, KPT and CHK.

In close collaboration with OD counterparts, CMEP2 cluster teams, HF staff, VMWs, local authorities and contact points, AHEAD identified 114 at risk locations (locations in high burden malaria endemic areas where informal/temporary settlements exist), established 48 contact points, organized 114 health education campaigns to 2,416 MMPs and distributed 1,268 ITNs to MMPs. PFDA identified 88 at-risk locations, established 88 contact points, organized 88 health education campaigns for 2,032 MMPs and distributed 2,734 ITNs to MMPs.

CMEP2, in collaboration with the PHDs of the six supported provinces, celebrated World Malaria Day (WMD) under the theme "Harness innovation to reduce globally the malaria disease burden and save lives" in hotspot areas in PLN, BTB, PST, KPT, KGG and KEP. The events were supported by CNM, provincial governors/deputy governors, with participation of PHD directors and staff, USAID/PMI representatives, district governors/deputy governors, public civil servants, OD directors and staff, HC chiefs, community volunteers, armed forces, school directors,

¹² See footnote 5.

teachers, students and villagers. The CMEP2 chief of party (COP) and senior technical advisor joined the WMD national event conducted on April 24th in Kampong Speu province with the minister of health, provincial governor, donors, implementing partners and other stakeholders.

Task 1.11 Support private sector involvement and engagement

Engagement with the private sector is limited at the moment, as private providers are not allowed to do malaria testing nor can they treat malaria cases. CMEP2 has noticed that some PPs do conduct malaria tests and may refer cases late to public health facilities. This was affirmed by the CNM supervision team. The issue was reported to relevant PHD directors and to the CNM director for further action.

Task 1.12 Strengthen and enhance entomological capacity and implementation

CMEP2 collaborates with the PMI-funded project VectorLink and the CNM entomology unit for technical support to conduct training on basic entomology and field implementation to OD/HF and volunteers. This is now planned for Q1 in PY2 due to conflicting schedules at CNM which actually conducts the training.

2.2 Objective 2: Strengthen national malaria surveillance, monitoring and evaluation systems appropriate for malaria elimination and control activities as well as prevention of re-introduction.

Objective 2: Deliverables and Results

The following results were achieved:

Cases investigated, classified within 24 hours: 99%. Target 100%

Malaria cases responded within 3 days: 95%. Target 100%

Foci investigations completed within 7 days: 100%. Target 100%

% of HFs submitted report on time following national guideline: 99.7%.
Target 100%

% of VMWs submitted report on time following national guideline: 98.2%.
Target 100%

Task 2.1 Support implementation of Day-1 investigation and classification

In PY1, 625/626 (100%) confirmed cases were investigated and classified within 24 hours. One *Pv* case missed 24-hour classification in SAB OD in December 2021. One *Pf* case was identified as L1.

Task 2.2 Support effective case-based responses

Within 3 days, reactive case detection (RACD) was conducted for 125 out of 131 eligible cases (95% = 125/131).¹³ The six eligible cases in the MIS which did not receive RACD included one *Pv* L1 case in SAB where HF staff refused to travel due to “inadequate DSA”, and five cases

¹³ The CNM surveillance manual requires RACD to be done only among all *Pf*/mixed, and the L1 cases of other species. The MIS only allows data for those all *Pf*/mixed and L1 cases of other species to be entered. The data included here in this report is from the MIS, hence we only reported on the 131 eligible cases that were entered. CMEP2 always encourages ODs and HCs to conduct RACD for all confirmed cases. That data is currently recorded on paper. It will be entered digitally in the new CMEP2 data system.

which did not require RACD. The latter included a UN peacekeeping soldier in BTB returning from Africa without co-travelers or others to screen; and four cases in PKV that had been identified within the index house and had already undergone the required testing/treatment as part of previous investigations. The MIS system does not currently have a way to register such cases where RACD is not applicable. Results from the RACD showed that 1,137 people were screened/tested for malaria (15/1,137 were positive); and 2,031 people received health education via interpersonal communication (IPC). Only HH members of an index case, co-travelers and/or those in nearby HHs with fever or other malaria suspect symptoms get tested and/or those in nearby HHs with fever or other malaria suspect symptoms get tested; others benefit from IPC.

Task 2.3 Respond to new active foci within 7 days and improve foci investigation and classification

An increasing number of *Pf* cases was detected in PKV OD starting in April 2022. Among those cases, a female was investigated and classified as L1, a first for this year. She had not traveled outside her village for months before she was diagnosed. The focus investigation was completed within 7 days following the diagnosis. The focus was classified as active with level V0 (low vulnerability) and R1 (high receptivity) with the focus radius of 1 kilometer covering 20 households. Response activities were taken including RACD, ITN top-up and ongoing AFS. No new or secondary cases were detected from this index case. Following the national surveillance standard operating procedures (SOPs), this focus required a response with a full package of VMW/MMW setup, TDA, IPTf and AFS. TDA started on July 22nd and reached a 98% completion rate; one targeted individual left the village after one dose had been administered. The second round of TDA was completed with a 68% completion rate. The reason for the lower coverage in the second round could be that some among those receiving R1 might have been mobile people away from home/village. Also, targets set for a first round based on a census may not be appropriate for subsequent rounds.¹⁴

Data sharing, specifically the travel history of cases (to relevant OD/HFs) among CMEP2 target areas is conducted to facilitate investigation of potential L1 locations. Sharing of case details from CMEP2 to non-CMEP2 areas has not been formally initiated as currently no functional channels exist for this. The provincial/district special malaria elimination team (PSMET/DSMET) meetings have been suggested as potential platforms for data sharing, but it is doubtful whether this suffices for information to reach the levels where it is most needed, i.e., at HF level.

PSMET meetings were conducted in four provinces during PY1: (i) in Battambang on April 11 and on July 18, 2022; (ii) in Pailin on April 26 and September 20; (iii) in Pursat on May 13 and on Oct 03; and (iv) in Koh Kong on Aug 18, 2022. In addition, three DSMET meetings were conducted in SPL OD in August 2022. No PSMET/DSMET meetings were yet organized in Kampot and Kep. Additional discussion on this point is included in section 9 of this report.

Task 2.4 Strengthening coordination and data sharing on imported cases under CMEP2 areas.

CMEP2 coordinates and shares data on imported cases when those cases are within the CMEP2 areas. One recent example concerns the *Pf* cases detected in BTB OD that had recent travel history to known areas of infection in PKV. The information was shared with the PKV team and resulted in timely identifying the source of transmission and additional cases as the response was

¹⁴ See also footnote 8.

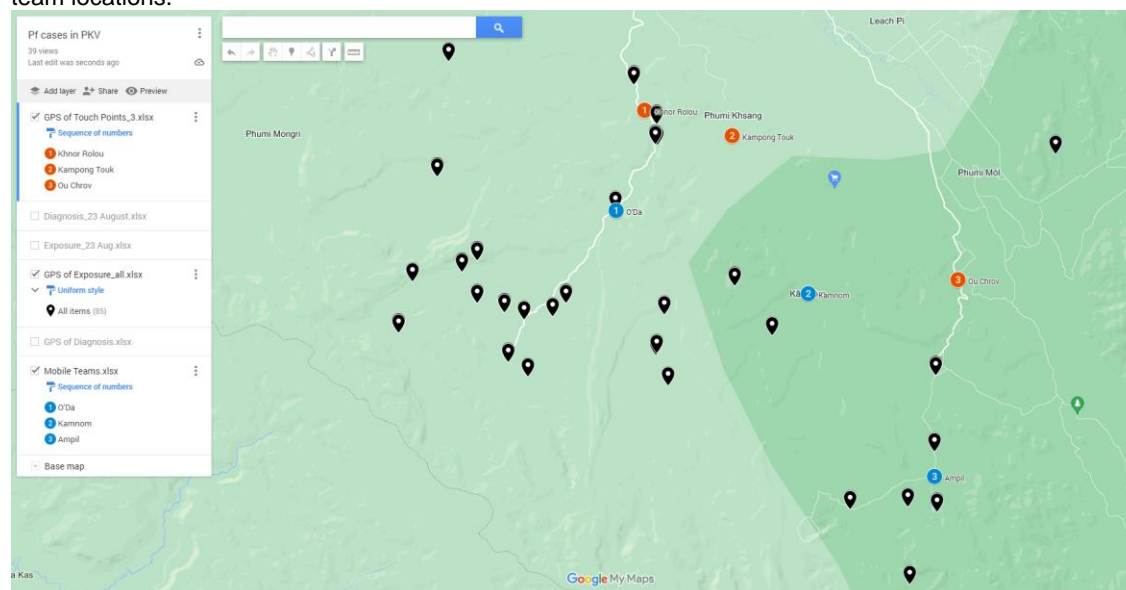
conducted immediately in the right place. CMEP2 will continue to advocate for better systems to share data on imported cases among provinces/districts outside the CMEP2 supported provinces.

Task 2.5 Early detection and response to all outbreaks

PKV is the only OD in the CMEP2 supported districts that reported recent *Pf* transmission.

CMEP2 put together a package of activities to respond to the increase and began implementation on April 26 (see details in section 1.8 above). It included a mapping analysis of travel histories (with GPS points) for all cases in the two weeks prior to diagnosis. This mapping (see figure 2 below) allowed CMEP2 to identify a specific forest area where all cases had traveled and to target our interventions on that area. Around the clock (24/7) implementation of stationary points started on May 23rd, and two additional stationary points and mobile teams were added. While questions still abound, one key lesson is that surveillance and case management activities must be kept up. The L1 case in Chamkar Phnom of Kset Borey village affirmed indigenous transmission. In addition, numerous potential hotspots were identified in forest fringe areas of PKV.

Figure 2: Reported exposure points for all *Pf* cases in PKV OD, April – September 2022; touch points; and mobile team locations.



Task 2.6 Develop an approach to prevent re-introduction and re-establishment

Prevention of reintroduction (POR) of malaria has started and its implementation reflects a gradual transition with interventions that are tailored to the specific situation in each OD. POR activities are similar to those already implemented in malaria elimination areas but must be applied based on needs and capabilities of the health system. Surveillance is being adapted while the role of volunteers (VMWs/MMWs) continues to be critical to ensure that services for testing and treatment, and surveillance capacity, remain available in all at risk settings. POR goes hand-in-hand with the transition from vertical implementation of malaria elimination activities to the integration of malaria services into the broader health system.

In each of the six CMEP2 provinces, at least one or more ODs have reached elimination status with cleared foci for some years. At present, agreement seems to have been reached at the national level for preparing for elimination certification with a focus on verification of elimination at subnational (OD) level first. Four of the 14 CMEP2-supported ODs (PKV, KRK, CHK, and SAB) have not yet reached this stage and are, therefore, not included. However, POR should be discussed also in those ODs as some areas within the ODs are already non-endemic.

Task 2.7 Strengthen and sustain quality reporting into the MIS

MEL assistants work closely with field teams with each case to remind health staff to enter the data timely and completely. This is also reinforced during MEL assistant visits to VMW monthly/quarterly meetings and during technical supervision visits. In addition, CMEP2 also supported the CNM MIS unit to complete supervision on a semi-annual basis.

2.3 Objective 3. Build capacity of the health staff to manage, intensify, and sustain malaria control and elimination efforts, particularly at the provincial and OD level.

Objective 3: Deliverables and Results

The following results were achieved:

Number of OD AOPs developed and implemented: 14. Target: 14

% of planned supervisory visits undertaken by CNM: 78%. Target 100%

% of planned supervisory visits undertaken by OD/PHD to HFs: 81%. Target 100%

% of planned supervisory visits undertaken by HFs to VMWs: 69%. Target 100%

% of ODs/HFs trained on malaria case-based management and surveillance: The cascade training:

87% of HF staff were trained - Target 100%

74% of VMWs/MMWs were trained - Target 100%

Task 3.1 Sustain, strengthen, and support AOP development and implementation.

The OD AOP development meeting was conducted in KPT on April 19th and 20th with participation by CNM, six PHDs, 14 ODs, PMI, and CMEP2's central and cluster teams. AOPs for 14 ODs and corresponding budgets were prepared, were signed by CMEP2 and countersigned by respective PHDs and ODs. Even though the OD AOP signing was delayed, CMEP2 implemented activities per the approved PY1 work plan to ensure that routine and essential services are ongoing at operational levels. The most important activities involved case detection, treatment and follow up, surveillance, and monitoring of supplies and distribution of malaria commodities. In addition, supervision at different levels has been conducted to ensure effective operation of the project and program. Each PHD also held a 9-month review of the AOP progress which provided data for the development of the CMEP2 workplan and AOPs for Y2. CMEP2 teams worked with provincial and district government counterparts to institutionalize data visualization and analysis to include in their AOP planning process. This work will continue and, in fact, requires significant effort to ensure that data is, indeed, used for implementation and management decision-making. Strengthen and enhance coordination on elimination

Task 3.2. Strengthen and enhance coordination on elimination

The CMEP2 team actively participated in several important events convened by the national program during this reporting period. Events attended included the CNM National Malaria Annual Conference and CNM partner meetings during which CMEP2 shared with participants information on the increase in *Pf* cases in PKV/PST and its planned interventions to respond to it. In addition, the CMEP2 team attended meetings to revise the national treatment guidelines and the national M&E plans, various meetings and workshops related to the midterm technical review of the malaria elimination action framework (MEAF)², various technical working group meetings (including Diagnosis and Treatment/Case Management/Pv Radical Treatment Working Group, Surveillance Working Group, Vector Control Working Group, Supply Coordination Group, Social and Behavioral Change Working Group), World Malaria Day activities in all target provinces, a meeting on 'certification for malaria elimination', and the 'Sustaining Cambodia's Malaria Response: An Assessment of Donor Transition Readiness and Budget Advocacy Opportunities' workshop. CMEP2 also continued to attend monthly meetings on *Pv* radical cure and stock monitoring.

The issues around the vetting of armed forces under the Leahy law and challenges to obtain required information on uniformed individuals forced CMEP2 to stop its support to uniformed personnel. CNM instructed PHDs in KPT and KEP to suspend PSMET/DSMET meetings while they are in the process to identify funding sources that are able to support also uniformed forces.

Task 3.3 Strengthen planning, program management, and execution at PHD and OD levels

The OD AOPs were developed jointly with the government counterparts both for PY1 and for PY2, for which the process started in June 2022. CMEP2 supported the progress review on AOP implementation in all ODs. CMEP2 has also helped improve the stock management in malaria commodities through engaging in monitoring and supporting supply request/reallocations.

Task 3.4 Strengthen planning, program management and execution at CNM

CMEP2 team supports CNM program management through various methods including attending the monthly supply chain coordination meetings where important updates and reflections on supply and stock management data in CMEP2-supported ODs are shared. In addition, the CMEP2 work plan was shared with CNM for their program planning and supports finances and technical support in the selected provinces. Engagement of the national program in CMEP2 operations, both at central and cluster levels, has increased over the year. The CNM director and his team participated in the CMEP2 OD AOP development workshop, CNM technical units conducted supportive supervision to PHD/OD/HF/VMW levels and also supported training activities in CMEP2 target areas.

Task 3.5 Refine existing malaria elimination tools, SOPs, and guidelines

CMEP2 has actively assisted CNM and partners to develop and revise several tools and SOPs including the revised NTGs and integrated drug efficacy surveillance protocol combining malaria case management and surveillance activities for elimination. This includes the 'case investigation, foci investigation and response' parts of the surveillance manual. The revision and update were made based on TES results and included all key elements of the NTGs: suspected case

definition/criteria, diagnosis by RDT/microscopy/PCR, treatment of uncomplicated malaria cases, radical treatment, treatment follow up and case referral, treatment of pregnant malaria patient, treatment of pediatric case, treatment of complicated and severe malaria, alternative treatment, pharmacovigilance, chemoprophylaxis (mainly for traveler), diagrams, figures and tables as well as the annexes for the document. The national lab quality assurance is also emphasized in the iDES with the NCAMM (national competency assessment for malaria microscopists) planned for HF laboratory technicians.

CMEP2 attended the 'national malaria annual conference', various meetings and workshops related to the midterm technical review of the malaria elimination action framework (MEAF2), the M&E plan and national treatment guidelines revision workshop, CNM partner meetings, various CNM technical working groups meetings, a meeting on 'certification for malaria elimination', and the 'sustaining Cambodia's malaria response: an assessment of donor transition readiness and budget advocacy opportunities' workshop.

Task 3.6 Maximize use of financial resources for sustainability

CMEP2 maximizes use of financial resources for sustainability. To that end, it will submit a sustainability plan in Q4 of PY2. It also includes advocating for additional funding from the government for malaria activities, historically a challenging endeavor. However, current government financing includes budgets for staffing, infrastructure, essential drugs and medical equipment and materials. Further effort is required. The CMEP2 message is consistent in that the project is a provider of technical assistance, not the implementer of services. This appears to require a change in thinking among *all* stakeholders, but a position that should be central in the CMEP2 sustainability strategy and plan, due by the end of PY2.

Task 3.7 Expand cross-sectoral collaboration

CMEP2 worked to expand cross-sectoral collaboration by engaging district officials, village councils, and other non-traditional partners (especially in PKV) to bring more synergies in the program and to reflect the need to transition for malaria programming to become gradually integrated into the overall health system as we reach elimination.

3. CROSS-CUTTING THEMES AND ACTIVITIES

Collaborating, Learning, and Adapting

During the first project year, the focus was on developing tools and materials for implementing CLA, embedding CLA approaches within existing program activities, and on building capacity for CLA among CMEP2 and grantee staff. This also required the CLA advisor, under our partner organization Panagora Group, to build strong relationships with staff across project sites and with other stakeholders. Key achievements during PY1 include:

- Developed tools and guides for conducting CLA within the project, including CLA action plan, CLA orientations, CLA self-assessment, and the Pause and Reflect tool
- Oriented 26 CMEP2 staff (8 female), comprising senior technical advisors and cluster leads, in key CLA concepts, including internal collaboration, monitoring and evaluation for learning, and conducting CLA self-assessments.
- A total of 17 project staff (6 female) carried out CLA self-assessments. These assessments identified internal collaboration and M&E for learning as key priorities for capacity strengthening. A capacity building action plan was developed accordingly.

- To respond to the learning needs identified through the CLA self-assessments and action plan sessions, the project designed and facilitated a workshop on internal collaboration. Twenty-two staff (4 female) participated in the workshop.
- Following internal orientations, CLA activities were rolled out at the field level. The CLA advisor facilitated seven “Pause and Reflect” sessions with teams and counterparts during the first project year. In addition, three rapid after-action reviews (RAAR) were conducted with the PLN team following key events - World Malaria Day, PSMET, and AOP meetings.
- The CLA advisor conducted field visits and facilitated activities review sessions in three major events – the project’s MEL quarterly meeting, stock management training, and CSOs quarterly meeting. A total of 80 participants (30 female) joined these sessions.

Through our CLA activities, we identified a number of challenges within project implementation, monitoring, and evaluation. For example, health facility staff identified challenges with stock record-keeping and data quality; district-level stakeholders noted that global guidelines and criteria are yet to be translated into the local context of Cambodia. Strategies to address those challenges were identified and shared among the CMEP2 team; a key step in PY2 will be ensuring that practical solutions and project adaptations are identified, rolled out, and assessed.

Social Inclusion and Gender (SIG)

Malaria elimination by 2025 will not be possible unless all members of Cambodian society are able to benefit from prevention, detection, referral, and treatment services in an equitable way. In the first year of the project, CMEP2 has focused on ensuring that gender is mainstreamed throughout the project, and that activities are identified to address gender-specific barriers in malaria prevention and treatment. Key achievements in PY1 include:

- The team prepared specific activities and priorities for implementation, detailing the requirements, planning steps, objectives, and team members involved in this integration work.
- Developed a theory of change graphic and life-of-project work plan (2021-2026) on gender and social inclusion for the integration of gender and social inclusion. This articulates the current situation, goals, and strategies to integrate gender and social inclusion project.
- Conducted a capacity assessment on gender and social inclusion in December 2021. This assessment determined the baseline level of CMEP2 staff understanding of gender equality and social inclusion and was used to identify internal capacity-building needs. The majority of staff participated in the assessment (37 respondents out of 41 invitees).
- CMEP2 carried out a literature review on malaria-specific gender disparities and barriers, which was finalized in January 2022. The review highlights evidence on gender-related issues and malaria intervention outcomes and identifies opportunities for integration of gender equality and social inclusion into all CMEP2 interventions.

CHALLENGES AND ISSUES

- We experienced turnover in the SIG advisor role, with a new advisor joining the project in mid-August. Due to the gap, we saw some delays in implementation.
- Effective CLA requires participants to freely discuss challenges and brainstorm solutions. Facilitating CLA through online/virtual platforms is challenging and requires specialized facilitation skills and approaches.
- CLA concepts and approaches are new to many staff, and the CLA advisor needs to help team members see the value of CLA in their work while also building capacity and facilitating coordination. It has taken more time to embed these concepts into project

activities than had been anticipated. Going into PY2, a detailed action plan is under preparation to include more practical CLA activities that project staff can use within their own work.

4. ENVIRONMENTAL MITIGATION AND MONITORING

In line with the Environmental Mitigation and Monitoring Plan (EMMP) endorsed by the mission on January 4, 2022, CMEP2 continued to implement a set of activities to prevent and mitigate any possible environmental impact associated with the project activities. Progress against key EMMP indicators is presented below.

CMEP2 supported the ODs/HFs/VMWs/MMWs in targeted provinces to distribute ITNs and facilitate proper storage and management of used ITNs as well as management of other commodities such as RDTs and laboratory consumables to ensure the mitigation of any potential environmental impact. Training on management of used testing tools was completed during case management training, meetings and technical supervision.

ITNs (LLIN & LLIHN): Storage of ITNs has been managed at warehouse, HF, and VMW/MMW houses. In warehouses, there are palettes placed between the floor and ITNs. HFs are recommended to store also on palettes but, in some cases, HFs place ITN bales directly on the floor. At VMW/MMW level, ITNs are mostly stored on the bed or in a corner of the room.

During distribution, the plastic bag of each net is removed before handing over to individuals. Those plastic bags are collected and buried far from water sources. This is also applied to the used/damaged ITNs. Poor management of storage has been identified in some HFs and VMW houses where the ITN bales were not properly kept, and some bales were torn.

RDT: Storage of RDTs has been well managed (in shelf inside OD drug store, HF pharmacy room and VMW/MMW bag). After RDTs are used for malaria testing, the used lancets are put into safety boxes and rest consumables are collected and burned (at HF, incinerators are used).

Other consumables (mainly laboratory items): At HFs (HC/RH), laboratory related waste is being separated into three categories: Liquid, solid, and sharp materials. Solid waste is burned or buried, liquid (laboratory reagents and not body fluids) were put into the drainage pipes inside the facility, and sharps are disposed of in high-capacity incinerators.

Repellents: Repellent management will be monitored in PY2 with the anticipated arrival of new repellents.

5. LIST OF REPORTS/DELIVERABLES COMPLETED IN THE REPORTING PERIOD

- CMEP2 Q1- Q3 reports and success stories.
- CMEP2 PY1 Work Plan was submitted on December 1, 2021 and approved on January 19, 2022.
- CMEP2 MEL Plan was submitted on December 1, 2021 and approved on February 2, 2022.
- CMEP2 Grants Under Contract manual was submitted on December 1, 2021 and

approved on January 11, 2022.

- CMEP2 Environmental Mitigation and Monitoring Plan was submitted on December 1, 2021. The plan was approved on January 4, 2022.
- CMEP2 Communications and outreach plan was submitted on November 27, 2021 and approved on December 20, 2021.
- CMEP2 PY2 Work Plan was submitted on August 15 and approved September 23, 2022.

6. SHORT-TERM CONSULTANT PROGRESS AND OBSERVATIONS, SIGNIFICANT ISSUES AND FOLLOW-ON INTERVENTIONS

N/A

7. GRANTS UNDER CONTRACT

In Q3, two CMEP2 sub-grantees (AHEAD and PFDA) started activities. These awards were fully executed on May 24, 2022.

- AHEAD works in BTB Province (OD BTB and MRS) and Koh Kong Province (OD SMC and SAB).
- PFDA works in PST province (OD PKV and KRK) and KPT province (OD KPT and CHK).

8. FINANCIAL AND ADMINISTRATIVE MANAGEMENT

[REDACTED]

Table 3

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Human Resource Management: At the end of PY1, CMEP2 had filled 53 out of 54 planned positions, a driver position remaining unfilled. All professional staff positions remain filled in PY1, quarter 4. Five staff resigned during the year: in quarter 1, the MEL assistant from the Pailin cluster; in quarter 2, the procurement and administration officer in Phnom Penh and the cluster team lead in Kampot; in quarter 3, the compliance and subgrant officer and the senior regional technical advisor, a 20% LOE position. The Panagora G&SI advisor also resigned in quarter 3.

Total technical level of effort (LOE) during PY1 was 5,363 (against a planned 5,725). Estimated LOE for PY2 is 7,059.

9. CHALLENGES AND ACTIONS TAKEN OR PROPOSED

Delayed OD AOP development: Due to delays in executing the CMEP2 - CNM MOA, the development of OD AOPs was postponed. Eventually, the AOP workshop was organized in KPT on April 19 – 20, 2022.

Pf outbreak in PKV OD/Pursat Province: A sudden increase in *Pf* cases in PKV started gradually during Q2 and spiked in Q3. Cases continuously increased until mid-June, then sharply declined in the following weeks. Cases increased again in August. The actual cause of the increase in cases is unknown; nevertheless, CMEP2 believes that its fast response helped to curb the rising numbers of *Pf* cases. In addition to the intensified activities already taking place, IPTf started in July 2022.

ITN monitoring and estimation: By June 2, 2022, CMEP2 had in stock 8,693 LLIHNS expiring in August 2022. Efforts were made to ensure proper quantification of LLIHNS and LLINs in the field at every level and monitor and estimate their use to ensure they are distributed following proper guidelines in advance of the expiry date. All LLIHNS were distributed prior to expiry.

Leahy vetting: The vetting of members of law enforcement and other uniformed forces has been challenging and has prevented CMEP2 from supporting these individuals for their participation in PSMET/DSMET meetings. CMEP2 has communicated to CNM and the PHDs its failure to obtain the for vetting required information, reaffirming its support to these meetings except for uniformed personnel if vetting information cannot be obtained.

G6PD Testing for *P. vivax* radical treatment: In PY1, 11.1% of eligible *Pv* cases did not have their G6PD levels tested. The two main reasons for not testing were: (i) MMPs wanting to seek treatment at home; and (ii) the long distances to HFs in a few villages in Koh Kong and Pursat. Therefore, there is a need to: 1) strengthen the referral system and ensure patients are properly referred; and 2) create mobile teams that can visit the patient's house for G6PD testing, especially among hard-to-reach communities.

Improvements in data collection, management, and quality: At the end of CMEP, the project specific database (PMIS) was abolished and no standardized data collection or data quality assessments (DQA) occurred at the beginning of CMEP2. In addition, there was limited use of data visualization and report sharing. In response, CMEP2 developed standardized electronic forms for data collection and started development of an electronic project specific database, created protocols for routine DQAs, standardized monitoring checklists (e.g., monthly meetings, documentation for elimination certification), and provided weekly reports on the situation in Pursat to stakeholders. CMEP2 also plans to utilize new software for enhanced data visualization in PY2.

10. PROJECTED USAID APPROVALS, WAIVERS OR DEVIATION REQUESTS ANTICIPATED DURING THE NEXT QUARTER

- Operational research plan to be submitted in PY2
- Revision of the CMEP2 MEL plan
- CMEP2 cluster restructuring plan

11. SUCCESS STORIES

Annex 1: Detection of rare malaria species with microscopy and PCR confirmation

12. LIST OF UPCOMING EVENTS AND DATES

- Visit of minister of health to PKV/Pursat on Oct 7-8, 2022

- CMEP2 OD AOP meeting on Oct 11, 2022
- iDES launch and TOT training in late Oct (24-26)
- Entomology training (November 2022 - Date to be confirmed by CNM).
- IPTf evaluation (October 2022)
- CNM epidemiological investigation in Pursat (October 2022)
- ASTMH meeting from Oct 31 – November 3 , 2022
- Starting pilot of PQ radical treatment for *Pv* patients with deficient G6PD (Quarter 1)
- Preparation of pilot of POR activities in CMEP2 selected ODs/provinces (Quarter 1)
- Establishment of CMEP2 data system for implementation in PY2 (Quarter 2)

13. ANNEX I

Detection of rare malaria species with microscopy and polymerase chain reaction (PCR) confirmation

Accurate malaria diagnosis is a critical part of early detection and appropriate treatment within malaria case management. To achieve the elimination of malaria and qualify for certification by the World Health Organization (WHO), all human malaria species need to be eliminated: *Plasmodium falciparum* (*Pf*), *vivax* (*Pv*), *ovale* (*Po*) and *malariae* (*Pm*). The rapid diagnostic test (RDT) currently in use in Cambodia can detect *Pf* and *Pv* malaria, but not the other species.

The Cambodia Malaria Elimination Project (CMEP2) encourages confirmation of malaria diagnosis by microscopy exam and, if necessary, PCR analysis. Systematically, every *Pf*/Mix case detected by RDT has been confirmed by microscopy exam, conducted by a laboratory technician at a referral hospital (RH) or provincial hospital (PH). For all suspected malaria cases presenting with symptoms and those that experienced exposure to malaria transmission but test negative with RDT, a microscopy slide is prepared and read by a microscopist. In following this practice, CMEP2 has been able to detect and treat non-*Pf*/*Pv* malaria cases, primarily *Plasmodium malariae*.

Malaria diagnosis by microscopy is supported by CMEP2 in close collaboration with the laboratory unit of the National Center for Parasitology, Entomology and Malaria Control (CNM) which provides training, supervision, quality assurance (QA), the national competency assessment for malaria microscopists (NCA) and assists by confirmation of testing results from the field, including microscopy and PCR validation. Even at RH and PH levels, microscopists have limited experience and skills in differentiating *Pm* and *Plasmodium knowlesi* (*Pk*), a zoonotic malaria species.

Since the start of CMEP2 in September 2021 until September 2022, 46 cases of non-*Pf*/*Pv* cases had been detected in Battambang (1 *Pm* and 2 *Pk*), Pailin (1 *Pk*) and Pursat provinces (31 *Pm* and 5 *Pk*). All cases were detected and effectively treated and followed up. With 32 cases confirmed as *Pm* and 8 as *Pk*, the remaining six (6) are currently pending confirmation by CNM.

The project, in collaboration with CNM, also identified a few areas for improvement, such as tests conducted in the field that included false positives, incorrect diagnosis of the species, and the quality of prepared microscopy slides and dried blood spot (DBS). Through patient investigation, we anticipate that these malaria species (*Pm* and *Pk*) would be also detected in other areas in Cambodia and neighboring countries if diagnosis is performed by microscopy exam.

Key lessons learned:

- To achieve elimination status, all human malaria species (not Pk) must be detected
- Microscopy exam remains important in malaria diagnosis of all species
- The capacity and skills of microscopists and their role must be maintained, in addition to strengthening diagnostics by RDT

This requires:

- Strong commitment at national level and policies in support of microscopy diagnosis
- Commitment of health staff at ground levels to maintain knowledge and skills in microscopy malaria diagnosis and confirmation

Figure: Pm trophozoites and gametocytes in microscopy slides exam

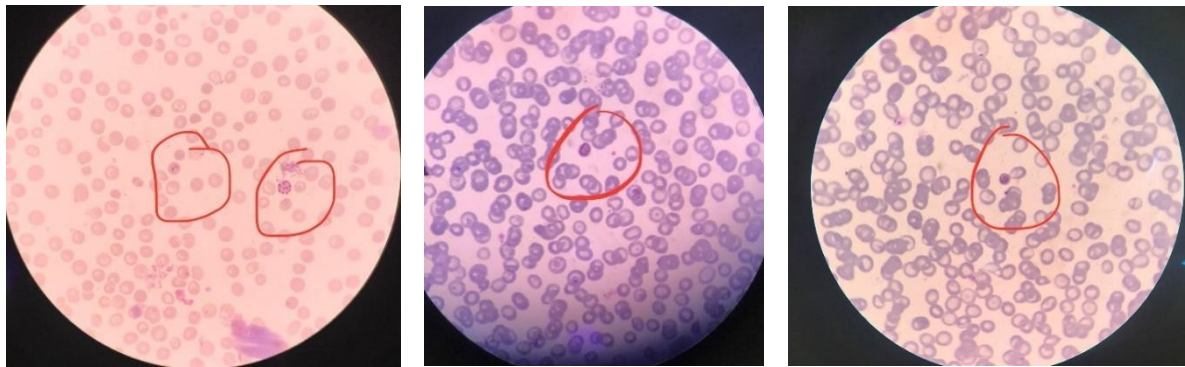
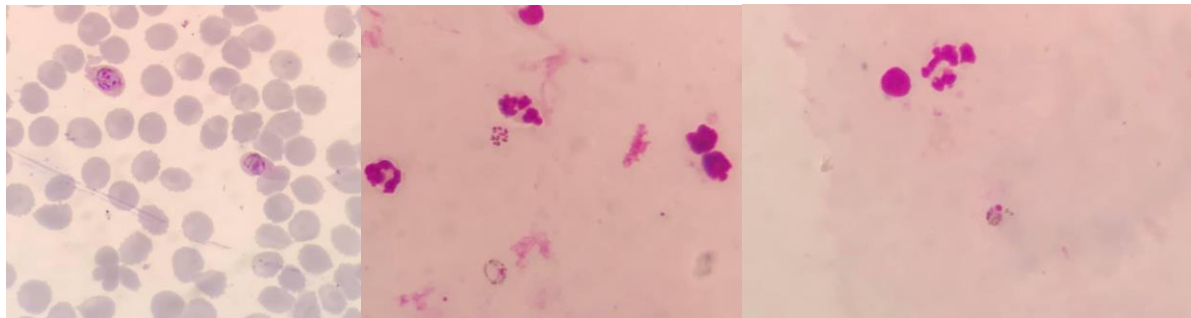


Figure: Pk trophozoites in microscopy slides



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14. ANNEX 2: VMWS INTEGRATED BY OD IN CMEP2 AREAS

OD	Integrated VMWs	VMWs Not Integrated
BTB	31	19
MRS	26	1
TMK	0	0
PLN	42	0
SPL	34	0
SPM	14	1
BKN	16	9
PKV	6	75
KRK	8	39
SMC	7	22
SAB	0	16
KPT	22	21
CHK	40	40
KEP	8	5
14 ODs	254	248