Standard Operating Procedures (SOP) for the Basic Essential Package of Malaria Pre-Elimination Activities

Sampov Loun Operational District (OD), Battambang Province, Cambodia

May 5, 2015

Proposed by:

USAID Control and Prevention of Malaria (CAP-Malaria) Project

in coordination with
Cambodia National Malaria Programme (CNM) and
WHO/Cambodia
Contents

1 Introduction ........................................................................................................................................... 1
1.1 Purposes ............................................................................................................................................... 1
1.2 Users of the SOPs ................................................................................................................................ 1
2 SOPs for DOT and Day-28 Case Management ..................................................................................... 2
2.1 Overall strategic approach .................................................................................................................. 2
2.2 Patient flow .......................................................................................................................................... 2
2.3 Practical approaches ............................................................................................................................. 4
2.4 Job aids for malaria diagnosis and treatment approaches according to NTG 2015 .......... 6
3 SOP for ‘1-3-7’ approach for malaria elimination surveillance and response ......................... 9
3.1 Overall strategy .................................................................................................................................... 9
3.2 Case notification on Day-1 .................................................................................................................. 9
3.3 Case investigation by Day-3 ............................................................................................................... 10
3.4 Response activities by Day-7 .............................................................................................................. 12
4 SOP for LLIN top up ............................................................................................................................. 13
5 Pilot SMS system to facilitate case reporting from point of diagnosis (Day-1) to HC, HC based case investigation (Day-3) and response activities (Day-7) ................................................................. 16
5.1 Objective .............................................................................................................................................. 16
5.2 Principle .............................................................................................................................................. 16
5.3 Implementation Plan for Piloting SMS System .................................................................................. 17
5.4 Information flowchart ......................................................................................................................... 18
5.5 Components and tools ......................................................................................................................... 18
5.6 Safe Operating Instructions ............................................................................................................... 19
5.7 Care Instruction for the Smartphone ............................................................................................... 19
5.8 Trouble shooting ............................................................................................................................... 20
5.9 Disclaimer .......................................................................................................................................... 20
6 Annex .................................................................................................................................................... 21
6.1 Annex 1: Village Malaria Worker Case Reporting Form ............................................................... 21
6.2 Annex 2: Community Malaria Treatment Follow-up Form Day 0-3 .............................................. 22
6.3 Annex 3: Community Malaria Treatment Follow-up Form Day 7-28............................................ 24
1 Introduction

In response to the Royal Government of Cambodia’s commitment to achieve malaria elimination by 2025 with a clear stepwise target to eliminate *P. falciparum* (*Pf*) by 2020, the National Malaria Control Program (CNM), the World Health Organization/Cambodia (WHO/Cambodia) and CAP-Malaria (funded by PMI) are determined to pilot a malaria pre-elimination project in Sampov Loun Operational District (OD), Battambang Province. The pilot project will comprise two main elements: (1) malaria case management with 28 days follow up and (2) a set of basic essential pre-elimination activities adapted from the Chinese’s 1-3-7 approach to malaria elimination surveillance and response. For malaria case management, the pilot project will intensify malaria case management through universal direct observed therapy (DOT) and 28 days follow-up *Pf*. The 1-3-7 strategy calls for the rapid reporting of malaria cases within one day, confirmation and case investigation within three days, and a follow-up response within seven days.

Standard operating procedures (SOPs) for the basic essential package include:

- SOP for directly observed therapy (DOT) and Day-28 case management
- SOP for case investigation and response (1-3-7)
- SOP on for LLIN top-up
- SOP for pilot ‘SMS mHealth’ system to facilitate case reporting from the point of diagnosis (Day-1) to Health Center (HC), HC-based case investigation (Day-3) and response activities (Day-7)
- Job aids for malaria diagnosis and treatment approaches according to the current national malaria treatment guidelines (NTG 2015).

1.1 Purposes

These SOPs and job aids have been developed:

1. To inform field staff (the project implementers) of the rationale for each key activity and to serve as guidance for them to perform their tasks in a systematic and standardized manner; and
2. To assist field and central-level supervisors to effectively monitor the project activities.

1.2 Users of the SOPs

These SOPs are intended for:

- Project implementers: Village Malaria Workers (VMWs), Migrant Malaria Workers (MMWs), Health Facility (HF) staff;
- Malaria officers at district, provincial and central/national levels; and
- NGO partners.
2 SOPs for DOT and Day-28 Case Management

2.1 Overall strategic approach
In the context of *Pf* Artesinin resistant, the treatment with ACT (DHA-PIP/A+M) must be closely follow-up and monitored. Treatment under directly observed therapy (DOT) and 28-days follow-up should be initiated. Early detection and avoiding treatment failure are crucial to stopping the spread of artemisinin resistant malaria (ARM) with the ultimate goal to eliminate ARM.

First line treatment is DHA-PIP while the second line treatment is quinine with tetracycline or doxycycline for 7 days, except for patients under the age of 8 years or who are pregnant.

In the first trimester of pregnancy, the patient is treated with alternative first line regimen-quinine alone for 7 days.

*Figure 1: Algorithm for Pf malaria case management in SPL*

2.2 Patient flow
As detailed in the flow chart below, a patient will make first contact with the health system at one of three possible points, seeing either a volunteer malaria worker (VMW), health facility (HF) or private provider (PP) depending on their location, preferences, and circumstances. Within the private sector, PP can test any suspected malaria patients but cannot treat the patient. Instead, current national policy requires that the provider must refer confirmed malaria positive patients or malaria suspected cases to VMWs/HFs.

---

1 The DHA-PIP currently supplied by the National Malaria Control Program (NMCP) is Euartesim (Name of company, city, and country of manufacturing). Recommended dosages are shown below in section 2.4 b.
At HF, the outpatient department (OPD) staff refer suspected malaria patients (either who were referred or who came directly to the HC) to the laboratory unit for microscopic diagnosis, unless the lab technician is not available (absent for some reason, for instance at night). In such cases, the OPD staff could use RDT for quick diagnosis and make a slide for reading later. OPD staff will provide first dose DHA-PIP with DOT to patients that test positive by RDT or microscopy before referring the patients to continue treatment follow-up with a VMW. The staff must provide 2 additional doses to the patient and fill in the treatment follow-up form (TFU) as a referral letter and send an SMS to inform VMWs.

Should the patient first present to a VMW, the latter will test patient using an RDT and prepare a smear at the same time for both patients that were self-referred or that were referred from PPs. Positive cases will be given 3 days of DHA-PIP (Day-0-1-2) with DOT, but if patients were referred from a HF, VMWs will follow the patient from Day-1 like other cases) and continue follow-up until Day 28 for Pf (for Pv, no further follow-up after 3 days DHA-PIP is required). Extra smears will be prepared by VMW on Days-3, 7 and 28 and these will be brought to the HC for reading. Identified treatment failure cases will be referred for second line treatment at FDH/RH with the support from VMW.

**Figure 2: Patient flow in malaria case management with 28 days follow-up**

**Inclusion Criteria/Exclusion**
- Inclusion: all uncomplicated Pf/mix cases
- Exclusion: took antimalarial in the last 28 days, severe cases, pregnancy and under 2 years old
- For Pv, only 3 days treatment is required with DOT; no smear is required
2.3 Practical approaches

Tasks and responsibilities of project personnel are listed below:

a) **Community health volunteers: VMWs and MMWs:**

*Figure 3: Malaria case management with DHA-PIP*

- Enroll patients referred from private providers (start as new patient)
- Perform RDT test on Day-0
- Record patients in the monthly malaria case registry (for VMWs) (annex1)
- Receive patient referred from HC and take responsibility for following up from Day-1
- Perform malaria smears on Day 0, 3, 7 and 28.
- Fill in the treatment follow-up (TFU) form for Day 0, 1, 2, 3 (annex 2) and on Day 7 and Day 28 ( annex 3)
- Provide DHA-PIP treatment to patients under DOT on Day 0, 1 and 2
- Visit to patient’s house on Day- 1, 2, 3, 7 and 28 (maybe sometimes during Days 4 to 6 & 8 to 27) and explain reasons for visits
- Bring blood smear slides and TFU forms to the HC on Day 0, 3, 7 and 28 and waiting for the results
- Bring patients to HC/FDH/RH as required (for second-line therapy or hospitalization)
b) **Health Centre OPD staff**
- Perform RDT/malaria microscopy on Day-1
- Provide treatment to patient with DHA-PIP (first dose only) under DOT
- Refer patient to be followed-up by a VMW using TFU form as a referral letter (annex 2)
- Provide the remaining 2 doses to the patient
- Call to inform VMW about the referral case

c) **Health Centre laboratory staff**
- Perform blood smear reading and record results including the parasite count
- Record results in the FTU form (annex 2 and 3)
- Provide results to respective VMWs
- Ask VMW to prepare new slide in case of poor quality slide
- Cross-check DOT through phone calls to patients.

d) **Supervisors (HC chief/Lab specialist/ODMS/PMS/CAP-M)**
- Supervise and cross-check DOT directly with patients.
- Lab specialist at OD level will conduct double microscopic reading for quality assurance (if lab specialist confirms slide Day-0 negative, no further follow-up for the case)
- Meet with VMWs and gather their feedbacks on a monthly basis.
- Take responsibility for technical support and data management.
- Quality assurance for diagnosis and case management
2.4 Job aids for malaria diagnosis and treatment approaches according to NTG 2015

*Figure 4: Malaria diagnosis with RDT*

**Malaria RDT Test Procedure**

1. Wear gloves
2. Clean the finger with alcohol pad
3. Puncture the ball of the finger with lancet
4. Take blood from the finger with pipette or loop

5. Dispense 5 µl of drawn blood into round well
6. Dispense all of the assay detergents into the square well
7. Read result between 15 and 30 minutes

**Result Interpretation**

- **Invalid** (no “C” line)
- **Negative**
- **P. v Positive**
- **P. f Positive**
- **Mixed infection P. f & P. v**
Figure 5: Malaria blood smear preparation

Select the patient finger (ring finger). Clean the finger with cotton wool dampened with alcohol.

Using a sterile lancet and a quick rolling action, puncture the ball of the finger or toe.

Collect 3 drop of blood for thick smear and 1 drop for thin smear where far away from thick smear 1cm.

Using another clean slide as a spreader.

Firmly push the spreader along the slide, keeping it at an angle of 45°. The edge of the spreader must remain in even contact with the surface of the other slide while the blood is being spread.

Handling the slides by the edges or a corner, make the blood film by using the corner of the spreader to join the drops of blood, and spread them to make an even, thick film. A circular or rectangular film can be made by three to six quick strokes with the corner of the spreader.

Label slide with patient’s ID and date of slide collection.
Figure 6: Malaria treatment and decision-making based on NTG 2015

Flow Chart on Malaria Treatment Decision for VMW/MMW

Malaria suspected has features/condition as below:
1. Has a typical malaria symptom: Fever-Chill-Sweating (3 major malaria signs) or
2. Has periodic fever: Fever in every other day or
3. Has one of the major sign or other minor signs or
4. Has stayed or crossed the malaria endemic area in the past month

- Performs RDT/Microscopic test

Test(+)

Pl/Pv/Mix

Simple malaria

Severe or 1st trimester pregnancy or took antimalarial drug in the past

follow NTG for simple malaria case management

Refer to HP/HC/FDH for malaria treatment

Test(-)

Refer to HP/HC/FDH for treatment of other diseases

---

* Severe malaria cases or first trimester pregnancy or unknown pregnancy age must be referred to public health facility.
** If the patient took antimalarial drug in the past month, this patient must be referred to public health facility

Eurartesim Treatment Table (Eurartesim: DHA-Pip)
For treating *Plasmodium falciparum* vivax and *mex* infection in infant from 3 months old to adult included 2nd and 3rd trimester pregnancy

<table>
<thead>
<tr>
<th>Age/Colour</th>
<th>Body Weight (Kilogram)</th>
<th>Age (Month or Year)</th>
<th>1st day (# of tablets)</th>
<th>2nd day (# of tablets)</th>
<th>3rd day (# of tablets)</th>
<th>Total 3 days (# of tablets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant (Green)</td>
<td>7-12 kg</td>
<td>3 M to 2 Y</td>
<td></td>
<td></td>
<td></td>
<td>1 tablet 1/2</td>
</tr>
<tr>
<td>Child (Orange)</td>
<td>13-29 kg</td>
<td>&gt;2-5 Y</td>
<td></td>
<td></td>
<td></td>
<td>3 tablets</td>
</tr>
<tr>
<td>Adult (Blue)</td>
<td>24-35 kg</td>
<td>&gt;5-14 Y</td>
<td></td>
<td></td>
<td></td>
<td>6 tablets</td>
</tr>
<tr>
<td></td>
<td>36-74 kg</td>
<td>&gt;14 Y</td>
<td></td>
<td></td>
<td></td>
<td>9 tablets</td>
</tr>
</tbody>
</table>

Remarks
1. It would be best to have all the three doses under direct observed therapy (DOT)\(^1\) If you could not observed all the three doses, at least the first dose must be provided to patient under DOT. If a patient vomits within 30 minutes of taking Eurartesim, the whole dose should be re-administered.
   If a patient vomits within 30-60 minutes of taking Eurartesim, half dose should be re-administered.
2. For group weight between 5-6 kg and 7-12 kg, must not keeping the half tablet loss for the next dose; the medicine become no effective after exposing to air. Please through it out.
3. This medicine cause common side effect such as nausea, vomitting and diarrhoea. Sometimes it cause uncommon side effects such as skin itching and inflammation.
   Do not use Eurartesim in the first trimester of pregnancy.
3  SOP for ‘1-3-7’ approach for malaria elimination surveillance and response

3.1 Overall strategy
All malaria species will be included in this approach in SPL.

- Day-1: case notification for all species (Pf, PV, Mix) through SMS system by lab staff within 24 hours to central server that will shared with key persons (HF staff/OMDS, CAP-M field staff). The lab technicians will also entry patient information into project web based application.

- Day-3: in between Day-1 to Day-3, after confirmation with microscopy double reading, case investigation will be conducted by HF staff with support from VMW and technical guidance/monitoring from ODMS/PMS/CNM/CAP-M. In case the result of double reading is negative, further action will not be needed.

- Day-7: in between Day-3 to Day-7, response activities will be conducted by HF staff with support from VMW and technical guidance/monitoring from ODMS/PMS/CNM/CAP-M.

*Figure 7: ‘1-3-7’ approach*

3.2 Case notification on Day-1
On Day-1, HF staff, specifically the lab technician, will notify a new case through SMS mHealth system (section 5) to key personnel such as HC chief, ODMS, PMS, Key CNM staff and CAP-M staff. HC lab staff/data entry person will enter information from TFU form and lab result into online pre-elimination database.
3.3 Case investigation by Day-3

Between Day-1 to Day-3, health facility staff, specifically the lab technician and HC malaria staff will conduct a case investigation -using the case investigation form reproduced below- for all confirmed malaria cases and will attempt to identify cases as indigenous or imported. ODMS/PMS/CNM/CAP-M is responsible for providing guidance and supervising these activities including monitoring and evaluation.

*Figure 8: Case investigation form*

**Case Investigation Form for Health Centre Staff**

<table>
<thead>
<tr>
<th>Investigation date:</th>
<th>Respondent: Patient □ Relative (Specified) □</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient ID:</td>
<td>Name:</td>
</tr>
<tr>
<td>Age:</td>
<td>Sex: Male □ Female</td>
</tr>
<tr>
<td>Occupation:</td>
<td>□ Farmer □ Vendor □ Worker in: □ Other types (specify):</td>
</tr>
<tr>
<td>House owner:</td>
<td>N. of HH members:</td>
</tr>
<tr>
<td>Village:</td>
<td>Code:</td>
</tr>
<tr>
<td>Permanent address:</td>
<td>Village:</td>
</tr>
<tr>
<td>Pop. Type:</td>
<td>□ RSD □ MMP</td>
</tr>
<tr>
<td>Malaria signs:</td>
<td>Fever: days, chills: days, sweating: days, headache: days</td>
</tr>
<tr>
<td>RDT (□ Pf □ Mv □ Pv) on:</td>
<td>Microscopy (□ Pf □ Mv □ Pv and or □ PIG) on:</td>
</tr>
</tbody>
</table>

**Classification of case**

Q1: Have you been outside SPL (overnight stay) within the last 30 days?

□ A11: No => Indigenous case (skip to Q4)
□ A12: Yes => Q2

Q2: Where did you stay?

- District: Province: □ Endemic □ Non-endemic (list of endemic HF/OD)
- District: Province: □ Endemic □ Non-endemic (list of endemic HF/OD)
- Country: Province: □ Endemic □ Non-endemic (list of endemic province)

□ A21: From endemic area => Imported case (skip to Q5)
□ A22: From non-endemic area => Q3

Q3: Describe villages that you were staying overnight in SPL within the last 30 days?

□ A31: In villages that had malaria reported case(s) in the last 2 years => Indigenous case (go to Q4)
□ A32: In villages that had no malaria reported case(s) in the last 2 years => Unclassified case* (go to Q4)

*the unclassified case will be reviewed by ODMS and make final case classification

**Identification of transmission focal & Hot-spot**

Q4: Where did you sleep at nights during these 30 days in SPL?

□ A41: Slept in the village
  - The house type: □ Concrete □ Wooden □ Cottage □ Other (specify)
  - Location: □ Water stream/river □ Forest □ Mountain/hill □ Flat land □ Agricultural farm

 => Transmission could occur here: □ Yes □ No

□ A42: Outside the village
  - The house type: □ Concrete □ Wooden □ Cottage □ Other (specify)
  - Location: □ Water stream/river □ Forest □ Mountain/hill □ Flat land □ Agricultural farm

 => Transmission could occur here: □ Yes □ No

Q5: How many people traveled with you to SPL? A: .......persons
**History of malaria treatment in past three months:**

Q6. Did you have malaria in the past 3 months?
- A61: No => New case (skip to Q11)
- A62: Yes => Old case

Q7. How long did you wait between noticing symptoms and seeking care? A: .......days

Q8. Where did you first seek care when you noticed symptoms?
- A81: HF
- A82: VMW
- A83: Private Provider
- A84: Not remember

Q9. What type of malaria test and specie were you diagnosed with?
- A91: RDT (☐ Pf/ ☐ Mix/ ☐ Pv)
- A92: Microscopy (☐ Pf/ ☐ Mix/ ☐ Pv)

Q10. What treatment did you get?
- A101: ACT/Other (Specified)...............for .......days, # of tablets/day........
- A102: Not remember

Q11. Last time you had malaria, had you been interviewed? A: ☐ Yes/ ☐ No

---

**Malaria prevention:**

Q12. Do you owned a net?
- A121: LLIN
- A122: Conventional net
- A123: Do not own any net

Q13. If yes, did you sleep under net in malaria transmission area?
- A131: Always
- A132: Sometimes
- A133: Never

Q14. Have you ever used repellent? A: ☐ Yes  ☐ No

Q15. Was your house ever sprayed? A: ☐ Yes  ☐ No
3.4 Response activities by Day-7

Between Day-3 to Day-7, response activities will be conducted by HF staff with support from VMW(s) and technical guidance/monitoring from ODMS/PMS/CNM/CAP-M.

a) Screening:

For imported cases, all household members of the index case and co-workers (hot pop) should be screened, whereas for indigenous cases, 9 households surrounding the index case (about 50 persons) will be screened with RDT and microscopy along with the household members in the index house (total 10 HHs). This activity is likely to be conducted during Day-3 case investigation, but if not possible it can be during the response activities. HC staff are responsible for these activities with support from VMW(s) in the village.

b) LLIN top-up and health education:

All household members will get health education on malaria prevention and treatment and also about LLIN ownership and use, ideally during Day-3 cases investigation, but if not possible these may be incorporated in the response activities. HC staffs are responsible for these activities with support from VMW(s) in the village.

During the response activities, in addition to the index case household, 9 HHs surrounding the index case will be included and the household heads or representative members will be asked about LLIN ownership. LLIN will be topped up (free distribution) to HH(s) that do not meet the optimal coverage.

c) IRS:

As agreed with CNM, if it is feasible to transfer IRS capability to OD/PHD the project intends to support OD/PHD to conduct IRS for all the 10 HHs during Days 3-7.
4 SOP for LLIN top up

Purpose: This SOP serves as a short guide for LLIN/LLIHN monitoring in order to:

1) identify any shortages of LLINs or LLIHNs among household members and mobile migrants; and
2) top up LLINs or LLIHNs based on the shortage

Key people:
- Farm owners (FOs)
- Village Malaria Workers (VMWs)
- Health facility staff
- Project staff (PCs, ODCs, ADCs, central staff)

Roles and Responsibilities:
- FOs:
  o Responsible for keeping sufficient buffer stock of LLINs/LLIHNs
  o Distribute LLIN/LLIHN to workers through lending/giving away
- VMWs:
  o Responsible for keeping sufficient buffer stock of LLINs/LLIHNs
  o Conducting regular visits to all households and all farms in their villages on quarterly basis
  o Identify the shortage of LLINs/LLIHNs, and top up
  o Provide health education
- Health facility staff:
  o Manage and supply LLINs/LLIHNs to VMWs
  o Monitor LLIN distribution of VMWs
  o Document and report actions taken
- The project staff:
  o providing clear instruction to VMWs, and health facility staff
  o ensuring sufficient buffer of LLINs/LLIHNs at HFs, and VMWs
  o monitoring, documenting and reporting

Procedure: The LLIN/LLIHN distribution to residents, mobile migrant workers is conducted through top up approach as described in the figure below.
Figure 9: LLIN/LLIHN Distribution scheme to residents and MMPs in SPL

- Check # of family members, and LLINs/LLIHNs
- Calculate coverage (ratio: 1/1.8)
- Top up LLINs/LLIHN based on need
- Documentation & reporting

CAP-M
Top-up system through LLIN monitoring (USG ITNs)

VMWs
Health Facilities
VMWs

Resident Households (top up)

Net distribution flow

MMP
(Lending, give-away)

- Stay less than 2 weeks
  - Lend LLINs to workers through owners
- Stay more than 2 weeks
  - Give LLIN away
Residents (top up):

- **Step 1**: LLINs/LLIHNs will be stored as buffer stock at VMWs and health facilities.
- **Step 2**: VMWs will conduct monitoring visits to residents’ households (20 HHs per visit/day). VMWs will complete visits to all households in an entire village once every 3 months.
- **Step 3**: check numbers of family members and their existing usable LLINs/LLIHNs. When LLINs/LLIHNs are found inadequate, top up immediately based on national ratio 1/1.8.
- **Step 4**: documenting into a family net receiving book (household card) for reference.
- **Step 5**: reporting to HFs during monthly meeting.

Mobile Migrants Population (lending and giving):

Farms/Companies:

- **Step 1**: VMWs update farms, replace LLINs/LLIHNs to existing farms and buffer LLIN/LLIHNs to new farms.
- **Step 2**:  
  - If the workers have been employed for less than 2 weeks, the owner lends LLINs to the workers;
  - If the workers have been employed for more than 2 weeks, the owners inform the VMWs and certifies the distribution.
- **Step 3**: VMWs conduct quarterly monitoring to the farms/companies to ensure sufficient buffer of LLINs and fill in monitoring checklist (to be revised).
- **Step 4**: Reporting to HFs during monthly meetings.

Construction, mining workers, cross border migrants (give away):

- **Step 1**: VMWs/MMWs visit the work sites immediately upon notification;
- **Step 2**: check LLIN availability among the workers.
- **Step 3**: distribute LLINs, LLIHNs, ratio: 1/1.
- **Step 4**: document, using the project tools, and reporting.
5 Pilot SMS system to facilitate case reporting from point of diagnosis (Day-1) to HC, HC based case investigation (Day-3) and response activities (Day-7)

5.1 Objective
CAP-M aims to pilot an SMS system to alert and keep track of services delivered with support from the project at the service delivery level and maintain an electronic record of the output, for example, a case notification. This system is designed to get input from mobile devices (Smartphone) through an SMS application. The objectives of the system are:

- To facilitate case notification from health facility (D1)
- To store health facility-based case investigation data (D3)
- To monitor response activities (D7)

Ideally, the application will be integrated into the MIS system of the CNM. However, at the time being the SMS system and database for implementation of the basic essential package for SPL pre-elimination will be started with the current CAP-M online system because the MIS is not yet upgraded to be web-based. When the latter is upgraded, integration will be done soonest possible.

5.2 Principle
The CAP-Malaria SMS system is a third-party application, which works with any smartphone to input data on malaria patients. This application allows HFs/VMWs from the service delivery level to input their daily enrolled cases by using a smartphone. Using computers and a project web-based application provided by CAP-M the HF staff will input data on all malaria cases (all species) to a secured server.

All information related to case management (D1, D3, D7) will be accessible at the central (CAP-Malaria project) and regional (Province and OD) levels by authorized users who will be able to log into the project web-based application on a computer. All information including patient details and case investigation follow-up details will be saved on a secured central server which receives information from health facility staff in Sampov Luon OD when transmitted to the server from smartphones and computers in the field. The central database will be able to produce analytics and report these back on a real-time basis to the program persons through remote access. The SMS-based application captures the geo-tagged location of each service delivery point where each notification was initiated.

The CAP-Malaria SMS system will be centrally managed by a service administrator, who is responsible for overall management of the application including customization of input parameters, granting access to health facilities and OD staff, and analyzing overall performance. Authorized program persons can access the application from their computer by logging into the system’s URL provided and, according to the privilege level set by the administrator, are able to
monitor different levels of information. Cases notified (D1) will be enrolled in the system from the service delivery level via SMS-based and the project web-based application. Within three days after initial case notification (D3), health facility staff will be required to conduct case investigation and classification and this information will be input to the project web-based application. Moreover, case response activities (D7) are needed to perform the comprehensive package such as screening, provision of health education, and topping up LLIN. This information will also be reported in the project web-based application.

5.3 Implementation Plan for Piloting SMS System
CAP-M SMS system will be implemented in all health facilities in Sampov Luon OD, Battambang Province.

Table 1: Health Facilities to Pilot SMS System

<table>
<thead>
<tr>
<th>No</th>
<th>Health facility name</th>
<th>Number of health staff</th>
<th>Number of contract staff</th>
<th>Number of VMWs</th>
<th>Number of MMWs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RH SPL</td>
<td>45</td>
<td>7</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>2</td>
<td>Bour / Tak krei</td>
<td>5</td>
<td>3</td>
<td>16</td>
<td>00</td>
</tr>
<tr>
<td>3</td>
<td>Trav chou</td>
<td>6</td>
<td>4</td>
<td>20</td>
<td>00</td>
</tr>
<tr>
<td>4</td>
<td>Serey meanchey</td>
<td>7</td>
<td>2</td>
<td>16</td>
<td>00</td>
</tr>
<tr>
<td>5</td>
<td>Sam Pouv Loun/ Angkoban</td>
<td>7</td>
<td>2</td>
<td>16</td>
<td>00</td>
</tr>
<tr>
<td>6</td>
<td>Baraing Thleak</td>
<td>4</td>
<td>1</td>
<td>10</td>
<td>00</td>
</tr>
<tr>
<td>7</td>
<td>Pechenda</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td>00</td>
</tr>
<tr>
<td>8</td>
<td>Reak smey Samaki</td>
<td>5</td>
<td>2</td>
<td>20</td>
<td>00</td>
</tr>
<tr>
<td>9</td>
<td>Trang</td>
<td>17</td>
<td>2</td>
<td>32</td>
<td>00</td>
</tr>
<tr>
<td>10</td>
<td>Kam Rineg</td>
<td>7</td>
<td>2</td>
<td>21</td>
<td>00</td>
</tr>
<tr>
<td>11</td>
<td>Ta krei</td>
<td>5</td>
<td>3</td>
<td>16</td>
<td>00</td>
</tr>
</tbody>
</table>
5.4 Information flowchart

Information is entered and captured by the CAP-M SMS systems as follows:

![Information flow chart](image)

5.5 Components and tools

The SMS system requires the following components:

- Hosting server to communicate between devices and to store information in the server
- SMS application will be designed to operate on android platform; therefore, it is important to make sure that all mobile phones used to operate the application fulfill the requirement of the software
- SIM cards to get mobile internet to operate this mobile application (SMS receiver)
- Network service is needed to submit information (SMS sender)
- Project web-based application will be developed for central access
5.6 Safe Operating Instructions

- Do not install any other applications to the Smartphone to avoid corruption of SMS application.
- During reporting, health facility staffs need to ensure that, the smartphone is getting mobile network signal. Without mobile network signal, data will not be transmitted to the server.

5.7 Care Instruction for the Smartphone

- Ensure that the mobile phone is fully charged before leaving home
- Avoid overcharging the mobile phone, which may damage the battery
- Avoid letting the smartphone get wet. If the smartphone does get wet accidentally, it should be dried with the use of absorbent paper, switched off immediately, and its battery removed. Switch it on only when it is dry.
- Use a cover for smartphone. There are rubberized covers for the phone that will prevent breakage of the phones exterior portion.
- Use gentle pressure only when operating the touch screen. Too much pressure will lead to the phone being damaged.
5.8 **Trouble shooting**

Though the SMS system is a stable and secured web application, occasional problems may be experienced, though it is unlikely. If any of the users experience any difficulties on either Smartphone or web-based management module, they should contact the service administrator immediately.

5.9 **Disclaimer**

The CAP-Malaria SMS system is not a diagnosis tool or a treatment process. CAP-M SMS promotes case management by facilitating case notification (D1), investigation and classification (D3), and response activities (D7). The SMS system is designed and developed carefully to avoid loss of data and data are stored in a secured database server to prevent corruption.
## 6 Annex

### 6.1 Annex 1: Village Malaria Worker Case Reporting Form

Malaria cases recording table for Village Malaria Worker

<table>
<thead>
<tr>
<th>Province</th>
<th>District</th>
<th>Commune</th>
<th>Village</th>
<th>Month</th>
<th>Year</th>
<th>VMW's Name</th>
</tr>
</thead>
</table>

**Date of next monthly meeting:**

**Drug & RDT Used in hand**

<table>
<thead>
<tr>
<th># RDTs</th>
<th># DHA-PIP</th>
<th># persons receiving HE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Health Education sessions</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Mobile</th>
<th>Drug &amp; RDT Used in hand</th>
<th>Requesting for new supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td># persons receiving HE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mobile**

<table>
<thead>
<tr>
<th>N</th>
<th>Date</th>
<th>Patient's Name</th>
<th>Sex</th>
<th>Age</th>
<th>Population type (Please tick)</th>
<th>Pregnancy (in months)</th>
<th>RDT result (please tick)</th>
<th>Drugs (Medication)</th>
<th>Death or Referral cases (write destination Health Facility Name)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mobile</td>
<td>Not Mobile</td>
<td>Pl</td>
<td>Ph</td>
<td>Mx</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total**

**Weight**

---

**CAP-MALARIA**

CONTROL AND PREVENTION OF MALARIA
6.2 Annex 2: Community Malaria Treatment Follow-up Form Day 0-3

Community Malaria Treatment Follow Up Form (TFU): Day-0/Day-3

Patient ID: Mode of entry: ☐ Self refer ☐ Refer from HC ☐ Refer from private provider

Patient Name: Age: Years Sex ☐ Male ☐ Female

Phone number (☐ Own number ☐ Relative number):

Occupation: ☐ Self-employ (Farmer/Vender) ☐ Rubber plantation worker ☐ Other type of farm worker
☐ Road construction worker ☐ Other type of construction worker ☐ Other:

Current address: Village: Commune: District: Province:

Temporary overnight stay in the past month (☐ Slept in village ☐ Slept in farm/forest):

1. Village: Commune: District: Province:
2. Village: Commune: District: Province:

Permanent address: Village: Commune: District: Province:

Malaria Treatment History: Have you ever been treated for malaria in the past 28 days? ☐ Yes ☐ No

If Yes, Name of anti-malarial drugs: ☐ Not remember, # of doses: ☐ Not remember

Signs and Symptoms:

Temperature: °C Weight: Kg

On Day-0
Fever: days Shiver: days Sweating: days Headache: days
Other signs:

On Day-1: Fever (☐ Yes ☐ No) Shiver (☐ Yes ☐ No) Sweating (☐ Yes ☐ No) Headache (☐ Yes ☐ No)
On Day-2: Fever (☐ Yes ☐ No) Shiver (☐ Yes ☐ No) Sweating (☐ Yes ☐ No) Headache (☐ Yes ☐ No)

Rapid Diagnosis Test Result:

☐ P F ☐ Mix ☐ P (No need smear)

- Smear before treatment (Smear Day-1) Date: Time: (24h type)
- Smear Day-1 and CIF sent to HC Date: Time:

Treatment with DHA-PIP under direct observed therapy (DOT):

- 1st dose (☐ DOT ☐ Non DOT): Date: Time: # of DHA-PIP: Tabs

- 2nd dose (☐ DOT ☐ Non DOT): Date: Time: # of DHA-PIP: Tabs

- 3rd dose (☐ DOT ☐ Non DOT): Date: Time: # of DHA-PIP: Tabs

- Smear before treatment (Smear Day 4) Date: Time:

- 2 Smears (Day-1 & Day-4) and CIF sent to HC Date: Time:

VMW name: Age: Sex ☐ Male ☐ Female Phone:

Village name: Distance to HC: km
This part is filled in by Health Centre laboratory staff:

- Date receiving smears: Date: .............................. Time: ..............................

☐ Smear Day 0: Code: ............... Thick smear (☐ Good ☐ Not good) Thin smear (☐ Good ☐ Not good)

☐ Smear Day 3: Code: ............... Thick smear (☐ Good ☐ Not good) Thin smear (☐ Good ☐ Not good)

- Date delivering smears results: Date: .............................. Time: ..............................

**Day 0 smear result:**

☐ Positive ☐ Negative

- Malaria species: ☐ Pf ☐ Mix ☐ PV

- Pf density: .................. /μl Pf Gametocyte: ☐ Positive ☐ Negative

**Day 3 smear result:**

☐ Positive ☐ Negative

- Malaria species: ☐ Pf ☐ Mix ☐ PV

- Pf density: .................. /μl Pf Gametocyte: ☐ Positive ☐ Negative

In case Day 3 smear remained positive, laboratory staff has to verify directly with the patient:

☐ Reach through phone ☐ Not reached

1. Complete dosage (☐ Yes ☐ No) 2. DOT (☐ Day 0 ☐ Day 1 ☐ Day 2)

In case Day 3 positive, written code below for sending SMS

<table>
<thead>
<tr>
<th>OD Code</th>
<th>Space</th>
<th>Current village code</th>
<th>Space</th>
<th>Name - Age - Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Name and position of SMS sender: .................................................................

- Sending phone number ........................................................ Receiving phone number ............................................................

- SMS sending date: .............................. Time: ..............................

- Receiving thanks message from central server within 1 h: ☐ Yes ☐ No (If no, resending)

Each case, HC malaria staff has to verify directly with the patient:

☐ Meet in person ☐ Reach through phone ☐ Not reached 1. Complete dosage (☐ Yes ☐ No)

2. DOT (☐ Day 0 ☐ Day 1 ☐ Day 2) 3. Indicating: ☐ indigenous case ☐ Imported case

Lab staff name ................................................................. Lab staff name .................................................................

HC name ................................................................. OD name .................................................................

Date: .............................. Date: ..............................
6.3 Annex 3: Community Malaria Treatment Follow-up Form Day 7-28

Community Malaria Treatment Follow Up Form (TFU): Day7/Day28

Patient ID: Mode of entry: □ Self refer □ Refer from HC □ Refer from private provider
Patient Name: Age: Years Sex □ Male □ Female
Phone number (□ Own number □ Relative number)

1st dose treatment (=Day 0) Date: Time: (24h type)
☐ Slide Day 7 (=Day 0+7) Date: Time:
☐ Slide Day 28 (=Day 0+28) Date: Time:

In case you can't find the patient, please indicate the reason: □ Working outside the village for... days
☐ Working outside the country □ Going back to home village in other district/province

Smear and CIF sent to HC Date: Time:

Patient followed up after treatment: □ From Day 4 to Day 7 □ From Day 8 to Day 28

Diagnosis, Treatment and Follow up conducted by VMW

Signs and Symptoms: Temperature: °C Weight: Kg
Fever... days Shiver... days Sweating... days
Headache... days Other signs:

VMW name: Age: Sex □ Male □ Female Phone:

Village name: Distance to HC: km

This part is filled in by Health Centre laboratory staff:

- Date receiving smears: Date: Time:

- Smear (☐ Day 7 ☐ Day 28): ID... Thick smear (☐ Good ☐ Not good) Thin smear (☐ Good ☐ Not good)

- Date delivering smears results: Date: Time:

Smear (☐ Day 7 ☐ Day 28) result: □ Positive □ Negative

- Malaria species: □ Pf □ Mix □ Pl

- Pf density: /µl Pf Gametocyte: □ Positive □ Negative

Lab staff name: OD staff name:

HC name: OD name:

Date: Date: