Supplemental material 1. Additional methods

Questionnaire survey of malaria program stakeholders

Malaria program stakeholders (disease control unit leaders, and Vector Borne Disease Control Unit staff from Provincial and District Health Offices) and malaria service providers (health centre and primary healthcare facility staff, and village malaria workers (VMW)) from Lao PDR were surveyed using questionnaires. Personnel responsible for managing, coordinating and supervising the field level malaria reactive surveillance and response (RASR) activities, and frontline malaria service providers in the field were included in the study. Two different survey questionnaires were used to collect information about the awareness and practices of malaria program stakeholders regarding current malaria reactive surveillance and response strategies, and feasibility of the current malaria reactive surveillance and response strategies currently implemented in their assigned geographical locations.

Qualitative assessment (interviews and focus group discussions) of malaria program stakeholders, malaria service providers and beneficiaries

Semi-structured interviews and focus group discussions with malaria program stakeholders, malaria service providers and beneficiaries of malaria programs, including mobile and migrant groups at heightened risk of malaria, were conducted. The qualitative assessment further explored perceptions and practice of the stakeholders regarding the current malaria RASR strategies, acceptability of the strategies, and feasibility of successful implementation of the strategies in Lao PDR. It also explored how the current malaria RASR strategies can be optimised so that they fit well into current elimination settings of Lao PDR. Implementation strategies for the questionnaire and interviews were flexible and adaptive and varied according to country and respondent due to ongoing constraints associated with the COVID-19 pandemic and competing work priorities.

Secondary data analysis

Secondary data analysis of malaria case-based reporting data and reactive surveillance and response data from Lao PDR in 2018 and 2022 was conducted to investigate adherence to and effectiveness of different malaria RASR strategies.

1. Questionnaire survey of malaria program stakeholders and malaria service providers

1.1. Study design

Cross-sectional quantitative surveys were conducted with malaria program stakeholders and malaria service providers from Lao PDR.

Two different survey questionnaires were used to collect information about the awareness and practices of malaria program stakeholders regarding the current malaria reactive surveillance and response strategies of their areas, and the feasibility of these strategies.

Questionnaire 1 was used for personnel responsible for field staff and field supervisors responsible for managing, coordinating and supervising field level malaria reactive surveillance and response activities. **Questionnaire 2** was used for frontline malaria service providers in the field.

1.2. Objectives

1. To determine awareness and practices of malaria program stakeholders in GMS countries regarding their current malaria reactive surveillance and response strategies, including the adherence of the field staff and frontline malaria service providers to the strategies and the timeliness and completeness of their reactive surveillance and response activities
2. To identify the facilitators and barriers in implementation and adherence of the current malaria reactive surveillance and response strategies in the GMS, and possible solutions to the identified barriers

1.3. Outcomes

1. Level of awareness of malaria program staff/volunteers in GMS countries regarding different activities of the malaria reactive surveillance and response strategies currently implemented in their countries
2. The proportion of malaria program staff/volunteers in GMS countries who strictly follow different activities of the malaria reactive surveillance and response strategies currently implemented in their countries
3. Facilitators and barriers to the implementation and adherence of the current malaria reactive surveillance and response strategies in the GMS, and identification of possible solutions to the identified barriers

1.4.Study settings and study sites

In Lao PDR, study areas were identified in consultation with Laos Centre of Malariology Parasitology and Entomology (CMPE) and HPA with consideration of malaria epidemiology and current surveillance systems. The study areas included four provinces – Huaphan (Sopbao District), Khammouane (Boualapha and Thakhek Districts), Luangprabang (Phoukhoun District), and Savannakhet (Vilabouli District) Provinces.

1.5.Study populations and sample size

Questionnaire 1

Twenty-eight personnel from Laos Ministry of Health and CMPE, who were responsible for managing, coordinating and supervising field level malaria reactive surveillance and response activities were recruited. The sample size was estimated based on the availability of stakeholders in Lao PDR, with consideration of likely logistical and accessibility challenges during the COVID-19 pandemic. The participants for Questionnaire 1 included disease control unit leaders and Vector Borne Disease Control Unit staff from Provincial and District Health Offices.

Questionnaire 2

Thirty-seven malaria service providers who were working under the supervision of either of the Lao Ministry of Health and malaria program implementing partners in Lao PDR, who usually undertake malaria case detection and case management in the field and have to directly or indirectly take part in the field level malaria reactive surveillance and response activities were recruited. The participants for Questionnaire 2 included health centre and primary healthcare facility staff, and village malaria workers.

Exclusion criteria (for both Questionnaire 1 and 2)

Individuals with any one of the following criteria were excluded from the study.

- Aged below 18 years
- Participant living in a village or a location not easily assessable by the investigator/data collector because of either remoteness of the location, difficult transportation, or ongoing armed conflict.

1.6.Sampling Strategy and Participant recruitment

For both Questionnaire 1 and 2, malaria program stakeholders and service providers (respectively) were purposively sampled. Personnel, staff and volunteers suitable for each questionnaire was identified by the research team in consultation with the CMPE and malaria program implementation partners and the sampling frame was developed based on this information.

The prospective participants were approached by the research team to request their participation in the study. For both Questionnaire 1 and 2, the prospective participants were approached individually in their working place, or they may be individually or collectively invited to a meeting place most probably at the provincial level malaria program offices for the recruitment procedure. For Questionnaire 2, the same procedure applied but a meeting place nearest to their working place was preferred. Investigators/trained data collectors facilitated the informed consent taking procedure in person.

1.7.Study procedures, data collection methods and tools

Once written informed consent had been obtained, participants were surveyed by a surveyor using the semi-structured questionnaire which is framed in the REDCap, a web-based application for building and managing online surveys and databases. The surveyors were investigators from the research team or a trained data collector familiar with the local context of the participant. The questionnaire covered the sociodemographic characteristics of the participant, and awareness and practice of the participant regarding the malaria reactive surveillance and response strategies currently implemented in their assigned geographical areas. The survey questionnaires were pilot tested with 1 – 2 malaria program stakeholders and 1 – 2 frontline malaria service providers from prior to data collection. Based on the pilot-testing results, the questionnaires were reviewed and revised.

Surveys were facilitated in-person by the surveyor. The surveyors recorded the participant's responses using the REDCap application on their Android OS running mobile devices (a mobile phone or a mobile tablet). The semi-structured questionnaire contained single and multiple responses questions with some pre-expected answers to choose to record, and open-ended questions which the surveyor wrote down the responses in verbatim in their mobile application. The surveys were conducted in the local language of the participant (i.e., Lao

language), and the surveyors translated the responses into English on site and recorded them in English into their mobile phones.

The surveyors conducted the survey with his mobile application in online or offline mode. But once data verification and data cleaning (which was done in the field on a daily basis) was done, the surveyor, with his mobile phone connected to an internet access and the REDCap application in the online mode, submitted the completed surveys to the Burnet Institute's REDCap server (which was done on a weekly basis). Then, the research team assessed the completed surveys in the server through their computers.

1.8.Data processing, management and analysis

Survey data in the Burnet Institute's REDCap server was accessible only to the research team members from Burnet Institute, the data custodians being Professor Freya Fowkes and Dr Win Han Oo from Burnet Institute. The data in the server was exported in Stata data format (".dta" and ".do") by the research team members from Burnet Institute. Then, the exported data was imported into, processed and analysed using Stata version 17.0. The exported data was accessible only to the research team members from Burnet Institute.

2. Qualitative assessment (interviews and focus group discussions) with malaria program stakeholders, service providers and beneficiaries

2.1.Study design

Semi-structured interviews and focus group discussions (FGD) were conducted with malaria program stakeholders, malaria service providers, and beneficiaries of malaria programs. To represent beneficiaries of malaria programs, mobile and migrant populations at higher risk of malaria were approached. Semi-structured interviews were conducted with malaria program stakeholders who were responsible for designing or overseeing malaria reactive surveillance and response policy, strategies and activities. Focus group discussion were conducted with malaria program stakeholders who are responsible for managing, coordinating and supervising field reactive surveillance and response activities, malaria service providers, and mobile and migrant populations.

The qualitative assessment further explored the perceptions and practice regarding the current malaria reactive surveillance and response strategies; acceptability to the strategies; and feasibility in successful implementation of the strategies in Lao PDR. It also exploreed how the current malaria reactive surveillance and response strategies can be optimised so that they fit well into current elimination settings of Lao PDR.

2.2.Objectives

1. To explore perceptions and practice of malaria program stakeholders in GMS countries regarding their current malaria reactive surveillance and response strategies, especially focusing on their adherence to the strategies
2. To explore the acceptability of current malaria reactive surveillance and response strategies to malaria program stakeholders and beneficiaries in GMS countries
3. To explore the feasibility of successful implementation of malaria reactive surveillance and response strategies in GMS countries
4. To explore how the current malaria reactive surveillance and response strategies can be adapted to overcome existing barriers and improve their effectiveness in malaria elimination in GMS countries, including participation of CHWs in the strategies and optimization of the strategies for the MMPs

2.3.Outcomes

1. Perceptions and practice of malaria program stakeholders in GMS countries regarding their current malaria reactive surveillance and response strategies, mainly focusing on the adherence to target schedules of different case notification, case investigation, focus investigations and response activities
2. Views and perspectives of different malaria program stakeholders and beneficiaries in GMS countries on the acceptability of the current malaria reactive surveillance and response strategies
3. Identified policy, strategic, and operational barriers and enablers in successful implementation of the current malaria reactive surveillance and response strategies in GMS countries
4. A matrix of opinions and suggestions on how the current malaria reactive surveillance and response strategies in GMS countries can be optimized so that the existing barriers are overcome, effectiveness in malaria elimination is improved, and the strategies fit well into current elimination settings in the region

2.4.Study setting and study sites

Considerations of the study setting and study sites for the qualitative component were the same as those for quantitative surveys.

2.5.Study population and sample size

Types of personnel, staff and MMPs suitable with the purposes of each qualitative study component were identified by the research team in consultation with focal persons from the CMPE, and its malaria program implementing partners. Data saturation was the determinant factor for discontinuing participant recruitment.

Semi-structured interviews with higher and middle level malaria program stakeholders

Personnel from Lao Ministry of Health, national malaria control programs and their malaria program implementing partners in the GMS countries, who are responsible for designing or overseeing malaria reactive surveillance and response policy, strategies and activities were recruited for the interview. The participants for semi-structured interviews included disease control unit leaders and Vector Borne Disease Control Unit staff from Provincial and District Health Offices.

Focus group discussion with lower-level malaria program stakeholders

Personnel from Lao Ministry of Health, national malaria control programs and their malaria program implementing partners in the GMS countries, who are responsible for designing or overseeing malaria reactive surveillance and response policy, strategies and activities were recruited for the FGD. The participants for FGD included disease control unit leaders and Vector Borne Disease Control Unit staff from Provincial and District Health Offices.

Focus group discussion with frontline malaria service providers

Frontline malaria service providers who are working under the supervision of either of the ministries of health, national malaria control programs and their malaria program implementing partners in Lao PDR, who routinely perform malaria case detection and case management in the field and may directly or indirectly take part in the field level malaria reactive surveillance and response activities were recruited for this FGD. The participants for FGD included health centre and primary healthcare facility staff, and village malaria workers (VMW).

Focus group discussion with mobile and migrant populations

Mobile and migrant populations (MMPs) who are at high risk of malaria infection and are usually receiving malaria prevention and treatment services from national malaria control programs and their malaria program implementing partners in Lao PDR were recruited for this FGD. In this study, a ***migrant*** is defined as "*a person who takes up residence or remains in another place for an extended period of time (including seasonal migrants and forest dweller: Any person who regularly works in forests and stays overnight). A migrant moves from one location to another, regardless of duration or distance; experiences inequitable access to public health services resulting from the movement; and is vulnerable to becoming infected with malaria as a result of the movement*" and a ***mobile person*** is defined as *"any person who is constantly moving, such as truck drivers, seafarers, travelling salespersons, sex workers etc"* [27]. The MMPs recruited for this FGD included but not limited to traditional slash-and-burn and paddy field farming communities visiting their forest farms, seasonal agricultural laborers, defense services, non-state combatants, internally displaced people and forest workers in the formal sectors (police, border guards, forest/wildlife protection services), forest workers in the informal sectors and formal and informal cross-border migrant workers.

Exclusion criteria

Individuals with any one of the following criteria were excluded from the study.

- Aged below 18 years
- Participant living in a village or a location not easily assessable by the investigator/data collector because of either remoteness of the location, difficult transportation, or ongoing armed conflict.

2.6.Sampling strategy

A purposive sampling approach was applied in recruiting the participants. Within each defined group of study population for each qualitative study component (for both interviews and FGDs), participant recruitment encouraged participation of a mix of different personnel, staff or MMPs representing different localities, and different levels of responsibilities (such as national level, provincial level, township level, etc.) so that a rich and saturated data with diverse ideas and opinions can be obtained. For FGDs with MMPs, participation of different types of MMPs of all genders was encouraged.

Participant recruitment for the qualitative component had taken the following factors into consideration: limited number of malaria program stakeholders in each sub-group who are available to engage in the interview and the FGD, complexity of political landscape to interview government staff, prolong approval process and time constraint, and complexity of authorization to conduct FGDs and workshop in different locations, prolong approval process and time constraints. However, those factors were weighed against the data saturation for continuing the participant recruitment.

2.7.Participant recruitment

Types of personnel, staff and volunteers suitable for each questionnaire were identified by the research team in consultation with the national malaria control programs and malaria program implementation partners. The local administrative bodies were also consulted for recruiting MMP participants for FGD. The consultation bodies were contacted through mobile phone calling or in person.

The prospective participants were approached by the research team through the respective national malaria control programs and malaria program implementation partners to request

their participation in the study. The prospective participants for interview were approached individually in their working place, or they were invited to a meeting place most probably at the provincial level malaria program offices for the recruitment procedure. For prospective participants for FGDs, they were invited to a meeting place most probably at the provincial level malaria program offices for the recruitment procedure. For FGDs with MMPs, the prospective participants were approached at their current residing or working place as appropriate. Investigators/trained data collectors facilitated the informed consent taking procedure in person.

2.8.Study procedures, data collection methods and tools

Semi-structured interviews

Once the written informed consent had been obtained, the participant was interviewed by an interviewer who was a nominated in-country senior member of the research team at the discretion of the principal investigator. The interview was conducted individually in-person in local language of the participant, and the interview was facilitated by a note taker. The interview was conducted in a place with privacy so confidentiality could be maintained. The location of interviews was determined separately for each interview and the location selected depended on the potential sensitivities and risks relevant to each participant. Prior to commencing the interview, the interviewer obtained non-identifying information relating to the job title, role/responsibility and relevant experience of the participant.

The interview was aided by an interview topic guide. The topic guide contained questions covering the perceptions and practice of malaria program stakeholders regarding their current malaria reactive surveillance and response strategies, acceptability of the strategies, feasibility for successful implementation, and how the current strategies could be optimised for malaria elimination settings of Lao PDR. The wordings and sequence of the questions in the topic guides did not need to be exactly followed but could be modified depending on the exiting dynamic of the discussion session. The interviewer facilitated the interview with open-ended questions to allow participants to reveal their opinions freely. The interview session was audio recorded using voice recorders and written notes was taken with the informed consent of the participant. During the session, participant was provided with refreshments. Each interview session took approximately 60 minutes. After completion of each interview, the interviewer completed notes of reflection on each interview within 24 hours of completion. To ensure the

participants had an opportunity to check what was said during the interview, the copy of transcript was sent to each participant for their own record of the discussion through email.

Focus group discussions

Once the written informed consent had been obtained, the participants were seated in circle with each two note-takers on the sides of the circle. The FGD was facilitated by a facilitator who was an in-country investigator of the research team or a trained facilitator/data collector familiar with the local context. The FGD were conducted in local language of the participants. The FGD were conducted in a place with privacy so confidentiality can be maintained. The location of interviews were determined separately for each FGD session and it depended on the potential sensitivities and risks relevant to each participant. Prior to commencing the FGD, the facilitator obtained non-identifying information relating to the age, sex, occupation and role/responsibility of the participants.

The FGD facilitator was aided by an FGD topic guide. The topic guide contained questions covering the perceptions and practice of malaria program stakeholders regarding their current malaria reactive surveillance and response strategies, acceptability of the strategies, feasibility for successful implementation, and how the current strategies could be optimised for malaria elimination settings of Lao PDR. Topic guide for FGD with MMPs focused mainly on the acceptability of the current reactive surveillance and response strategies/activities for them and how they could be optimised for them. The wordings and sequence of the questions in the topic guides did not need to be exactly followed but could be modified depending on the exiting dynamic of the discussion session. The facilitator facilitated the discussion with open-ended questions to allow participants to reveal their opinions freely and interact with each other to build responses. Each FGD session was audio recorded using voice recorders and written notes was taken with the informed consent of the participant. During the session, participants were provided with refreshments. Each FGD session took approximately 60 to 90 minutes. After completion of each discussion session, the interviewer completed notes of reflection on each session within 24 hours of completion. To ensure the participants had an opportunity to check what was said during the focus group discussion, the copy of transcript was sent to each participant for their own record of the discussion.

Other considerations for study procedures

Implementation strategies for the interviews and FGD were flexible and adaptive and varied according to respondent due to ongoing constraints associated with the COVID-19 pandemic and competing work priorities.

Pilot testing of interview and FGD topic guides

Each interview and FGD topic guide were pilot tested with similar participants before commencing actual data collection. Pilot testing helped fine-tune the topic guides that led to more reliable results and rich data. It provided an opportunity to validate the wording of the tasks, understand the time necessary for the session and supply additional data points for the research. It also identified problems and barriers related to participant recruitment, including the informed consent procedure, and commenced the engagement in the research as a qualitative researcher. The participants in the pilot test were selected to be as similar as possible to the intended participants in the actual study. The study procedure for the pilot test was the same as the actual research described in this protocol.

2.9.Data processing and management

Each participant was assigned a unique code linked to his or her data and no identifying information was stored with the collected data. Voice recorders used to take audio-recordings were kept in a locked box in the field before the data was transferred into a password-protected computer and was only accessible to the investigators. Once the quality of electronic audio files had been confirmed, the original files in the recorders were erased. The audio recordings were transcribed verbatim and translated them into English by the in-country research team members. Transcripts in English were used for analysis. Written field notes were stored in locked filing cabinets in the Burnet Institute office. No personal identifiers were recorded on the written notes.

2.10. Qualitative data analysis

Deductive followed by inductive thematic analysis, including constant comparative analysis where appropriate, was used. The process included the steps of data immersion, coding, categorisation/sub-theme development and major theme development, guided by the collected data via an in-depth code guide. Emerging themes during the data collection were captured and incorporated into the thematic framework in data analysis stage. One investigator analysed all the data and another investigator randomly extracted 10% of the data and performed an

independent analysis. Afterwards, both investigators discussed the themes and subthemes and reached a consensus. The findings were reported thematically. Key findings were illustrated with direct quotations from the data. NVivo version 12 assisted the qualitative data analysis.

Member checking with all types of study participants was done and reflexivity was employed from the data collection stage up to the data analysis and reporting stages to improve the rigour of the study. Positionality of the researchers, and experiences of the data collection and analysis were also considered during the write up.

3. Secondary data analysis

3.1.Study design

This component involved descriptive analysis of routinely collected malaria case-based reporting data and reactive surveillance and response data during the 2018 and 2022 calendar years in Lao PDR to investigate adherence to and effectiveness of different malaria reactive surveillance and response strategies.

3.2.Objective

1. To determine the timeliness of the national malaria control program to the malaria reactive surveillance and response strategies currently implemented in Lao PDR

3.3.Outcome

1. Number and percentage of malaria cases that result in timely '**case notification and case investigation**' according to the current national reactive surveillance and response strategies in Lao PDR

Table 1: Malaria case reporting data metrics

Domain	Measurement metric	Reported as
Timeliness	Number and percentage of malaria positive test notifications completed within time frame specified by current reactive surveillance and response strategy in the country (e.g., 24 hours according to 1-3-7)	%
	Number and percentage of malaria positive test notifications for which case investigations were completed within time frame specified by current reactive surveillance and response strategy in the country (e.g., 3 days according to 1-3-7)	%
	Number of malaria positive test notifications for which focus investigations were completed within time frame specified by current reactive surveillance and response strategy in the country (e.g., 7 days according to 1-3-7)	number

3.4.Study setting, study sites and study population

This part of the study tried to collate nationally representative dataset for Lao PDR in the study as much as possible. The period of the data was from 2018 to 2022 calendar years.

3.5.Data retrieval, processing, management and analysis

The CMPE will be approached to request national level datasets of routinely collected malaria case-based reporting data and reactive surveillance and response data. Data transfer agreement was also obtained from the respective authoritative bodies before submission of the protocol to the respective institutional review boards in Lao PDR.

The data was requested in Microsoft Excel format. All data shared with research team members was non-identifiable. Data analysis was performed with Stata version 17.0. The number and percentage of positive malaria test notifications for which reactive surveillance and response activities were completed within the time frame specified by local policy was calculated as outlined in **Table 1** and reported as numbers and percentages.

3.6.Limitations in secondary data

The secondary dataset provided no more than the provincial level aggregated data. Variables include in the secondary dataset were – total number of malaria cases, number of malaria cases notified within 1 day, number of case investigations conducted within 3 days, and number of foci investigations completed within 7 days disaggregated by reporting unit (province) and year. Due to this limitation in the secondary dataset, completeness, and effectiveness of the RASR strategies in Lao PDR could not be assessed. Future studies should be conducted to assess the completeness and effectiveness domains which are essential parameters for measuring the success of RASR strategy (Table 2).

Table 2: Measurements for completeness and effectiveness of RASR strategy

Domain	Suggested measurement metric
Completeness	Number and percentage of positive test notifications for which all case investigation activities were completed
	Number and percentage of positive test notifications for which all focus investigation activities were completed

	Number and percentage of positive test notifications for which all necessary response activities were completed
Effectiveness	Number of positive cases yield from RACD activity in Lao PDR
	Percentage of positive cases derived from RACD among all malaria positive cases in Lao PDR
	Village API in villages implemented RACD in 2018-2022
	Malaria positivity rate in villages implemented RACD in 2018-2022

4. Ethical considerations

4.1. Ethics review

The study protocol was approved by the Alfred Ethics Committee (393/21) and the National Ethics Committee for Health Research of Lao PDR (06/NECHR).

4.2. Informed consent

Two approaches of informed consent was involved in this study. While written informed consent was sought for all active participants (survey, interview and FGD), a waiver of consent was sought for secondary data analysis – which involved the analysis of routinely collected, non-identifiable data collected throughout the 2018-2022 calendar years – from both the Alfred Hospital Ethics Committee and the National Ethics Committee for Health Research of Lao PDR.

Written informed consent

Written informed consent was obtained from all participants taking part in the survey, interviews and FGDs. At time of recruitment, the investigator/data collector thoroughly explained to all prospective participants the overarching scope and purposes of the study, the role of a participant in the study, the study procedures, and the risks and benefits of participating in the study which were described in the Participant Information and Consent Form (PICF) in details. The prospective participant was also asked to read through the PICF. The researcher confirmed the participant's understanding of the information provided and adequately answered any questions. If the individual agreed to participate in the study, he/she was asked to sign the PICF and the researcher obtained written informed consent from the individual. The original signed PICFs for the participants were stored in lockable document storage facility, such as locked folders or locked filing cabinets, and were stored separately from other study documentation.

The informed consent taking procedure was always conducted in the local language of the prospective participant. Care was taken to prepare culturally appropriate and comprehensible explanations about the study with a particular emphasis on the participant's right to withdraw from participation at any time without a reason and without any consequences.

Waiver of consent

A waiver of consent was sought for secondary data analysis to cover the access and analysis of routinely collected, non-identifiable malaria program data on malaria cases and malaria reactive surveillance and response activities collected throughout the 2018 to 2022 calendar years. A waiver of consent was sought for the following reasons, consistent with factors listed in 2.3.10 of the National Statement on Ethical Conduct in Human Research:

a) *This research poses no foreseeable risk to the participants. Participation in the secondary data analysis would be limited to the use of non-identifiable data relating to malaria tests, case investigation, foci investigations and other public health response activities conducted in response to the identification of a malaria case.*

b) *The benefits from the research (a greater understanding of the timeliness and quality of current malaria reactive surveillance and response strategies in the GMS countries) justify any risk of harm associated with not seeking consent noting that there is no foreseeable risk of harm associated with inclusion of one's malaria case record(s) in this study.*

c) *It is impracticable to obtain consent from all individuals whose malaria case records are included in the national datasets we intend to analyse because of the sheer volume of records (approximately 23,900 individual records). The datasets will include basic information on all malaria cases, malaria case notifications, case investigations, focus investigation and responses that occurred in the five GMS countries in the 2019 and 2020 calendar years. Therefore, it would be impracticable to obtain consent from each individual who contributed a malaria case record to this dataset.*

d) *There is no known or likely reason for thinking that participants would not have consented if they had been asked to participate in this study. Firstly, the same datasets are routinely analysed by national malaria control programs to investigate trends in the epidemiology of malaria in GMS countries. The analyses to be conducted by Burnet researchers, using the same datasets, come under the broader topic of malaria epidemiology, but are specifically focused on determining the proportion of malaria cases that are followed up with case investigations, foci investigations and other public health measures. Secondly, it is not foreseeable that analysis of these datasets by Burnet*

researchers will lead to any significant findings that would impact on an individual's health or welfare. Importantly, any health information determinable from the data (that is, malaria test results) has already been communicated to individual patients.

e) *There will be sufficient protection of participant privacy because the records contained in the datasets will have already been collated and names and contact details removed by the relevant national malaria programmes or implementing partner prior to sharing the datasets with Burnet Institute. In other words, the individual to whom the malaria case record relates ("participant") will never be in a position where they are directly disclosing any information to the researchers, as this information will have already been collected in 2019-2020.*

f) *There is an adequate plan to protect the confidentiality of data. The malaria case records will be non-identifiable to researchers because all names and contact details will have been removed by the relevant national malaria programmes or implementing partner prior to sharing the datasets with Burnet Institute. Datasets will be shared with Burnet Institute using a secure password protected sharing platform (most probably Google Drive). Subsequently, data will be stored on secure Burnet Institute servers, accessible only to authorised researchers at the Burnet Institute.*

g) *The results will not have significance for the participants' welfare because they relate to the effectiveness of existing malaria surveillance approaches, rather than being relevant to the health of specific individuals. Any health information contained in the datasets, namely the results of point of care malaria tests, will have already been communicated to the patient at the point of care.*

h) *There is no foreseeable possibility of commercial exploitation of derivatives of the data to deprive the participants of any financial benefits to which they would be entitled*

i) *The waiver is not prohibited by State, federal, or international law.*

The waivers of consent ware submitted to the Alfred Hospital Ethics Committee and the National Ethics Committee for Health Research of Lao PDR.

4.3. Risks and Benefits

4.3.1. Risks

The risk of participating was minimal for all participants both individually and collectively in all individual components of the study. During the surveys, interviews and FGDs, the participants might feel some discomfort discussing some personal information and sensitive issues if there were any. To minimise these risks, trained data collector/interviewer/ investigator conducted the surveys, interviews and FGDs in a private space where the participants could not be overheard. The participants were always allowed to refuse to answer any personal questions and questions in-any-way sensitive to them. Moreover, the materials containing the personal information and sensitive data were always non-identifiable and the data was only assessable to the research team members. Reporting of the findings about the sensitive issues always took cautions to make the data source non-identifiable. Researchers (interviewers) always informed the interview and FGD participants about the use of digital voice recorders to audio-record interviews and FGDs before the start of each session and the use of these voice recorders was done only with the consent of the participants.

4.3.2. Benefits

There was no direct benefit to study participants for participating in the study, and this was made clear in the PICF. However, the study participants were provided with refreshments during the study procedures. The cost of travel and accommodation for study participants, if they was any, were reimbursed as considered appropriate by the principal investigator. Participants of survey, interviews and FGDs were provided with a token of appreciations worth not more than 5 USD to compensate their time spent for participation in this study. Apart from them, other forms of remuneration will not be provided to any participants in this study.

4.3.3. Confidentiality

All individual data entries were always made non-identifiable. No personal information was recorded on the data collection tools and materials. Personal information of the participants was recorded in a separate document and numerical and alphabetical coding systems were used to link the data with their personal identifications. The document containing the personal information were securely stored separately from the data and these documents were accessible only to the research team members. Signed PICF forms were securely stored separately from the survey forms, transcripts and audio-recordings. Moreover, all data-containing documents and material were stored securely in locked filing cabinet, and they were accessible only to

research team members. The audio records of the interviews and FGDs were permanently deleted from the recorders when they were securely transferred to a password-protected computer. All forms of electronic data collected and processed in this study were securely stored in password-protected computers and password-protected cloud servers and they were accessible only to the nominated research team members with the permission of the data custodians, Professor Freya Fowkes and Dr. Win Han Oo from Burnet Institute. All primary data collected through research will be destroyed within seven years after data collection.