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Identifying Forms of Interventions Towards Cross Border Malaria in Asia-Pacific: Scoping Review Protocol

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Identifying Forms of Interventions Towards Cross Border Malaria in Asia-Pacific: Scoping Review Protocol

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Abstract

Introduction

An ambitious strategy has been set for 2030, aiming for malaria elimination in at least 35 countries as one of its goals. Challenges in malaria cross borders require greater attention to achieve the elimination target. This scoping review aims to identify successful forms of interventions to control malaria transmission across national borders in the Asia-Pacific area.

Methods and Analysis

This scoping review will apply a methodology from Arksey and O'Malley (2005). The literatures will be searched from electronic databases (PubMed, ScienceDirect, EBSCOhost, and ProQuest) using the time limit of 1 January 2010 to 30 June 2021. Two independent reviewers will screen all titles and abstracts during the second stage. Study characteristics will be recorded; qualitative data will be extracted and evaluated, while quantitative data will be extracted and summarized.

Ethics and Dissemination

The results will be disseminated through peer-reviewed publications and conference presentations. The data used will be from publicly available secondary sources. This data does not require ethical review because no data collection on primary data and human samples will be carried out.

Strengths and limitations of this study

- This review is a novel scoping review to understand what types of malaria intervention and how this intervention exists within cross border settings in the Asia-Pacific.
- Stakeholders will be engaged throughout the review process.
- A significant limitation concerns the time filter (data collection in the last ten years). However, this enables updates to strategic planning on malaria elimination in 2030.

Introduction

Malaria is a fatal disease caused by the *Plasmodium* parasite, transmitted from person to person by the *Anopheles* mosquito as a vector. This disease creates a significant health and socio-economic burden, with 3.7 billion people at risk of being infected with malaria (1). Globally, there are an estimated 229 million malaria cases and over 400 thousand deaths across 87 malaria-endemic countries in 2019, with the African region accounting for 94% of the global case burden (1). However, some of the "leftover countries" are still malaria-endemic (1,2). In Asia-Pacific countries, the malaria burden is highly under-diagnosed due to the high proportion of submicroscopic malaria which lead to ongoing undetectable transmission (3–5).

The global plan aims to eliminate malaria in at least 35 countries in 2030, including malaria-endemic countries in Asia-Pacific (Figure 1) (1,6). By 2015, three countries were at the pre-elimination stage and four countries at the control stage (7). With massive control to eliminate malaria in 2030, the malaria burden in the Asia-Pacific region shows impressive progress. The malaria burden declined by 68%, from 23 million cases in 2000 to 7.3 million in 2019 (1). This region has specific characteristics, for instance, low-intensity transmission and the dominance of *P. vivax* (8). Moreover, several unique challenges appear, such as resistance to artemisinin treatment and insecticides used, diversity of malaria vectors, and hard-

to-reach population as people at risk (8–10). Another problem in this region is the movement of individuals or mosquitoes across countries, which is usually called cross border malaria (11).

[Insert Figure 1 here]

Cross border intervention is critical to accelerating the malaria elimination effort because no country can achieve and maintain an exclusive malaria elimination status (12). As emphasized by WHO in their strategic plan, there is an urgency to collaborate in accelerating elimination efforts by paying attention to prevention and treatment management and the importance of surveillance (6). Also, adaptation to the local context to support this strategic planning (13). In the Asia-Pacific region, attention to malaria elimination efforts is given by a joined networking of the Asia-Pacific Malaria Elimination Network (APMEN), the Asia Pacific Leaders Malaria Alliance (APLMA), and the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) (14–16). APMEN started in 2009 to support capacity building, advocacy, and research in member countries, hence aims to solve problems of malaria control in the area (10,12). In line with APMEN, since 2013, ALPMA provides political commitment through a high-level advocacy platform to eliminate malaria from the Asia Pacific by 2030 (8,15). Meanwhile, the Global Fund provides and leveraging funding to support malaria elimination efforts (16,17).

However, the effectiveness of cross border malaria control activities remains unclear. Existing reviews mainly discuss the characteristics and challenges of malaria in Asia-Pacific and its relation to the technical strategy of malaria elimination (8,9,12). Other review-related malaria and cross borders talk about mobile populations, cross border characteristics, and multidrug resistance (11,18,19).

In conclusion, there has been no scoping review related to cross border control efforts in the Asia-Pacific. The result of this study would reveal the most effective and efficient intervention in the Asia-Pacific cross border setting.

Purpose and objectives

The purpose of the proposed scoping review is to identify and summarize existing evidence on any intervention related to malaria elimination effort in cross border settings. Our primary research question is "What are the most successful interventions or innovations in accelerating malaria elimination goals in a cross border setting?"

Methods and analysis

Protocol design

To address the purpose and objectives of the proposed study, we will use the scoping review method described by Arksey and O'Malley and further refined Levac *et al.* (20). There are six stages: (i) identify research questions, (ii) search for relevant studies, (iii) select studies, (iv) mapping data, (v) collate, summarize and report results, and (vi) consultation. The study will cover all malaria borders; a malaria potential transmission between countries sharing land border, in the Asia-Pacific (Figure 2) (21). We will include all original articles and case studies in this scoping review. Quality appraisal of studies will not be conducted as this review only explores the general scope of research conducted in this field.

[Insert Figure 2 here]

Stage one: Identifying research questions

Our research questions will be developed and refined through an iterative process and consultations held by the research team. Within this stage, the team will also decide Population, Concept, and Context (PCC) on the study (Table 1). Our team will decide to use the PCC approach as a second screening after all literature search is combined.

[Insert Table 1 here]

Stage two: Search for relevant studies

At this stage, the team will deliberate and decide upon criteria for eligibility, databases to search, and formulate a search strategy and key terms. We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles.

The search strategy uses malaria-related and cross border keywords as our primary filtering methods, and all researchers have agreed with this. The secondary research terms will include broader keywords on intervention and migration or movement. The filtering methods of ranged date, English, and non-review articles are used in all databases.

The following eligibility criteria will be used to guide the search and reviewing articles: (i) study location in Asia-Pacific, (ii) countries with malaria nationwide elimination program (iii) data collection in the last ten years (from January 1st 2010 – June 30st 2021), (iv) articles written in English. The explicit exclusion criteria identified are:

- Transnational malaria; an importation of malaria parasites from airport and seaport international border

- review articles including systematic reviews, meta-analysis, meta-synthesis, scoping reviews, narrative reviews, rapid reviews, critical reviews, and integrative reviews
- journal articles that are not rigorous reviews, such as opinion articles, commentaries, or editorial reviews

Stage three: Study selection

All retrieved papers will be uploaded to a reference management software (Mendeley). We will design a two-level screening. First, an independent reviewer will review titles and abstracts to determine eligibility based on inclusion and exclusion criteria. The second part of the selection process will include two reviewers about the PCC suitability. When differences arise or any uncertainty appears, the citation will not be eliminated for consideration in the next stage. For studies that have multiple publications of the same outcomes reported, we will use the one with the newest publication.

The next stage of the study selection process is a full-text review. In this stage, each reviewer will assess whether the articles meet the eligibility criteria. Any lack of agreement will be discussed until consensus is received or by involving a third reviewer if disagreement still arises. Those fulfilling criteria will be retrieved in this study.

Stage four: Mapping the data

Two independent reviewers will do the data extraction in an excel file. As been agreed by all researchers, the heading of data extraction data will include at least the following: author's name; publication date; country and study location; type of population; study design; aim of the study; type of intervention such as Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), vector control such as Indoor Residual

Spray (IRS), the use of ACTs, intersectoral collaboration, border-notification; and outcomes (e.g., malaria elimination status, prevalence/ incidence).

We will involve stakeholders to review the data extraction form. After that, each member will be independently charting the data from all included literature studies. The validation of the data extraction will be known by discussing samples of literature (e.g., 20%) with other authors.

Stage five: Collating, summarizing, and reporting the results

For our scoping review, the studies identified will be analyzed using both qualitative and quantitative methods. An overview of the research will be displayed through all the findings. Related to qualitative aspects, all reports will be coded by the WHO framework (6). Meanwhile, the quantitative data will be briefly summarized. However, although we are likely to include many different types of studies, our overall assessment of the evidence strength will be more narrative rather than quantitative.

Stage six: Consultation and stakeholder involvement

Consultation with stakeholders, experts, and key informants will be conducted to clarify potential missing studies or ongoing relevant interventions. Moreover, by involving stakeholders, we will have more insights into what happened in the literature. The consultation will include the Ministry of Health, UN Agencies such as UNICEF and WHO, APMEN, APLMA and Non-Governmental Organizations working in malaria.

Patient and Public Involvement

No patient involved.

Dissemination and ethics

This scoping review will only be curating data from secondary data; thus, it does not require ethics approval. Results will be disseminated through a peer-reviewed publication and/or conferences.

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Contributors

All authors made substantial contributions to the work. UC designed the review, including the search strategies and producing the initial draft. EH, IE, and AP were involved in conception the protocol. EH, NR, AP, IE, RA, and UC editing and reviewed the protocol. All authors read and approved the final protocol.

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Disclaimer

This article is based on the author's view and not the funders.

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None declared.

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Not required.

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Table 1. Identification of Population, Concept, and Context (PCC)

Population	Concept	Context
People or community at risk who live in the cross border area	Malaria at the cross border or any human-intervention model	Any community Any areas (districts level, countries level) Any elimination phases Any type of mobility in cross border

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page #1 See title *"Identifying Forms of Interventions Towards Cross Border Malaria in Asia-Pacific: **Scoping Review** Protocol"*
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page #2 See abstract As this is a protocol, results and conclusions are not provided yet in the summary.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page #4-5 The scoping review was chosen because our topic (malaria and cross border; in combination) has not yet been extensively reviewed. *"In conclusion, there has been no scoping review related to cross border control efforts in the Asia-Pacific."*
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page #5-6 See purpose and objectives in page #5. See key elements in page #6 and table 1
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	The protocol is not submitted to PROSPERO (as been suggested by BMJ Open) because scoping review is the exclusion criteria. Screenshot the trial submission is provided below this checklist.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page #6 See inclusion and exclusion criteria *The following eligibility criteria will be used to guide the search and reviewing articles: (i) study location in Asia-Pacific, (ii) countries with malaria nationwide elimination program (iii) data collection in the last ten years (from January 1st 2010 – June 30st 2021), (iv) articles written in English. The explicit exclusion criteria identified are:*
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as	Page #6 (line 134-137) See stage 2: search for relevant studies

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Page #6 (line 131-132) Four electronic databases are going to used. *We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles.*
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page #7 See stage three: study selection
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page #7-8 See stage four: mapping the data
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page #7-8 (line 164-169) *Author's name; publication date; country and study location; type of population; study design; aim of the study; type of intervention such as Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), vector control such as Indoor Residual Spray (IRS), the use of ACTs, intersectoral collaboration, border-notification; and outcomes (e.g., malaria elimination status, prevalence/ incidence).*
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Critical appraisal is not yet done as it is a protocol manuscript.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page #8 See stage five and six. *After mapping the data, there are stages namely: collating, summarizing and reporting the results; followed by consultation and involvement of stakeholder for further clarification.*
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Not yet done. This paper describes the protocol of scoping review.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Not yet done. This paper describes the protocol of scoping review.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not yet done. This paper describes the protocol of scoping review.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Not yet done. This paper describes the protocol of scoping review.
Limitations	20	Discuss the limitations of the scoping review process.	Page #3 See strength and limitation of the study
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Not yet done. This paper describes the protocol of scoping review.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page #9 See funding.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

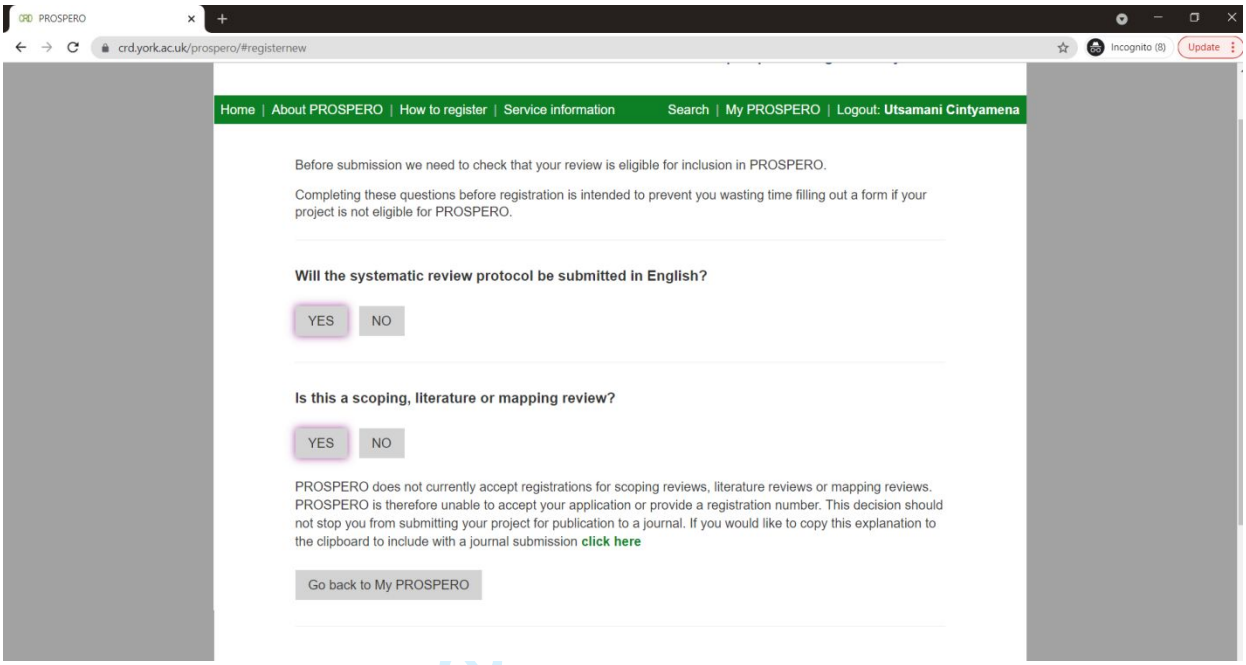
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.



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Identifying Forms of Interventions Towards Cross Border Malaria in the Asia-Pacific Region: A Scoping Review Protocol

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Abstract

Introduction

An ambitious epidemiology strategy has been set by World Health Organization, targeting malaria elimination for at least 35 countries in 2030. Challenges in preventing malaria cross borders require greater attention to achieve the elimination target. This scoping review aims to identify successful forms of interventions to control malaria transmission across national borders in the Asia-Pacific region.

Methods and Analysis

This scoping review will search four electronic databases (PubMed, ScienceDirect, EBSCOhost, and ProQuest) limiting the time of publication to the last 10 years. Two independent reviewers will screen all titles and abstracts during the second stage. Study characteristics will be recorded; qualitative data will be extracted and evaluated, while quantitative data will be extracted and summarized. Overall, we will follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.

Ethics and Dissemination

This scoping review has received ethical approval from the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada. The results will be disseminated through peer-reviewed publications and conference presentations. The data used will be from publicly available secondary sources.

Strengths and limitations of this study

- The study is a first comprehensive scoping review to understand malaria interventions related to malaria elimination efforts in cross border settings in the Asia-Pacific region.
- Stakeholders will be engaged throughout the review process.
- This scoping review is limited to land borders, according to its main definition.
- Only the latest interventions or activities related to malaria elimination will be identified (Literature searching not to include publications before 2010).

Introduction

Malaria is a public health burden caused by the *Plasmodium* parasite, which is transmitted from person to person by the *Anopheles* mosquito as a vector. This disease creates a significant health and socio-economic burden, with 3.7 billion people at risk of being infected with malaria (1). Globally, there were an estimated 229 million malaria cases and over 400 thousand deaths across 87 malaria-endemic countries in 2019, with the African region contributed for 94% of the global case burden (1).

Some countries in Asia Pacific have low-intensity transmission, and have specific challenges that should be overcome, including lack of surveillance (2–4), dominance of *P. vivax* (5), starting to find resistance to artemisinin drugs and insecticides, diversity of malaria vectors, and having hard-to-reach populations (5–7), and cross border malaria problems (8).

Cross border intervention is critical to accelerating the malaria elimination effort because no country can achieve and maintain an exclusive malaria elimination status (9). As emphasized by the World Health Organization (WHO) in their strategic plan, there is an urgency to collaborate in accelerating elimination

efforts by paying attention to prevention and treatment management and the importance of surveillance (10). There are three main pillars developed in the WHO strategic plan that emphasize the importance of the cross border intervention: (i) Maximize access to malaria interventions in border areas (within national boundaries), (ii) Maximize malaria surveillance and response as well as M&E in border areas, and (iii) Maximize cross border coordination mechanisms that provide an enabling environment (10).

Also, adaptation to the local context is imperative to support this strategic planning (11). In the Asia-Pacific region, attention to malaria elimination efforts is promoted by a strategically united networking of the Asia-Pacific Malaria Elimination Network (APMEN), the Asia Pacific Leaders Malaria Alliance (APLMA), and the Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund) (12–14). APMEN started in 2009 to support capacity building, advocacy, and research in member countries, with the main aims to solve problems of malaria control in the area (7,9). In line with APMEN, since 2013, ALPMA provides political commitment through a high-level advocacy platform to eliminate malaria from the Asia Pacific by 2030 (5,12). Meanwhile, the Global Fund is more focused on providing and leveraging funding to support malaria elimination efforts (14,15).

However, the effectiveness of cross border malaria control activities remains unclear. Existing reviews mainly discussed the characteristics and challenges of malaria in the Asia-Pacific region and its relation to the technical strategy of malaria elimination (5,6,9). Other reviews identified issues related to malaria and cross borders challenges involving mobile populations, cross border characteristics, and multidrug resistance (8,16,17).

Conclusively, there has been no specific scoping review related to cross border control efforts in this region. Therefore, we aim to identify and summarize existing evidence on any interventions related to malaria elimination efforts in cross border settings among the Asia-Pacific regions.

Methods and analysis

Protocol design

To address the purpose and objectives of the proposed study, we will use the scoping review method described by Arksey and O'Malley (18). There are six stages: (i) identify research questions, (ii) search for relevant studies, (iii) select studies, (iv) mapping data, (v) collate, summarize and report results, and (vi) consultation. The study will cover all malaria borders, where there is a potential for malaria transmission between countries sharing land borders, in the Asia-Pacific region (19). The scoping review will be conducted until April 2022, and will include all original articles, case studies, and grey literatures including selected reports. We will follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses: extension for Scoping Review (PRISMA-ScR) checklist in all stages (20). Quality appraisal of studies will be conducted by guidance from the Joanna Briggs Institute (JBI) website.

<u>Stage one: Identifying research questions</u>

Our research question is developed and refined through an iterative process and consultations held by the research team. The objective of this review is to identify the most successful interventions or innovations in accelerating malaria elimination goals in a cross-border setting among Asia-Pacific regions.

Moreover, within this stage the team will also decide the parameters for the Population, Concept, and Context (PCC) of the study (Table 1). Our team will decide to use the PCC approach as a second screening after all literature search is combined.

[Insert Table 1 here]

Stage two: Search for relevant studies

At this stage, the team will deliberate and decide upon criteria for eligibility, databases to search, and formulate a search strategy and key terms. We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles. For grey literatures, we will search for publications from organization or institution websites supporting malaria elimination, such as the WHO, APMEN, APLMA, Global Funds reports.

The search strategy uses malaria-related and cross border keywords as our primary filtering methods, and all researchers have agreed with this approach. The secondary research terms will include broader keywords on intervention and migration or cross border movement. The filtering methods of ranged date, English, and non-review articles will be used in all databases. For example, in using PubMed database, the search strategy will be developed to specific MeSH terms. Keywords that will be search are malaria* title/abstract, cross$border OR border* title/abstract. Then we will use "English" as the language filter "1 Jan 2010" and "31 Oct 2021" as the initial and final time filter.

The following eligibility criteria will be used to guide the search and reviewing published articles and grey literature: (i) study location in Asia-Pacific region, (ii) countries with malaria nationwide elimination program (iii) data collection in the last ten years (from January 1st 2010 to October 31st 2021), and (iv) articles written in English. The explicit exclusion criteria identified are:

- Transnational malaria; an importation of malaria parasites from airport and seaport international border areas.

- review articles including systematic reviews, meta-analysis, meta-synthesis, scoping reviews, narrative reviews, rapid reviews, critical reviews, and integrative reviews.

Stage three: Study selection

All retrieved papers will be uploaded to a reference management software (Mendeley). We will design a two-level screening. First, an independent reviewer will review titles and abstracts to determine eligibility based on inclusion and exclusion criteria. The second part of the selection process will include two reviewers about the PCC suitability. When differences arise or any uncertainty appears, the citation will not be eliminated for consideration in the next stage. For studies that have multiple publications of the same outcomes reported, we will use the one with the newest publication.

The next stage of the study selection process is a full-text review. In this stage, each reviewer will assess whether the articles meet the eligibility criteria. Any lack of agreement will be discussed until consensus is received or by involving a third reviewer if disagreement still arises. Those fulfilling criteria will be retrieved for review and meta-analysis in this study.

Stage four: Mapping the data

Two independent reviewers will do the data extraction in an Excel file. As agreed by all researchers, the heading of data extraction data will include at least the following: author's name; publication date; country and study location; type of population; study design; aim of the study; type of intervention such as Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), vector control such as Indoor Residual Spray (IRS), the use of ACTs, intersectoral collaboration, border-notification; and outcomes (e.g., malaria elimination status, prevalence/ incidence).

We will involve stakeholders to review the data extraction form. After that, each member will be independently charting the data from all included literature studies. The validation of the data extraction will be known by discussing samples of literature (e.g., 20%) with other authors. When there is a differing opinion, one author will be the third reviewer.

Stage five: Collating, summarizing, and reporting the results

For our scoping review, the studies identified will be analyzed using both qualitative and quantitative methods. We will use the PRISMA-ScR checklist for summarizing the data. An overview of the research will be displayed through all the findings. Related to qualitative aspects, all reports will be coded by the WHO framework (6). The WHO/global framework is the most familiar and is a global consensus, which will make it easier for global audiences to understand and use it in their context. We will use the pillars in the WHO framework as a reference guide, and any intervention found will be grouped and summarized according to these pillars. Meanwhile, the quantitative data will be briefly summarized with descriptive statistics. However, although we are likely to include many different types of studies, our overall assessment of the evidence strength will be more narrative than quantitative.

Stage six: Consultation and stakeholder involvement

Consultation with stakeholders, experts, and key informants will be conducted to clarify potential missing studies or ongoing relevant interventions. Moreover, by involving stakeholders, we will have more insights into what is discussed in the literature. The consultations will include the Ministry of Health, UN Agencies such as UNICEF and WHO, APMEN, APLMA and Non-Governmental Organizations working in the malaria elimination efforts.

The initial potential stakeholders are obtained from the discussion results with the National Malaria Program (NMP). Additional potential participants will be possibly recruited with the snowball sampling technique.

Patient and Public Involvement

No patient involved.

Ethics and Dissemination

This scoping review has received ethical approval from the Medical and Health Research Ethics Committee of the Faculty Medicine, Public Health and Nursing, Universitas Gadjah Mada (KE/0873/08/2021), as part of World Class Research – Malaria Cross Border study. Results will be disseminated through a peer-reviewed publication and/or conferences, for example, in APMEN or APLMA meetings.

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Contributors

All authors made substantial contributions to the work. UC designed the review, including the search strategies and producing the initial draft. EH, IE, and AP were involved in conception the protocol. EH, NR, AP, IE, RA, and UC editing and reviewed the protocol. All authors read and approved the final protocol.

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Disclaimer

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None declared.

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List of Table

Table 1. Identification of Population, Concept, and Context (PCC)

Table 1. Identification of Population, Concept, and Context (PCC)

Population	Concept	Context
People or community at risk who live in the cross border area	Malaria at the cross border or any human-intervention model	Any community Any areas (districts level, countries level) Any elimination phases Any type of mobility in cross border

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page #1 See title *"Identifying Forms of Interventions Towards Cross Border Malaria in Asia-Pacific: **Scoping Review** Protocol"*
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page #2 See abstract As this is a protocol, results and conclusions are not provided yet in the summary.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page #4-5 The scoping review was chosen because our topic (malaria and cross border; in combination) has not yet been extensively reviewed. *"In conclusion, there has been no scoping review related to cross border control efforts in the Asia-Pacific."*
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page #5-6 See purpose and objectives in page #5. See key elements in page #6 and table 1
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	The protocol is not submitted to PROSPERO (as been suggested by BMJ Open) because scoping review is the exclusion criteria. Screenshot the trial submission is provided below this checklist.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page #6 See inclusion and exclusion criteria *The following eligibility criteria will be used to guide the search and reviewing articles: (i) study location in Asia-Pacific, (ii) countries with malaria nationwide elimination program (iii) data collection in the last ten years (from January 1st 2010 – June 30st 2021), (iv) articles written in English. The explicit exclusion criteria identified are:*
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as	Page #6 (line 134-137) See stage 2: search for relevant studies

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Page #6 (line 131-132) Four electronic databases are going to used. *We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles.*
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page #7 See stage three: study selection
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page #7-8 See stage four: mapping the data
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page #7-8 (line 164-169) *Author's name; publication date; country and study location; type of population; study design; aim of the study; type of intervention such as Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), vector control such as Indoor Residual Spray (IRS), the use of ACTs, intersectoral collaboration, border-notification; and outcomes (e.g., malaria elimination status, prevalence/ incidence).*
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Critical appraisal is not yet done as it is a protocol manuscript.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page #8 See stage five and six. *After mapping the data, there are stages namely: collating, summarizing and reporting the results; followed by consultation and involvement of stakeholder for further clarification.*
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Not yet done. This paper describes the protocol of scoping review.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Not yet done. This paper describes the protocol of scoping review.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not yet done. This paper describes the protocol of scoping review.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Not yet done. This paper describes the protocol of scoping review.
Limitations	20	Discuss the limitations of the scoping review process.	Page #3 See strength and limitation of the study
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Not yet done. This paper describes the protocol of scoping review.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page #9 See funding.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

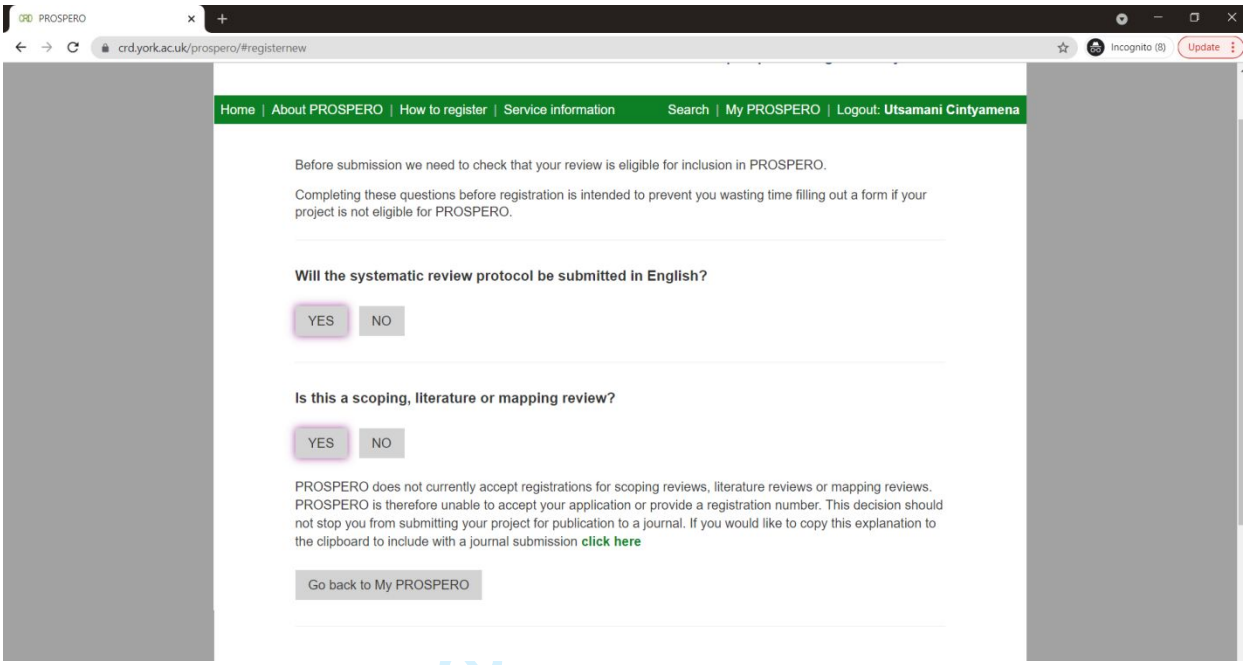
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.



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Identifying Forms of Interventions Towards Cross Border Malaria in the Asia-Pacific Region: A Scoping Review Protocol

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Identifying Forms of Interventions Towards Cross Border Malaria in the Asia-Pacific Region: A Scoping Review Protocol

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Abstract

Introduction

An ambitious epidemiology strategy has been set by the World Health Organization, targeting malaria elimination for at least 35 countries in 2030. Challenges in preventing malaria cross borders require greater attention to achieve the elimination target. This scoping review aims to identify successful forms of interventions to control malaria transmission across national borders in the Asia-Pacific region.

Methods and Analysis

This scoping review will search four electronic databases (PubMed, ScienceDirect, EBSCOhost, and ProQuest) limiting the time of publication to the last 10 years. Two independent reviewers will screen all titles and abstracts during the second stage. Study characteristics will be recorded; qualitative data will be extracted and evaluated, while quantitative data will be extracted and summarized. Overall, we will follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.

Ethics and Dissemination

This scoping review has received ethical approval from the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada. The results will be disseminated through peer-reviewed publications, conference presentations, and policy briefs.

Strengths and limitations of this study

- This scoping review will be the first related to malaria cross border interventions or activities in the Asia-Pacific region.
- Stakeholders will be engaged throughout the review process.
- This scoping review is limited to land borders, according to its main definition.
- Only the latest interventions or activities related to malaria elimination will be identified (Literature searching not to include publications before 2010).

Introduction

Malaria is a public health burden caused by the *Plasmodium* parasite, which is transmitted from person to person by the *Anopheles* mosquito as a vector. This disease creates a significant health and socio-economic burden, with 3.7 billion people at risk of being infected with malaria (1). Globally, there were an estimated 229 million malaria cases and over 400 thousand deaths across 87 malaria-endemic countries in 2019, with the African region contributing 94% of the global case burden (1). Some countries in the Asia-Pacific region have low-intensity transmission, and there are specific challenges that should be overcome, including lack of surveillance (2–4), dominance of *P. vivax* (5). Additionally, epidemiologists are starting to find resistance to artemisinin drugs and insecticides, and diversity of malaria vectors, while identifying hard-to-reach populations (5–7), and cross border malaria problems (8).

Cross border intervention is critical to accelerating the malaria elimination efforts because no country can achieve and maintain an exclusive malaria elimination status (9). As emphasized by the World Health Organization (WHO) in their strategic plan, there is an urgency to collaborate in accelerating elimination efforts by paying attention to prevention and treatment management and the importance of surveillance

(10). There are three main pillars developed in the WHO strategic plan that emphasize the importance of the cross border intervention: (i) Maximize access to malaria interventions in border areas (within national boundaries), (ii) Maximize malaria surveillance and response, as well as monitoring and evaluation (M&E) in border areas, and (iii) Maximize cross border coordination mechanisms that provide an enabling environment (10).

Also, adaptation to the local context is imperative to support this strategic planning (11). In the Asia-Pacific region, attention to malaria elimination efforts is promoted by a strategically united networking of the Asia-Pacific Malaria Elimination Network (APMEN), the Asia Pacific Leaders Malaria Alliance (APLMA), and the Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund) (12–14). APMEN started in 2009 to support capacity building, advocacy, and research in member countries, with the main aims to solve problems of malaria control in the area (7,9). In line with APMEN, since 2013, ALPMA provides political commitment through a high-level advocacy platform to eliminate malaria from the Asia Pacific by 2030 (5,12). Meanwhile, the Global Fund is more focused on providing and leveraging funding to support malaria elimination efforts (14,15).

However, the effectiveness of cross border malaria control activities remains unclear. Existing reviews mainly discussed the characteristics and challenges of malaria in the Asia-Pacific region and its relation to the technical strategy of malaria elimination (5,6,9). Other reviews identified issues related to malaria and cross borders challenges involving mobile populations, cross border characteristics, and multidrug resistance (8,16,17).

Conclusively, there has been no specific scoping review related to cross border control efforts in this region. Therefore, we aim to identify and summarize existing evidence on interventions related to malaria elimination efforts in cross border settings among the Asia-Pacific regions.

Methods and analysis

Protocol design

To address the purpose and objectives of the proposed study, we will use the scoping review method described by Arksey and O'Malley (18). There are six stages: (i) identify research questions, (ii) search for relevant studies, (iii) select studies, (iv) mapping data, (v) collate, summarize and report results, and (vi) consultation. The study will cover all malaria borders, where there is a potential for malaria transmission between countries sharing land borders, in the Asia-Pacific region (19). The scoping review will be conducted up to six months after the protocol is finished, and will include all original articles, case studies, and grey literatures including selected reports. We will follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses: extension for Scoping Review (PRISMA-ScR) checklist in all stages (20). Quality appraisal of studies will be conducted by guidance from the Joanna Briggs Institute (JBI) website.

<u>Stage one: Identifying research questions</u>

Our research question was developed and refined through an iterative process and consultations held by the research team. The objective of this review is to identify the most successful interventions or innovations in accelerating malaria elimination goals in a cross border setting among Asia-Pacific regions.

Moreover, within this stage, the team will use the Population, Concept, and Context (PCC) of the study (Table 1). The PCC approach is used as a second screening after all literatures search is combined.

[Insert Table 1 here]

Stage two: Search for relevant studies

At this stage, the team will deliberate and decide upon criteria for eligibility, databases to search, and formulate a search strategy and key terms. We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles. For grey literatures, we will search for publications from organization or institution websites supporting malaria elimination, such as the WHO, APMEN, APLMA, and Global Funds reports.

The search strategy uses malaria-related and cross border keywords as our primary filtering methods, and all researchers have agreed with this approach. The secondary research terms will include broader keywords on intervention and migration or cross border movement. The filtering methods of ranged date, English, and non-review articles will be used in all databases. For example, in using PubMed database, the search strategy will be developed to specific MeSH terms. Keywords search terms will include malaria* title/abstract, cross$border OR border* title/abstract. Then we will use “English” as the language filter “1 Jan 2010” and “31 Oct 2021” as the initial and final time filter.

The following eligibility criteria will be used to guide the search and reviewing published articles and grey literatures: (i) all primary studies, quantitative, qualitative and mixed method published articles, (ii) grey literatures such as reports of projects and programs, government documents or documents from ministry websites from countries in the Asia-Pacific region and documents from organization related malaria elimination efforts, such as UN agencies and APMEN-APLMA, (iii) study location in the Asia-Pacific region, (iv) countries with malaria nationwide elimination program (v) data collection in the last ten years (from

January 1st 2010 to October 31st 2021), and (vi) articles written in English. The explicit exclusion criteria identified are:

- Transnational malaria; an importation of malaria parasites from airport and seaport international border areas.
- review articles including systematic reviews, meta-analysis, meta-synthesis, scoping reviews, narrative reviews, rapid reviews, critical reviews, and integrative reviews.

Stage three: Study selection

All retrieved papers will be uploaded to a reference management software (Mendeley). We will design a two-level screening. First, an independent reviewer will review titles and abstracts to determine eligibility based on inclusion and exclusion criteria. The second part of the selection process will include two reviewers about the PCC suitability. When differences arise or any uncertainty appears, the citation will not be eliminated for consideration in the next stage. For studies that have multiple publications, we will use all publications that have different outcomes.

The next stage of the study selection process is a full-text review. In this stage, each reviewer will assess whether the articles meet the eligibility criteria. Any lack of agreement will be discussed until consensus is received or by involving a third reviewer if disagreement still arises. Those articles fulfilling criteria will be retrieved for review and meta-analysis in this study.

Stage four: Mapping the data

Two independent reviewers will do the data extraction in an Excel file. As agreed by all researchers, the heading of data extraction data will include at least the following: (1) author's name; (2) publication date; (3) country and study location; (4) type of population; (5) study design; (6) aim of the study; (7) type of

interventions such as: (i) quality assurance of malaria diagnosis, treatment, and prevention, (ii) vectors control (Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), Indoor Residual Spray (IRS)), (iii) equity in migrant, mobile population, and other vulnerable populations, (iv) community and civil society engagement, (v) collaboration activities the use of ACTs, intersectoral collaboration, (vi) case-based surveillance system, (vii) data sharing, (viii) joint M&E, (ix) regulation, policies, strategies, and collaboration, and (x) joint capacity building and research implementation (Figure 1); and (8) outcomes (e.g., malaria elimination status, prevalence/ incidence). These data extraction headings are adapted from the WHO pillars of cross border collaboration and the WHO framework for malaria elimination (10,21).

[Insert Figure 1]

We will involve stakeholders who are involved in malaria-cross border elimination efforts, such as expertise in surveillance, public health and program planning, to review the data extraction form. Those stakeholders include MoH, WHO, UNICEF, APMEN, and APLMA. After receiving their feedback, each team member will be independently charting the data from all included literature studies. The validation of the data extraction will be known by discussing samples of literature (e.g., 20%) with other authors. When there is a differing opinion, one author will be the third reviewer.

Stage five: Collating, summarizing, and reporting the results

For our scoping review, the studies identified will be analyzed using both qualitative and quantitative methods. We will use the PRISMA-ScR checklist for summarizing the data. An overview of the research will be displayed through all the findings. Related results of qualitative literatures, all reports will be coded by the WHO framework, such as: (1) prevent and/or reduce transmission and disease burden, with special emphasis on minimizing risk of importation of malaria cases; (2) prevent, and/or rapidly respond to, and

control malaria epidemics; and (3) prevent re-establishment of malaria transmission (10). The WHO/global framework is the most familiar and is a global consensus, which will make it easier for global audiences to understand and use it in their context. We will use the pillars in the WHO framework as a reference guide, and any intervention found will be grouped and summarized according to these pillars. Meanwhile, the quantitative data will be briefly summarized with descriptive statistics. However, although we are likely to include many different types of studies, our overall assessment of the evidence strength will be more narrative than quantitative.

Stage six: Consultation and stakeholder involvement

Consultation with stakeholders, experts, and key informants will not be our primary data, but serve as triangulation of data sources in reviewing findings or as inputs in the synthesized results. This approach will be conducted to clarify potential missing studies or ongoing relevant interventions. Moreover, by involving stakeholders, we will have more insights into what is discussed in the literature. The consultations will include the Ministry of Health, UN Agencies such as UNICEF and WHO, APMEN, APLMA and Non-Governmental Organizations working in the malaria elimination efforts. The stage aims at triangulation of findings, especially adding insights into policy documents or guidelines.

The initial potential stakeholders are obtained from the discussion results with the National Malaria Program (NMP). Additional potential participants will be possibly recruited with the snowball sampling technique.

Patient and Public Involvement

No patient involved.

Ethics and Dissemination

This scoping review has received ethical approval from the Medical and Health Research Ethics Committee of the Faculty Medicine, Public Health and Nursing, Universitas Gadjah Mada (KE/0873/08/2021), as part of World Class Research – Malaria Cross Border study. Results will be disseminated through a peer-reviewed publication and/or conferences, for example, in APMEN or APLMA meetings. Moreover, we will also produce policy briefs for relevant stakeholders.

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Contributors

All authors made substantial contributions to the work. UC designed the review, including the search strategies and producing the initial draft. EH, IE, and AP were involved in conception the protocol. EH, NR, AP, IE, RA, and UC editing and reviewed the protocol. All authors read and approved the final protocol.

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Disclaimer

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None declared.

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List of Table

List of Figure

Table 1. Identification of Population, Concept, and Context (PCC)

Population	Concept	Context
People or community at risk who live in the cross border area	Malaria at the cross border or any human-intervention model	Any community Any areas (districts level, countries level) Any elimination phases Any type of mobility in cross border

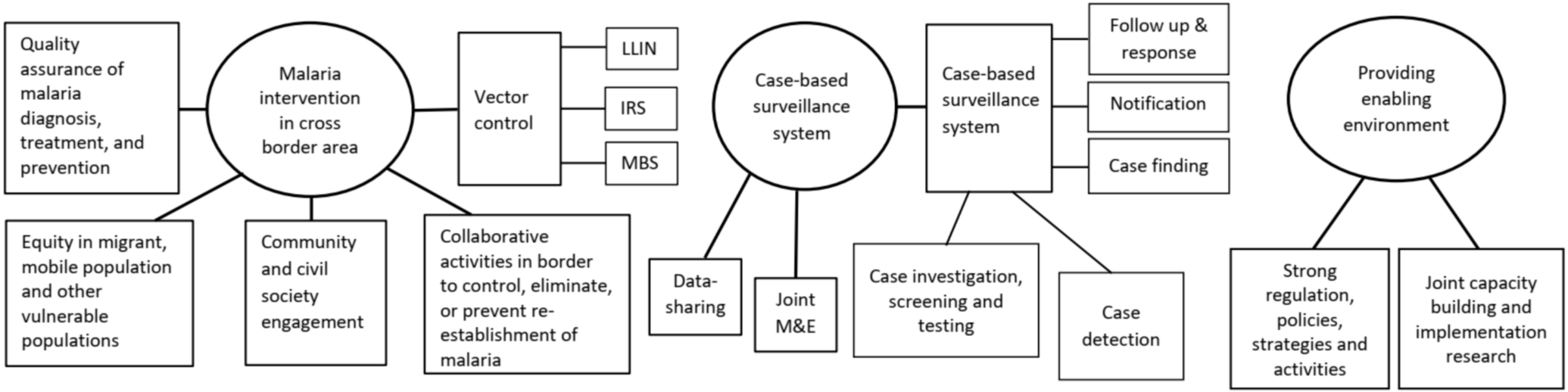


Figure 1. Interventions and activities related malaria cross border.

Notes: LLIN: Long-Lasting Insecticide Net, IRS: Indoor Residual Spraying, MBS; Mass Blood Survey, ME: Monitoring and Evaluation

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page #1 See title *"Identifying Forms of Interventions Towards Cross Border Malaria in Asia-Pacific: **Scoping Review** Protocol"*
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page #2 See abstract As this is a protocol, results and conclusions are not provided yet in the summary.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page #4-5 The scoping review was chosen because our topic (malaria and cross border; in combination) has not yet been extensively reviewed. *"In conclusion, there has been no scoping review related to cross border control efforts in the Asia-Pacific."*
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page #5-6 See purpose and objectives in page #5. See key elements in page #6 and table 1
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	The protocol is not submitted to PROSPERO (as been suggested by BMJ Open) because scoping review is the exclusion criteria. Screenshot the trial submission is provided below this checklist.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page #6 See inclusion and exclusion criteria *The following eligibility criteria will be used to guide the search and reviewing articles: (i) study location in Asia-Pacific, (ii) countries with malaria nationwide elimination program (iii) data collection in the last ten years (from January 1st 2010 – June 30st 2021), (iv) articles written in English. The explicit exclusion criteria identified are:*
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as	Page #6 (line 134-137) See stage 2: search for relevant studies

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Page #6 (line 131-132) Four electronic databases are going to used. *We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles.*
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page #7 See stage three: study selection
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page #7-8 See stage four: mapping the data
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page #7-8 (line 164-169) *Author's name; publication date; country and study location; type of population; study design; aim of the study; type of intervention such as Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), vector control such as Indoor Residual Spray (IRS), the use of ACTs, intersectoral collaboration, border-notification; and outcomes (e.g., malaria elimination status, prevalence/ incidence).*
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Critical appraisal is not yet done as it is a protocol manuscript.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page #8 See stage five and six. *After mapping the data, there are stages namely: collating, summarizing and reporting the results; followed by consultation and involvement of stakeholder for further clarification.*
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Not yet done. This paper describes the protocol of scoping review.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Not yet done. This paper describes the protocol of scoping review.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not yet done. This paper describes the protocol of scoping review.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Not yet done. This paper describes the protocol of scoping review.
Limitations	20	Discuss the limitations of the scoping review process.	Page #3 See strength and limitation of the study
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Not yet done. This paper describes the protocol of scoping review.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page #9 See funding.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

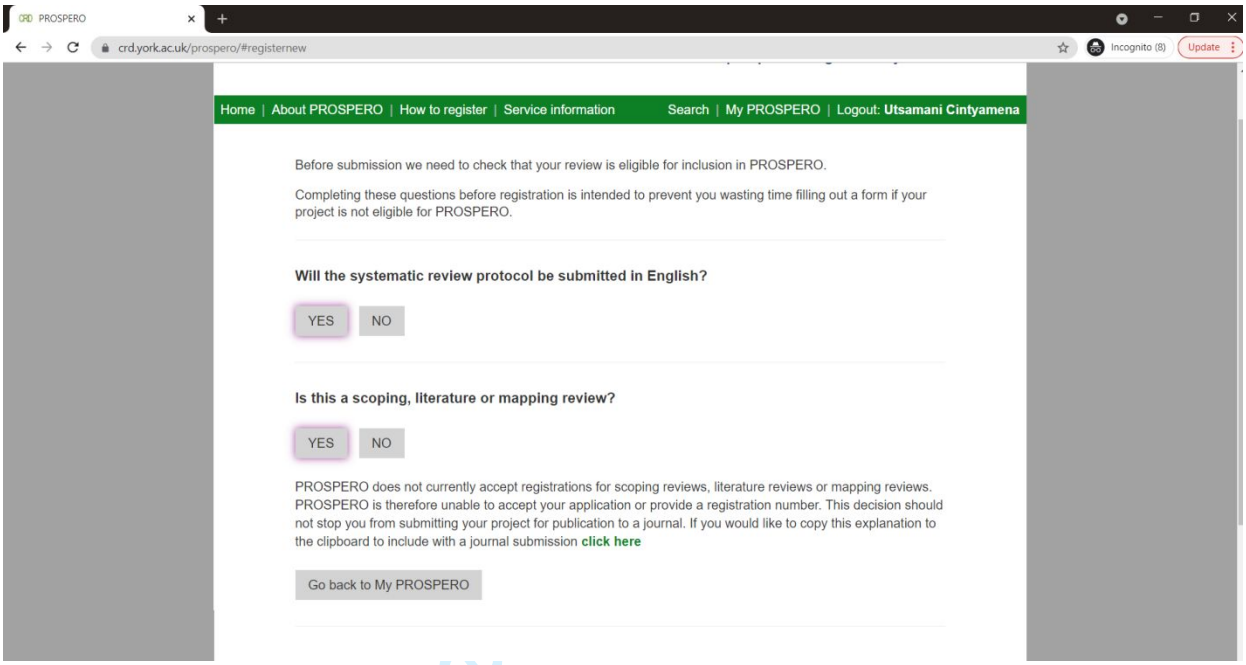
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.



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Identifying Forms of Interventions Towards Cross Border Malaria in the Asia-Pacific Region: A Scoping Review Protocol

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Identifying Forms of Interventions Towards Cross Border Malaria in the Asia-Pacific Region: A Scoping Review Protocol

Authors

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Abstract

Introduction

An ambitious epidemiology strategy has been set by the World Health Organization, targeting malaria elimination for at least 35 countries in 2030. Challenges in preventing malaria cross borders require greater attention to achieve the elimination target. This scoping review aims to identify successful forms of interventions to control malaria transmission across national borders in the Asia-Pacific region.

Methods and Analysis

This scoping review will search four electronic databases (PubMed, ScienceDirect, EBSCOhost, and ProQuest) limiting the time of publication to the last 10 years. Two independent reviewers will screen all titles and abstracts during the second stage. Study characteristics will be recorded; qualitative data will be extracted and evaluated, while quantitative data will be extracted and summarized. Overall, we will follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.

Ethics and Dissemination

This scoping review has received ethical approval from the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada. The results will be disseminated through peer-reviewed publications, conference presentations, and policy briefs.

Strengths and limitations of this study

- The data extraction headings are adapted from the WHO pillars of cross border collaboration and the WHO framework for malaria elimination.
- Stakeholders will be engaged throughout the review process.
- This scoping review is limited to land borders, according to its main definition.

- Only publications regarding interventions or activities related to malaria elimination since 2010 will be included.

Introduction

Malaria is a public health burden caused by the *Plasmodium* parasite, which is transmitted from person to person by the *Anopheles* mosquito as a vector. This disease creates a significant health and socio-economic burden, with 3.7 billion people at risk of being infected with malaria (1). Globally, there were an estimated 229 million malaria cases and over 400 thousand deaths across 87 malaria-endemic countries in 2019, with the African region contributing 94% of the global case burden (1). Some countries in the Asia-Pacific region have low-intensity transmission, and there are specific challenges that should be overcome, including lack of surveillance (2–4), dominance of *P. vivax* (5). Additionally, epidemiologists are starting to find resistance to artemisinin drugs and insecticides, and diversity of malaria vectors, while identifying hard-to-reach populations (5–7), and cross border malaria problems (8).

Cross border intervention is critical to accelerating the malaria elimination efforts because no country can achieve and maintain an exclusive malaria elimination status (9). As emphasized by the World Health Organization (WHO) in their strategic plan, there is an urgency to collaborate in accelerating elimination efforts by paying attention to prevention and treatment management and the importance of surveillance (10). There are three main pillars developed in the WHO strategic plan that emphasize the importance of the cross border intervention: (i) Maximize access to malaria interventions in border areas (within national boundaries), (ii) Maximize malaria surveillance and response, as well as monitoring and evaluation (M&E) in border areas, and (iii) Maximize cross border coordination mechanisms that provide an enabling environment (10).

Also, adaptation to the local context is imperative to support this strategic planning (11). In the Asia-Pacific region, attention to malaria elimination efforts is promoted by a strategically united networking of the Asia-Pacific Malaria Elimination Network (APMEN), the Asia Pacific Leaders Malaria Alliance (APLMA), and the Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund) (12–14). APMEN started in 2009 to support capacity building, advocacy, and research in member countries, with the main aims to solve problems of malaria control in the area (7,9). In line with APMEN, since 2013, ALPMA provides political commitment through a high-level advocacy platform to eliminate malaria from the Asia Pacific by 2030 (5,12). Meanwhile, the Global Fund is more focused on providing and leveraging funding to support malaria elimination efforts (14,15).

However, the effectiveness of cross border malaria control activities remains unclear. Existing reviews mainly discussed the characteristics and challenges of malaria in the Asia-Pacific region and its relation to the technical strategy of malaria elimination (5,6,9). Other reviews identified issues related to malaria and cross borders challenges involving mobile populations, cross border characteristics, and multidrug resistance (8,16,17).

Conclusively, there has been no specific scoping review related to cross border control efforts in this region. Therefore, we aim to identify and summarize existing evidence on interventions related to malaria elimination efforts in cross border settings among the Asia-Pacific regions.

Methods and analysis

Protocol design

To address the purpose and objectives of the proposed study, we will use the scoping review method described by Arksey and O'Malley (18). There are six stages: (i) identify research questions, (ii) search for relevant studies, (iii) select studies, (iv) mapping data, (v) collate, summarize and report results, and (vi) consultation. The study will cover all malaria borders, where there is a potential for malaria transmission between countries sharing land borders, in the Asia-Pacific region (19). The scoping review will be conducted until June 2022, and will include all original articles, case studies, and grey literatures including selected reports. We will follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses: extension for Scoping Review (PRISMA-ScR) checklist in all stages (20). Quality appraisal of studies will be conducted by guidance from the Joanna Briggs Institute (JBI) website.

Stage one: Identifying research questions

Our research question was developed and refined through an iterative process and consultations held by the research team. The objective of this review is to identify the most successful interventions or innovations in accelerating malaria elimination goals in a cross border setting among Asia-Pacific regions.

Moreover, after this stage, the team will use the Population, Concept, and Context (PCC) of the study (Table 1). The PCC approach is used as a second screening after all literatures search is combined.

[Insert Table 1 here]

Stage two: Search for relevant studies

At this stage, the team will deliberate and decide upon criteria for eligibility, databases to search, and formulate a search strategy and key terms. We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles. For grey literatures, we

will search for publications from organization or institution websites supporting malaria elimination, such as the WHO, APMEN, APLMA, and Global Funds reports.

The search strategy uses malaria-related and cross border keywords as our primary filtering methods, and all researchers have agreed with this approach. The secondary research terms will include broader keywords on intervention and migration or cross border movement. The filtering methods of ranged date, English, and non-review articles will be used in all databases. For example, we will select 'Academic Search Complete' and 'MEDLINE with Full Text' databases from EBSCOHOST website. Meanwhile, in using PubMed database, the search strategy will be developed to specific MeSH terms. Keywords search terms will include malaria* title/abstract, cross$border OR border* title/abstract. Then we will use "English" as the language filter "1 Jan 2010" and "31 Oct 2021" as the initial and final time filter. The full search strategies are available in the online supplementary file 1.

The following eligibility criteria will be used to guide the search and reviewing published articles and grey literatures: (i) all primary studies, quantitative, qualitative and mixed method published articles, (ii) grey literatures such as reports of projects and programs, government documents or documents from ministry websites from countries in the Asia-Pacific region and documents from organization related malaria elimination efforts, such as UN agencies and APMEN-APLMA, (iii) study location in the Asia-Pacific region, (iv) countries with malaria nationwide elimination program (v) data collection in the last ten years (from January 1st 2010 to October 31st 2021), and (vi) articles written in English. The explicit exclusion criteria identified are:

- Transnational malaria; an importation of malaria parasites from airport and seaport international border areas.

- review articles including systematic reviews, meta-analysis, meta-synthesis, scoping reviews, narrative reviews, rapid reviews, critical reviews, and integrative reviews.

Stage three: Study selection

All retrieved papers will be uploaded to a reference management software (Mendeley). We will design a two-level screening. First, an independent reviewer will review titles and abstracts to determine eligibility based on inclusion and exclusion criteria. The second part of the selection process will include two reviewers about the PCC suitability. When differences arise or any uncertainty appears, the citation will not be eliminated for consideration in the next stage. For studies that have multiple publications, we will use all publications that have different outcomes.

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Two independent reviewers will do the data extraction in an Excel file. As agreed by all researchers, the heading of data extraction data will include at least the following: (1) author's name; (2) publication date; (3) country and study location; (4) type of population; (5) study design; (6) aim of the study; (7) type of interventions such as: (i) quality assurance of malaria diagnosis, treatment, and prevention, (ii) vectors control (Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), Indoor Residual Spray (IRS)), (iii) equity in migrant, mobile population, and other vulnerable populations, (iv) community and civil society engagement, (v) collaboration activities the use of ACTs, intersectoral collaboration, (vi) case-based

surveillance system, (vii) data sharing, (viii) joint M&E, (ix) regulation, policies, strategies, and collaboration, and (x) joint capacity building and research implementation (Figure 1); and (8) outcomes (e.g., malaria elimination status, prevalence/ incidence). These data extraction headings are adapted from the WHO pillars of cross border collaboration and the WHO framework for malaria elimination (10,21).

[Insert Figure 1]

We will involve stakeholders who are involved in malaria-cross border elimination efforts, such as expertise in surveillance, public health and program planning, to review the data extraction form. Those stakeholders include MoH, WHO, UNICEF, APMEN, and APLMA. After receiving their feedback, each team member will be independently charting the data from all included literature studies. The validation of the data extraction will be known by discussing samples of literature (e.g., 20%) with other authors. When there is a differing opinion, one author will be the third reviewer.

Stage five: Collating, summarizing, and reporting the results

For our scoping review, the studies identified will be analyzed using both qualitative and quantitative methods. We will use the PRISMA-ScR checklist for summarizing the data. An overview of the research will be displayed through all the findings. Related results of qualitative literatures, all reports will be coded by the WHO framework, such as: (1) prevent and/or reduce transmission and disease burden, with special emphasis on minimizing risk of importation of malaria cases; (2) prevent, and/or rapidly respond to, and control malaria epidemics; and (3) prevent re-establishment of malaria transmission (10). The WHO/global framework is the most familiar and is a global consensus, which will make it easier for global audiences to understand and use it in their context. We will use the pillars in the WHO framework as a reference guide, and any intervention found will be grouped and summarized according to these pillars.

Meanwhile, the quantitative data will be briefly summarized with descriptive statistics. However, although we are likely to include many different types of studies, our overall assessment of the evidence strength will be more narrative than quantitative.

Stage six: Consultation and stakeholder involvement

Consultation with stakeholders, experts, and key informants will not be our primary data, but serve as triangulation of data sources in reviewing findings or as inputs in the synthesized results. This approach will be conducted to clarify potential missing studies or ongoing relevant interventions. Moreover, by involving stakeholders, we will have more insights into what is discussed in the literature. The consultations will include the Ministry of Health, UN Agencies such as UNICEF and WHO, APMEN, APLMA and Non-Governmental Organizations working in the malaria elimination efforts. The stage aims at triangulation of findings, especially adding insights into policy documents or guidelines.

The initial potential stakeholders are obtained from the discussion results with the National Malaria Program (NMP). Additional potential participants will be possibly recruited with the snowball sampling technique.

Patient and Public Involvement

No patient involved.

Ethics and Dissemination

This scoping review has received ethical approval from the Medical and Health Research Ethics Committee of the Faculty Medicine, Public Health and Nursing, Universitas Gadjah Mada (KE/0873/08/2021), as part of World Class Research – Malaria Cross Border study. Results will be disseminated through a peer-

reviewed publication and/or conferences, for example, in APMEN or APLMA meetings. Moreover, we will also produce policy briefs for relevant stakeholders.

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Contributors

All authors made substantial contributions to the work. UC designed the review, including the search strategies and producing the initial draft. EH, IE, and AP were involved in conception the protocol. EH, NR, AP, IE, RA, and UC editing and reviewed the protocol. All authors read and approved the final protocol.

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Disclaimer

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Competing interests

None declared.

Patient consent for publication

Not required.

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List of Table

List of Figure

Table 1. Identification of Population, Concept, and Context (PCC)

Population	Concept	Context
People or community at risk who live in the cross border area	Interventions model or activities of malaria control program at the cross border	Any areas (districts level, countries level) Any antimalarial activities or phases of malaria control program Any type of mobility in cross border

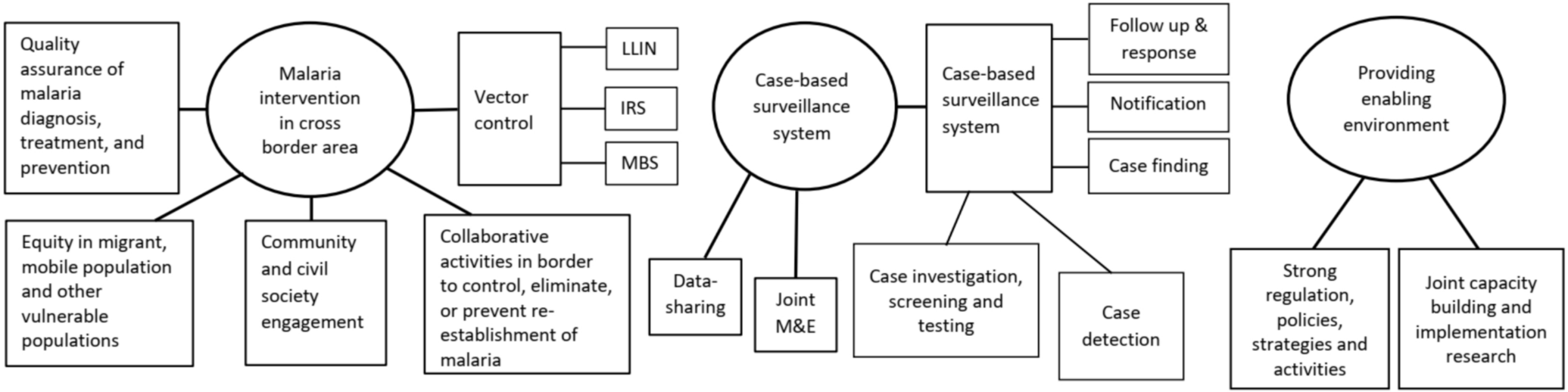
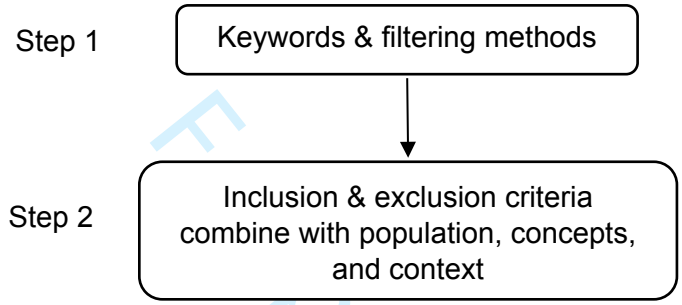


Figure 1. Interventions and activities related malaria cross border.

Notes: LLIN: Long-Lasting Insecticide Net, IRS: Indoor Residual Spraying, MBS; Mass Blood Survey, ME: Monitoring and Evaluation

Supplementary file 1

Detailed search strategy:



Step 1 – Main search strategy and filtering option

Database	Keyword (1)	Keyword (2)	Language filter	Publication time filter
PubMed	malaria* (MeSH Terms)	cross$border OR border* (title/abstract)	English	1 Jan 2010 to 31 Oct 2021
EBSCOHOST	malaria* (title)	crossborder OR cross border OR cross-border OR border* (abstract)	English	1 Jan 2010 to 31 Oct 2021
ProQuest	malaria* (title)	crossborder OR cross border OR cross-border OR border (abstract)	English	1 Jan 2010 to 31 Oct 2021
ScienceDirect	malaria* (title)	crossborder OR cross border OR cross-border OR border* (abstract)	English	2010-2021

Step 2 – Hand search strategy for Population, Concepts, and Context (OR)

Population	
People or community at risk who live in the cross border area	Men OR women; all/document text Pregnant; all/document text Children OR child; all/document text Migrant; all/document text Nomad OR mobile population; all/document text Traveler OR miner OR forest worker; all/document text Vulnerable populations; all/document text
Concepts	
Interventions model or activities of malaria control program at the cross border	Intervention OR activity*; all/document text Diagnosis OR treatment OR prevention; all/document text LLIN OR IRS OR MBS; all/document text Surveillance; all/document text Data sharing; all/document text Notification; all/document text Case finding; all/document text Monitoring and evaluation; all/document text Capacity building; all/document text
Context	
Any areas (districts level, countries level)	National OR district OR village; all/document text (China OR North Korea OR Lao DPR OR Myanmar OR Bhutan OR Nepal OR Vietnam OR Afghanistan OR Bangladesh OR India OR Cambodia OR Malaysia OR Indonesia OR Timor Leste OR Papua New Guinea OR Iran OR Yamen OR Saudi Arabia); all/document text NOR Africa NOR Europe NOR America NOR Australia; abstract
Any antimalarial activities or phases of malaria control program	Control OR elimination OR prevention of re-establishment; all/document text
Any type of mobility in cross border	Land border; all/document text NOR sea border NOR port border; abstract

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Page #1 See title *"Identifying Forms of Interventions Towards Cross Border Malaria in Asia-Pacific: **Scoping Review** Protocol"*
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Page #2 See abstract As this is a protocol, results and conclusions are not provided yet in the summary.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Page #4-5 The scoping review was chosen because our topic (malaria and cross border; in combination) has not yet been extensively reviewed. *"In conclusion, there has been no scoping review related to cross border control efforts in the Asia-Pacific."*
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Page #5-6 See purpose and objectives in page #5. See key elements in page #6 and table 1
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	The protocol is not submitted to PROSPERO (as been suggested by BMJ Open) because scoping review is the exclusion criteria. Screenshot the trial submission is provided below this checklist.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Page #6 See inclusion and exclusion criteria *The following eligibility criteria will be used to guide the search and reviewing articles: (i) study location in Asia-Pacific, (ii) countries with malaria nationwide elimination program (iii) data collection in the last ten years (from January 1st 2010 – June 30st 2021), (iv) articles written in English. The explicit exclusion criteria identified are:*
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as	Page #6 (line 134-137) See stage 2: search for relevant studies

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		the date the most recent search was executed.	
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Page #6 (line 131-132) Four electronic databases are going to used. *We agreed to use four electronic databases, namely EBSCOhost, PubMed, ProQuest, and ScienceDirect, to get more diverse articles.*
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Page #7 See stage three: study selection
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Page #7-8 See stage four: mapping the data
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Page #7-8 (line 164-169) *Author's name; publication date; country and study location; type of population; study design; aim of the study; type of intervention such as Mass blood survey (MBS), Long-lasting insecticidal nets (LLINs), vector control such as Indoor Residual Spray (IRS), the use of ACTs, intersectoral collaboration, border-notification; and outcomes (e.g., malaria elimination status, prevalence/ incidence).*
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Critical appraisal is not yet done as it is a protocol manuscript.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Page #8 See stage five and six. *After mapping the data, there are stages namely: collating, summarizing and reporting the results; followed by consultation and involvement of stakeholder for further clarification.*
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Not yet done. This paper describes the protocol of scoping review.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Not yet done. This paper describes the protocol of scoping review.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not yet done. This paper describes the protocol of scoping review.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Not yet done. This paper describes the protocol of scoping review.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Not yet done. This paper describes the protocol of scoping review.
Limitations	20	Discuss the limitations of the scoping review process.	Page #3 See strength and limitation of the study
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Not yet done. This paper describes the protocol of scoping review.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Page #9 See funding.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.