


BMJ Open Identifying forms of interventions towards cross border malaria in the Asia-Pacific region: a scoping review protocol

Utsamani Cintyamina,¹ E Elsa Herdiana Murhandarwati ,^{1,2} Iqbal Elyazar,³ Ari Probandari,^{1,4} Riris Andono Ahmad^{1,5}

To cite: Cintyamina U, Murhandarwati EEH, Elyazar I, *et al.* Identifying forms of interventions towards cross border malaria in the Asia-Pacific region: a scoping review protocol. *BMJ Open* 2022;**12**:e056265. doi:10.1136/bmjopen-2021-056265

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-056265>).

Received 10 August 2021
Accepted 24 January 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Dr E Elsa Herdiana
Murhandarwati;
elsa.herdiana@ugm.ac.id

ABSTRACT

Introduction An ambitious epidemiology strategy has been set by the WHO, 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 summarised. Overall, we will follow the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews 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.

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 socioeconomic 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

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.

diversity of malaria vectors, while identifying hard-to-reach populations⁵⁻⁷ 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 emphasised by the 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 emphasises the importance of the cross-border intervention: (1) maximise access to malaria interventions in border areas (within national boundaries), (2) maximise malaria surveillance and response as well as monitoring and evaluation (M&E) in border areas and (3) maximise 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 bordered 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 summarise 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: (1) identify research questions, (2) search for relevant studies, (3) select studies, (4) mapping data, (5) collate, summarise and report results and (6) 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 website.

Stage 1: 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 literature searches are combined.

Stage 2: search for relevant studies

At this stage, the team will deliberate and decide on 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 organisation 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 Medical Subject Headings terms. Keyword search terms will include malaria* title/abstract, cross\$border OR border* title/abstract. Then we will use 'English' as the language filter '1 January 2010' and '31 October 2021' as the initial and final time filter. The full search strategies are available in the online supplemental file 1.

The following eligibility criteria will be used to guide the search and reviewing published articles and grey literatures: (1) all primary studies, quantitative, qualitative and mixed method published articles, (2) grey literatures such as reports of projects and programmes, government documents or documents from ministry websites from countries in the Asia-Pacific region and documents from organisation-related malaria elimination efforts, such as UN agencies and APMEN-APLMA, (3) study location in the Asia-Pacific region, (4) countries with malaria nationwide elimination programme, (5) data collection in the last 10 years (from 1 January 2010 to 31 October 2021) and (6) articles written in English. The explicit exclusion criteria identified are:

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

Table 1 Identification of population, concept and context

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

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

Stage 3: 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 4: 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, Long-lasting insecticidal nets, indoor residual spray), (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 (eg, 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}

We will involve stakeholders who are involved in malaria cross-border elimination efforts, such as expertise in surveillance, public health and programme planning, to review the data extraction form. Those stakeholders include Ministry of Health, 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 (eg, 20%) with other authors. When there is a differing opinion, one author will be the third reviewer.

Stage 5: collating, summarising and reporting the results

For our scoping review, the studies identified will be analysed using both qualitative and quantitative methods. We will use the PRISMA-ScR checklist for summarising 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 minimising 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 summarised according to these pillars. Meanwhile, the quantitative data will be briefly summarised 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 6: 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 synthesised results. This approach will be conducted to clarify potential missing studies or ongoing relevant

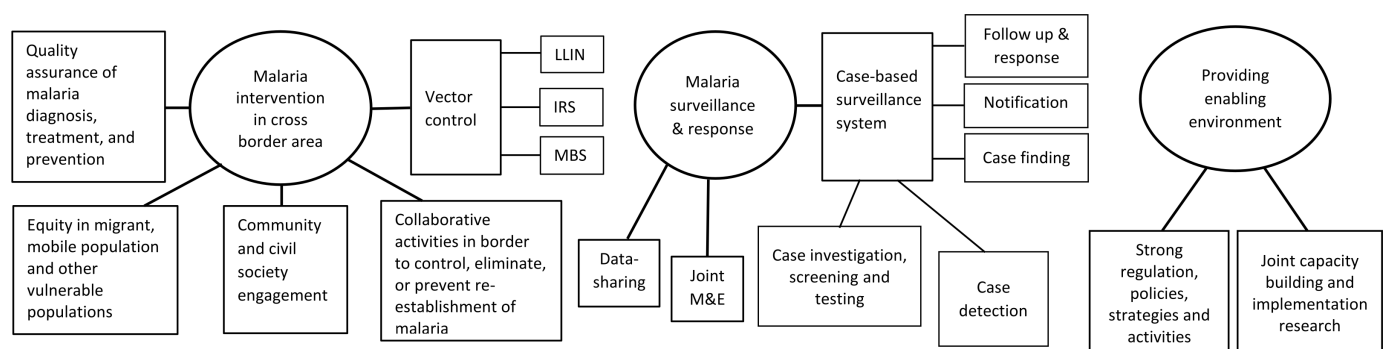


Figure 1 Interventions and activities related malaria cross border. IRS, indoor residual spraying; LLIN, long-lasting insecticide net; MBS, mass blood survey; ME, monitoring and evaluation.

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 organisations 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 Programme. 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.

Author affiliations

¹Center for Tropical Medicine, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia

²Department of Parasitology, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia

³Eijkman-Oxford Clinical Research Unit, Eijkman Institute for Molecular Biology, Jakarta Pusat, DKI Jakarta, Indonesia

⁴Department of Public Health, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia

⁵Department of Biostatistics, Epidemiology and Population Health, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia

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

Funding This project is supported by the *Direktorat Jenderal Pendidikan Tinggi, Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi (Dirjen Dikti)* Republik Indonesia under grant agreement No. 2716/UN1/DITLIT/DIT-LIT/PT/2021.

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

Map disclaimer The inclusion of any map (including the depiction of any boundaries therein), or of any geographic or locational reference, does not imply the expression of any opinion whatsoever on the part of BMJ concerning the legal status of any country, territory, jurisdiction or area or of its authorities. Any such expression remains solely that of the relevant source and is not endorsed by BMJ. Maps are provided without any warranty of any kind, either express or implied.

Competing interests None declared.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those

of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

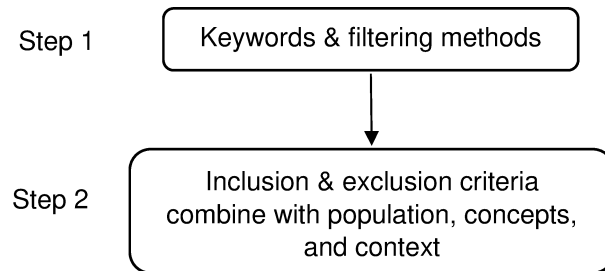
Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

E Elsa Herdiana Murhandarwati <http://orcid.org/0000-0002-0374-8167>

REFERENCES

- World Health Organization. *World malaria report 2020: 20 years of global progress and challenges*. Geneva, 2020.
- Sutanto I, Kosasih A, Elyazar IRF, et al. Negligible impact of mass screening and treatment on mesoendemic malaria transmission at West Timor in eastern Indonesia: a cluster-randomized trial. *Clin Infect Dis* 2018;67:1364–72.
- Baum E, Sattabongkot J, Sirichaisinthop J, et al. Common asymptomatic and submicroscopic malaria infections in Western Thailand revealed in longitudinal molecular and serological studies: a challenge to malaria elimination. *Malar J* 2016;15:333.
- Tripura R, Peto TJ, Veugen CC, et al. Submicroscopic Plasmodium prevalence in relation to malaria incidence in 20 villages in Western Cambodia. *Malar J* 2017;16:56.
- Baird JK. Asia-Pacific malaria is singular, pervasive, diverse and invisible. *Int J Parasitol* 2017;47:371–7.
- Lynch C, Hewitt S. Malaria in the Asia-Pacific: burden, success and challenges. In: *Malaria 2012: saving lives in the Asia-Pacific conference by the AusAID health resource facility (HRF)*, 2012: 56.
- Gosling RD, Whittaker M, Gueye CS, et al. Malaria elimination gaining ground in the Asia Pacific. *Malar J* 2012;11:2–4.
- Wangdi K, Gatton ML, Kelly GC, et al. Cross-border malaria: a major obstacle for malaria elimination. *Adv Parasitol* 2015;89:79–107.
- Wangdi K, Clements AC. Ending malaria transmission in the Asia Pacific Malaria Elimination Network (APMEN) Countries; Challenges and the way forward. In: *Towards malaria elimination - a leap forward*, 2018: 200–32.
- WHO/GMP. *A framework for malaria elimination*. Geneva: World Health Organization, 2017: 100.
- World Health Organization. *Global technical strategy for malaria 2016–2030*, 2015.
- Vivax Working Group. Targeting vivax malaria in the Asia Pacific: the Asia Pacific malaria elimination network vivax Working group. *Malar J* 2015;14:484.
- Hsiang MS, Abeyasinghe R, Whittaker M, et al. Malaria elimination in Asia-Pacific: an under-told story. *Lancet* 2010;375:1586–7.
- Hanefeld J. The global fund to fight AIDS, tuberculosis and malaria: 10 years on. *Clin Med* 2014;14:54–7.
- Zelman B, Melgar M, Larson E, et al. Global fund financing to the 34 malaria-eliminating countries under the new funding model 2014–2017: an analysis of national allocations and regional grants. *Malar J* 2016;15:1118.
- Smith C, Whittaker M. Beyond mobile populations: a critical review of the literature on malaria and population mobility and suggestions for future directions. *Malar J* 2014;13:1–10.
- Bhumiratana A, Intarapuk A, Sorosjinda-Nunthawarasilp P, et al. Border malaria associated with multidrug resistance on Thailand-Myanmar and Thailand-Cambodia borders: transmission dynamic, vulnerability, and surveillance. *Biomed Res Int* 2013;2013:363417.
- Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19–32.
- Malaria Policy Advisory Committee. *Evidence review group on border malaria*, 2018.
- Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018;169:467–73.
- World Health Organization. *An urgent front: Cross-border collaboration to secure a malaria-free south-east Asia region*. New Delhi, 2018.

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