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Scoping Review: Malaria risk stratification and incidence mapping

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Abstract

Context: As countries continue to make progress against malaria at national level, transmission of malaria and, hence, risk becomes increasingly heterogeneous. To maximize available resources and ensure that effective interventions continue to have their desired epidemiological impact, Ministries of Health and National Malaria Control Programs need to be able to stratify their malaria burden so that specific interventions are tailored and targeted to well-defined strata—based on a multitude of factors, including socio-demographics, climatic variables, operational context, and/or epidemiology. Currently, there is no unified or standardized approach how countries should stratify their malaria burden and allocate their programmatic resources, including to target programmatic interventions. The objective of this scoping review is to map and summarize the different analytical approaches that have been used for malaria stratification.

Methods: We will follow the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews) to conduct and report this scoping review.

Attachments



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Rationale

- 1 Malaria is an acute febrile illness caused by a parasitic infection transmitted by Anopheles mosquitoes. Human malaria is caused by five different Plasmodium parasites, with *P. falciparum* being the predominant species in sub-Saharan Africa (SSA) [1]. Malaria burden has a marked spatial heterogeneity with endemicity varying across and within countries. Malaria risk in endemic areas differs due to various factors, including the environment, human behavior, vector ecology, health system, and country socio-economics. The WHO Global technical strategy for malaria 2016–2030 suggests that malaria intervention strategies should be tailored to account for the marked heterogeneity that characterizes malaria risk within an endemic country. The implementation of the same intervention(s) across a whole country could waste resources and reduce effectiveness of interventions. Thus, countries should target interventions and approaches based on a stratification of malaria burden using data describing malaria incidence trends, vector and parasite characteristics, human behavior, and environmental factors. Given the importance of improving intervention allocation and their effectiveness, malaria stratification is key to malaria control and elimination programming, with countries able to routinely analyze their data and stratify malaria at subnational level.

Objectives

- 2 **Objectives** The objective of this scoping review is to map and summarize different analytical approaches for malaria stratification. To our knowledge, such review has not been conducted. A preliminary search for existing scoping and systematic reviews on the topic was conducted on November 15, 2023, using PubMed and no similar reviews were found. We will follow the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews) to conduct and report this scoping review [2].

Information Sources

- 3 A systematic search of PubMed was conducted on January 2, 2024, to identify studies and analyses that had used routine surveillance and health management information systems data to assess the effectiveness of malaria interventions. A detailed search strategy was designed and piloted to identify the optimal combination of keywords used.

Search Strategy

- 4 We examined the available electronic databases using combination searches of the following Boolean terms: "Malaria" AND "Stratification". Other key terms for such as "epidemiology", "heterogeneity" or "information systems" were not included in the search strategy to have a more comprehensive search and will be used during abstract and full text screening.

Study Records

- 5 All identified studies will be imported into Rayyan, a systematic review management software, to screen (title, abstract, and full text) and manage the results of the search. Two reviewers will independently assess the titles and abstracts of the included articles based on the inclusion criteria. In the event of discordance between the two reviewers, a third reviewer will review the titles and abstracts and will come to a final decision. From the included articles, the two reviewers will identify relevant publications by reviewing the full text. Any discordance will again be resolved by a third reviewer. A PRISMA flow diagram will be used to report final numbers of articles that are included and excluded at each stage.

Eligibility Criteria

- 6 No exclusion criteria were applied in terms of time period or language.

Data Items

- 7 From the included articles, each reviewer will work independently to extract data from the articles following a pre-specified extraction sheet. The following data will be extracted from each paper into an MS Excel spreadsheet: (1) author; (2) year of publication; (3) geography; (4) study design; (5) study period / time period covered; (6) approach to stratification; (7) data platform for stratification; (8) indicator variables used for stratification; (10) key findings; and (11) items from the Template for Intervention Description and Replication (TIDieR) checklist. TIDieR is a 12-item checklist that includes the brief name, why, what (materials), what (procedure), who provided, how, where, when and how much, tailoring, modifications, how well (planned), how well (actual) of a program.

Data Synthesis

- 8 The proposed scoping review will outline the approaches that have been used for malaria stratification. The scoping review does not involve



data on human subjects and ethical approval is not required.

Protocol references

1. World Health Organization (2023) World Malaria Report 2022.
2. PRISMA [Internet]. [cited 2021 Dec 2]. Available from:
<http://www.prismastatement.org/Extensions/ScopingReviews>