INPLASY PROTOCOL

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None declared.

Indirect effects of interventions for malaria: a scoping review protocol

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Review question / Objective: **The aim of this review is to identify and catalog studies that have reported the impact of indirect effects in interventions targeting malaria.**
Specific review questions are the following.
1. How many studies explicitly reported indirect effects?
a. Have the number of publications increased in recent years?
2. What methodologies were employed by these studies to estimate the indirect effects?
3. Which terminologies were used to describe indirect effects?
Background: **Malaria is still a major health problem, particularly in sub-Saharan Africa, where 98% of global malaria mortality occurs. According to World Malaria Report 2022, the estimated case incidence was 229.4 per 1000 population in the African Region in 2021. Although the morbidity and mortality of malaria continued to decline from the 2000s to 2015 owing to many investments and interventions, such as long-lasting insecticide-treated net, rapid diagnostic tests, and artemisinin-based combination therapy, progress has been stalled since 2015. Moreover, especially after 2020, it has been reported that malaria incidence and mortality have increased in many African countries due to disruptions to services during the COVID-19 pandemic.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 07 June 2023 and was last updated on 07 June 2023 (registration number INPLASY202360025).

INTRODUCTION

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Background: Malaria is still a major health problem, particularly in sub-Saharan Africa, where 98% of global malaria mortality occurs. According to World Malaria Report 2022, the estimated case incidence was 229.4 per 1000 population in the African Region in 2021. Although the morbidity and mortality of malaria continued to decline from the 2000s to 2015 owing to many investments and interventions, such as long-lasting insecticide-treated net, rapid diagnostic tests, and artemisinin-based combination therapy, progress has been stalled since 2015. Moreover, especially after 2020, it has been reported that malaria incidence and mortality have increased in many African countries due to disruptions to services during the COVID-19 pandemic.

Rationale: Dependent happenings represent distinctive characteristics observed in infectious diseases. Unlike cancers and other organic diseases, the disease occurrence in one person significantly influences the risk of disease in others. Consequently, in the context of infectious diseases, the fundamental assumption of the Stable Unit Treatment Value Assumption (SUTVA) for causal inference, known as "the assumption of no interference", is often not satisfied. Therefore, adopting a comprehensive approach by identifying transmission dynamics is imperative to gain a detailed understanding of intervention effects.
Given that malaria is transmitted through mosquitoes, a decline in the number of malaria cases within a specific community will reduce overall infection prevalence among community members. This effect is mediated by a decrease in the number of infected mosquitoes. Consequently, malaria control measures implemented in a community are expected to yield benefits not only for individuals directly receiving the intervention but for the community as a whole.
However, scientific literature on malaria interventions that explicitly differentiate and thoroughly analyze these indirect effects is currently very limited. Moreover, the causal structures of these indirect effects vary widely across interventions, and the terminologies of broad kinds of indirect effects were not standardized, such as herd effects, community effects, peer effects, mass effects, assembly effects, spillover effects, contextual effects, free-rider effects, or positive externalities. The usage of these terms varies among academic fields and interventions. Although these terms do not indicate exactly the same effects, they all share the commonality of denoting impacts beyond the direct effects of the intervention on the individual.
Through an in-depth review, this study aims to meticulously examine existing literature on malaria interventions that consciously account for these effects. Doing so, it will help identify critical gaps in evidence for future research.

METHODS

Strategy of data synthesis: We will conduct a descriptive analysis of the characteristics of the included literature. Specifically, we will summarize all the selected papers by publication year, study design, region, country, type of malaria parasite, type of interventions, type of outcomes, the population for intervention, the population for outcome measurement, type of indirect effects, terminology of indirect effects, and additional outcomes.

Eligibility criteria: The eligibility criteria will be any studies conducted quantifying the indirect effects of any interventions for all types of malaria infection, such as Plasmodium falciparum, P. vivax, P. ovale, and P. malariae. The primary studies will be cluster randomized control trials, mathematical studies, and observational studies.

Source of evidence screening and selection: Search strategy: The review will be conducted in accordance with the PRISMA for scoping review statement.
The search term will be the following:
("malaria" OR "plasmodium")
AND
("indirect effect" OR "indirect effects" OR "indirect protection" OR
"herd effect" OR "herd effects" OR "herd protection" OR
"community effect" OR "community effects" OR "communal effect" OR "communal effects" OR
"community-level effect" OR "community-level effects" OR
"community protection" OR "communal protection" OR "community-level protection" OR
"peer effect" OR "peer effects" OR "peer influence effect" OR "peer influence effects" OR
"mass effect" OR "mass effects" OR
"assembly effect" OR "assembly effects" OR
"spillover effect" OR "spillover effects" OR
"contextual effect" OR "contextual effects" OR
"free-rider" OR "free rider" OR "free-riding" OR "free riding" OR
"positive externality" OR "positive externalities" OR
"dependent happenings")
Additional reference and citation searches will also be conducted. In addition, grey literature will be included using OAIster.
Participants or population:
We will search for populations in malaria-endemic areas of Asia, Oceania, Africa, and South America.
Intervention:
We will search for all kinds of interventions for malaria, not limiting the search term.
Comparator:
Not applicable
Information sources:
We will search PubMed, Web of Science, and EMBASE by title and abstracts. In addition, for grey literature, we will search OAIster by keywords.
Main outcomes:
All kinds of malaria prevalence, incidence, malaria-related symptoms like anemia
Additional outcomes:
Entomological surveys (entomological inoculation rate [EIR], Sporozoite rate [SR]).

Data management: The data for each relevant publication will be imported into reference software (Rayyan). Prior to the initial screening, the duplicate literature will be deleted automatically. Two reviewers (YKK, and SMM) will screen all the literature for the eligibility criteria. Any discrepancies in the process will be resolved by discussion between both reviewers. Once a paper is selected, the full text will be read by four reviewers (YKK, WK, CC, and AKR). Each author is responsible for 50% of the selected papers. The specific data (see the section "Strategy of data synthesis") will be recorded and summarized in tabular form through this second review process. Any disagreement will be addressed through discussion or consultation with a single arbitrator (AK). In addition, additional reference and citation searches will also be conducted. The reference lists of the articles identified during the search will be scanned manually.

Language restriction: Only English literature will be included in this review.

Country(ies) involved: Sweden, Japan, Kenya.

Other relevant information: Quality assessment/ Risk of bias analysis: As scoping review research, there will be no formal quality assessment of studies.
Subgroup analysis: Not applicable.
Sensitivity analysis: Not applicable.

Keywords: Malaria; plasmodium; indirect effects; herd effects; community effects; positive externality; dependent happenings.

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