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Integration of malaria and schistosomiasis prevention and control programs: protocol for scoping review

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ABSTRACT

Context: It is imperative to build resilient, and sustainable programs to maintain efforts for the control and elimination of malaria and schistosomiasis during health emergencies. The objective of this scoping review is to map and summarize the evidence for integrating malaria and schistosomiasis prevention and control programs.

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.

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1 Integration of malaria and schistosomiasis prevention and control programs: protocol for scoping review

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Rationale

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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). In 2020, more than 240 million malaria cases were estimated, with over 600,000 deaths(2). Despite a 44% reduction in malaria deaths in the World Health Organization (WHO) African region since 2000, progress has stalled with disruptions in malaria prevention, diagnosis and treatment during the coronavirus disease 2019 (COVID-19) pandemic exacerbating current trends(2,3). Unless urgent action is taken to reverse the current trends, the global technical strategy (GTS) targets for 2030 will not be met(i.e., reduce malaria mortality and case incidence by at least 90% globally compared to 2015)(2,4). Three important tools to control and prevent malaria have been introduced in the past two decades, including long lasting insecticidal nets (LLIN), early diagnostic and treatment with artemisinin-based combination therapy (ACT)(5). Two billion LLINs have been distributed between 2004-2020 with 65% of households in SSA now owning at least one LLIN (2). LLINs are particularly important for preventing malaria as the dominant mosquito vector species in SSA are endophagic and bite from dusk till dawn (3).

The control, elimination and eradication of malaria was addressed in Millennium Development Goal (MDG) 6 and has further been targeted by the Sustainable Development Goals (SDGs) that were implemented in 2015(6,7). Progress towards malaria eradication will have a positive effect on multiple SDG goals(5), but it is specifically targeted in SDG 3.3 that states “by 2030, [we should] end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases”(6). One important change from MDG 6 to SDGs 3.3 is the explicit inclusion of Neglected Tropical Diseases (NTDs) which were only previously only included as ‘other diseases’(7,8). NTDs are a group of twenty preventable and treatable diseases, affecting over 1.7 billion of the most vulnerable and marginalized populations around the world(9,10). Aligned with the SDGs, NTDs have their own global targets set out for 2030 which are outlined in their second roadmap published earlier in 2021(10). One goal is to reduce the number of people requiring intervention against NTDs by 90% (compared to the 2010 baseline).

Schistosomiasis is one of the twenty NTDs with more than 200 million people requiring preventive treatment in 2019 in SSA(11,12). In SSA, there are two forms of schistosomiasis caused by two different *Schistosoma* species – *S. mansoni* that causes intestinal schistosomiasis and *S. haematobium* that causes urogenital schistosomiasis (11,12). Prevention strategies for schistosomiasis have primarily focused on mass drug administration (MDA) campaigns that deliver low-cost or donated praziquantel tablets without prior diagnosis to at-risk populations (children over 5 years old, those with occupations involving contact with infected water, and communities that live in highly endemic areas), at a frequency that depends on the endemicity of the community to reduce worm burden (11,13). Although more resource intensive (financial and structurally), snail control and providing safe water, sanitation, and hygiene (WASH) have also been critical for schistosomiasis prevention and control (9,12,14).

As of April 2020, the coronavirus diseases 2019 (COVID-19) pandemic spread to all malaria endemic countries and has the potential to impact malaria and schistosomiasis prevention and control strategies(3). This could be attributed to a decrease in outpatient attendance, malaria testing during the initial phase of the pandemic, and disruptions in LLIN distribution and MDAs(2,15). The COVID-19 pandemic highlighted the vulnerabilities of malaria and schistosomiasis prevention and control programs not only by threatening to reverse progress made to date, but by exacerbating the challenge to remain on track to reach the 2030 GTS targets, the 2030 NTD roadmap targets, and most importantly the SDGs(16).

It is imperative to build resilient, and sustainable programs to maintain efforts for the control and elimination of malaria and schistosomiasis during health emergencies. There is an opportunity for local integrated control strategies for malaria and schistosomiasis, such as combining activities or the addition of an environmental control strategy to existing programs, that could optimize the use of existing resources.

Objectives

- 3 The objective of this scoping review is to map and summarize the evidence for integrating

malaria and schistosomiasis prevention and control programs. To our knowledge, a review identifying the available evidence for integrating malaria and schistosomiasis prevention and control programs has not been conducted. A preliminary search for existing scoping and systematic reviews on the topic was conducted on December 1, 2021, using Medline (Ovid) 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(17).

Information sources

- 4 A systematic search of three databases (Medline, EMBASE, and Web of Science) was conducted on August 17 to identify the evidence for integrating malaria and schistosomiasis prevention and control programs. A detailed search strategy for each database was designed and piloted in consultation with a librarian at the University of Ottawa, School of Epidemiology and Public Health to identify the optimal combination of keywords used.

Search strategy

- 5 We examined the available electronic databases using combination searches of the following terms: "malaria" OR "*Plasmodium falciparum*" OR "*Anopheles*" AND "schistosomiasis" OR "*Schistosoma haematobium*" OR "*Schistosoma mansoni*" OR "snails". An additional search term to exclude conference abstracts was included for EMBASE. Key terms for prevention and control were not included in the search strategy to have a comprehensive search and will be excluded during abstract, title, and full text screening. Detailed search strategies and terms for each database are reported in Appendix 1.

Study records

- 6 All identified studies will be imported into COVidence, 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 reviewer will identify relevant publication 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

- 7 The search was limited to French and English publications (published or in press) that focus on malaria and schistosomiasis, although other diseases can be included. A list of possibly relevant titles in other languages will be provided as an appendix. No limits were placed in terms of location or year of publication. Studies that describe the integration of malaria and schistosomiasis (may include other diseases) prevention and control programs will be included.

Data items

- 8 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 COVIDENCE: (1) author; (2) year of publication; (3) study period; (4) study type; (5) year of program implementation; (6) country of program implementation; (7) target population; (8) health system level; (9) program objectives; (10) program type; (11) key findings; and (12) 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

- 9 The proposed scoping review will outline the evidence to integrate malaria and schistosomiasis programs by identifying knowledge gaps and informing recommendations of entry points for integration of preventative and control programs. The scoping review does not involve data on human subjects and ethical approval is not required.

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Appendix 1

11 Detailed Search Strategy: August 17, 2022

MEDLINE

#	Searches	Results
1	malaria/ or exp malaria, falciparum/	67734
2	malaria*.ti,ab,kf.	94531
3	Plasmodium falciparum/	32381
4	Plasmodium falciparum*.ti,ab,kf.	34358
5	Anopheles/	14869
6	Anopheles.ti,ab,kf.	15075
7	or/1-6	118298
8	schistosomiasis*.ti,ab,kf.	19393
9	schistosoma*.ti,ab,kf.	20960
10	(haematobium* or mansoni*).ti,ab,kf.	17663
11	schistosoma/ or schistosoma haematobium/ or schistosoma mansoni/	15532
12	schistosomiasis/ or schistosomiasis haematobia/ or schistosomiasis mansoni/	22545
13	Snails/	11920
14	snail*.ti,ab,kf.	24414
15	or/8-14	60305
16	7 and 15	1864

EMBASE

#	Searches	Results
1	malaria/ or exp malaria falciparum/	91538
2	malaria*.ti,ab,kf.	108923
3	Plasmodium falciparum/	44375
4	Plasmodium falciparum*.ti,ab,kf.	40974
5	Anopheles/	10161
6	Anopheles.ti,ab,kf.	16019
7	1 or 2 or 3 or 4 or 5 or 6	142053
8	schistosomiasis*.ti,ab,kf.	19104
9	schistosoma*.ti,ab,kf.	21478
10	(haematobium* or mansoni*).ti,ab,kf.	17772
11	Schistosoma haematobium/ or Schistosoma/ or Schistosoma mansoni/	17934
12	schistosomiasis/ or schistosomiasis mansoni/ or schistosomiasis haematobia/	21692
13	snail/	12909
14	snail*.ti,ab,kf.	26592
15	8 or 9 or 10 or 11 or 12 or 13 or 14	62906
16	7 and 15	3180
17	Conference Abstract.pt.	4494927
18	16 not 17	2874

Web of Science: Core Collection

#	Searches	Results
1	malaria* or "Plasmodium falciparum" or Anopheles (Title) or malaria* or "Plasmodium falciparum" or Anopheles (Abstract)	112542
2	schistosomiasis* or schistosoma* or haematobium* or mansoni* or snail* (Title) or schistosomiasis* or schistosoma* or haematobium* or mansoni* or snail* (Abstract)	58827
3	#2 AND #1	1197