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Lay health worker-delivered and technology-based interventions for sexual and reproductive health among adolescents and young adults in low- and middle-income countries: protocol for a scoping review

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ABSTRACT

Background Adolescents and young adults (AYAs) in low- and middle-income countries (LMICs) are at high risk of harmful sexual and reproductive health (SRH) practices due to limited knowledge, low availability or acceptability of modern contraceptives, gender inequality and cultural practices like child marriage. Preventive and educational interventions by lay health workers or through technological means are a cost-effective and scalable solution. Unfortunately, too little is currently known about the scope, content and conditions of the effectiveness and sustainability of these approaches and synthetic evidence on this topic is scarce. To help fill this knowledge gap and to identify where further research is needed, we will conduct a scoping review of technology-based or lay health-worker delivered preventive and educational SRH interventions targeting AYAs in LMICs. This information is valuable to both policymakers and researchers as it provides a synthesis of existing interventions, highlights best practices for their implementation and identifies potential avenues for future research.

Methods This review will include studies on SRH preventive and educational interventions targeting AYAs aged 10–24 years in LMICs. It encompasses interventions delivered by lay health workers or via technological means, assessing various outcomes including but not limited to SRH literacy, sexual risk behaviours, pregnancies, sexually transmitted infections and gender-based violence. Key databases, including PubMed via *MEDLINE* and *Embase*, will be searched from 1 January 2000 up to 23 January 2024, using a comprehensive search strategy. Screening will be conducted using *Covidence* software. Data extraction will cover study details, methods, intervention strategies, outcomes and findings. A narrative synthesis will be conducted following *synthesis without meta-analysis* guidelines.

Ethics and dissemination The scope of this scoping review is limited to publicly accessible databases that do not require prior ethical approval for access. The findings will be disseminated through peer-reviewed journal publications, as well as presentations at national and international conferences and stakeholder meetings in LMICs.

Scoping review registration The final protocol is prospectively registered with the Open Science Framework on 7 May 2024 (osf.io/vna2z).

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Unique focus on sexual and reproductive health (SRH) preventive and educational lay health worker-delivered or technology-based interventions.
⇒ Broad search not restricted to specific study designs.
⇒ Comprehensive examination of interventions addressing a wide array of different SRH outcomes.
⇒ In-depth extraction of information about numerous attributes of identified interventions.
⇒ Only two electronic databases systematically searched and no inclusion of grey literature.

INTRODUCTION

During adolescence and young adulthood, individuals undergo psychological, social and physiological changes that can facilitate risky sexual behaviours, such as early onset of sexual activity, unprotected sex and multiple sexual partners.[1 2] These behaviours increase the risk of sexual violence, unintended pregnancies, sexually transmitted infections (STIs)[3] and the accompanying consequences of compromised mental and physical health, maternal and neonatal morbidity and mortality, unsafe terminations of pregnancies, social ostracisation, school dropout and poverty.[3–5] In line with this, early pregnancies

and STIs are among the most significant health threats during this life phase.[6–10]

In many low- and middle-income countries (LMICs), health challenges related to sexual and reproductive health (SRH) are exacerbated by a frequent lack of knowledge about SRH practices, limited availability or acceptability of modern contraceptives including condoms, gender inequality and cultural practices such as child marriage.[1] Consequently, compared with high-income countries (HICs), the birth rate among adolescents (10–19 years) is more than twice as high,[11] access to and utilisation of SRH services among AYAs are significantly lower, and incidence rates for both HIV and other STIs among AYAs are considerably higher in LMICs.[10]

Despite being a period of heightened risk for SRH issues, adolescence and young adulthood also offer a unique window of opportunity to foster skill development that can lead to lasting improvements in SRH behaviours. During these phases, young people have already developed the cognitive abilities and acquired the social liberties to critically evaluate, take agency of and alter their behaviours. At the same time, their health behaviours in general and SRH behaviours in particular have not yet been fully habitualised,[12] rendering them malleable. Accordingly, SRH interventions targeting AYAs can play an important role in addressing many SRH challenges.[13]

Preventive and educational sexual and reproductive health literacy (SRHL) interventions are particularly well-suited for low-resource settings due to their cost-effectiveness and scalability. Health literacy refers to 'the knowledge, motivation and competencies to access, understand, appraise and apply health-related information within the healthcare, disease prevention, and health promotion setting'.[14] SRHL, specifically, pertains to health literacy in the context of sexuality and sexual relationships.[15] It encompasses the understanding, skills and confidence necessary to make informed decisions about sexual health, particularly in preventing SRH risk behaviours.

Adolescents with limited SRHL are more susceptible to unintended pregnancies,[16] early sexual debut, multiple sex partners and unprotected sex.[17] SRHL interventions address these issues by equipping young people with the knowledge and skills needed to make informed decisions about their SRH. They cover topics such as understanding consent, fostering healthy relationships, awareness around birth control options, contraception methods and STIs, along with safe sex practices for pregnancy and infection prevention. Several studies have shown that preventive and educational SRHL interventions can improve SRH knowledge, attitudes and behaviours among AYAs.[18–21]

However, a significant obstacle to implementing SRH interventions in LMICs is the frequent shortage of professional healthcare providers. Globally, Sub-Saharan Africa (SSA), South Asia, North Africa and the Middle East face the most pronounced shortages of trained healthcare professionals.[22] Consequently, SRH interventions that rely on professional healthcare workers as delivery agents might face issues in recruiting qualified staff, which can limit their scalability. To address this issue, many interventions use lay health workers such as teachers, community health workers, frontline health workers, volunteers or peers as delivery agents. Evidence suggests that individuals without any formal medical training can effectively deliver SRH interventions to AYAs in LMICs.[13]

An alternative approach that has gained popularity in settings with a low density of trained healthcare providers is technology-based interventions.[23] These interventions, often referred to as mHealth or eHealth interventions, use technological tools such as text messaging, websites, (social) media campaigns, smartphone apps, didactic games and chatbots.[24 25] Over the past decade, access to digital devices including computers, mobile and smart phones as well as mobile networks has significantly increased in LMICs, with many early adopters being AYAs,[26] rendering technology-based interventions increasingly feasible in those contexts.[27] Technology-based interventions offer two primary advantages for effectively promoting SRHL among AYAs in LMICs. Their cost-effectiveness makes them particularly apt for low-resource settings,[23] and they offer greater privacy, making it more comfortable for AYAs to engage with sensitive topics such as SRH.[25]

While lay health worker-delivered and technology-based interventions hold promise for improving SRH among AYAs in LMICs, critical knowledge gaps remain regarding their effectiveness and sustainability.

For lay health worker-delivered interventions, evidence is mixed, particularly with peer-led approaches, likely due to variations in content, delivery settings, training and supervision of delivery agents.[28] Understanding these factors is essential to develop clearer guidance for future interventions.

A major gap also exists in reaching out-of-school AYAs, as many interventions are school-based and exclude vulnerable groups like migrants and early school leavers. There is a need to identify effective strategies, platforms and delivery agents for engaging male and female AYAs in community settings.

Similarly, for technology-based interventions, most evidence comes from HICs,[23] with limited understanding of their feasibility, accessibility and cultural appropriateness in LMICs, especially in rural areas.[24] Moreover, little is known about how these interventions compare to conventional approaches or their potential risks, such as data privacy concerns and widening health inequities.[27 29]

To address these knowledge gaps, this work aims to comprehensively review the literature on lay health worker-delivered and technology-based preventive or educational SRH interventions for AYAs in LMICs. To the best of our knowledge, this is the first review with this scope. It aims to synthesise intervention content, document delivery mechanisms and supervision, training approaches and support for human resources, capture lessons learnt, explore implementation facilitators and barriers, and finally identify research gaps.

To obtain a comprehensive overview of all relevant interventions, we will not restrict our search to studies employing a particular design or assessing particular SRH outcomes. Given (a) the resulting heterogeneity of included studies and study designs,[30] (b) the above sketched broad aim of this review that does not focus on assessing intervention effectiveness[31] and (c) the scarcity of available synthetic evidence on this topic,[32] we chose a scoping review approach.

This review will add to the literature in multiple ways. First, by focusing specifically on lay health worker-delivered and technology-based preventive and educational SRH interventions for AYAs in LMICs, we will identify cost-effective and scalable interventions for low-resource settings. Second, our broad search strategy, covering diverse study designs and SRH outcomes, will provide a comprehensive overview and highlight key research gaps, informing both policymakers and researchers. Finally, our in-depth extraction of information about intervention characteristics, including implementation processes such as recruitment and training of delivery agents, will help unpack factors influencing effectiveness and offer practical recommendations for future programmes.

METHODS

Data sources, search terms and search strategy

We will search MEDLINE (through PubMed), and Embase. MEDLINE and Embase are two of the most widely used and comprehensive sources for biomedical and public health literature. Both have a good coverage of international journals in medicine, nursing, public health and related disciplines and complement each other very well, leading to a very good recall when used in combination.[33] To further ensure that no relevant publications are missed, we will examine references and bibliographies of identified studies and reviews to identify additional sources of information. The databases will be searched for eligible studies published from 1 January 2000 until 23 January 2024. We will identify potentially relevant published studies using the combination of medical subject headings and text words denoting SRH preventive and educational interventions. We will also examine cross-references and bibliographies of included studies to identify additional sources of information.

We will use the Population, Intervention, Comparison, Outcome (PICO) model to guide our search strategy but will not be restricted by the outcome to maintain a broad search. The PICO framework is described in table 1.

First, a broad search strategy (eg, intervention domain [SRH education] AND population [adolescents and young adults] AND setting [low- and middle-income countries] AND delivery mode [lay or volunteer health-worker delivered OR digital intervention]) will be performed in PubMed. We will confirm the sensitivity of the search strategy by identifying various sentinel articles. The PubMed strategy will be adapted to suit Embase (see online supplemental file 1). We will document the following details for both searches: databases searched, date of search, search strategy (ie, subject headings and keywords, including if terms are expanded, truncated and how they are combined), filters used and the number of records retrieved. Additionally, we will provide a source for each publication identified through manual search (ie, journal name, conference proceedings, website, etc).

Table 1 PICO framework

Participants	Studies primarily involving AYAs aged 10–24 years in LMICs
Intervention	Preventive or educational lay health worker-delivered or technology-based SRH interventions
Comparison	Varies by study design; some studies include a control group (eg, RCTs or cluster RCTs), while others (eg, pre–post or qualitative studies) do not include a formal comparison.
Outcome	All relevant SRH outcomes including but not limited to: ► SRH literacy ► sexual risk behaviour (including sexual violence) ► HIV/STIs ► (unwanted/early) pregnancy ► (unsafe) abortion ► gender norms ► STI/HIV stigma ► female circumcision ► child marriage ► birth spacing ► uptake of medical SRH interventions (ie,PrEP, male circumcision, STI screening, etc)

AYA, adolescents and young adult; LMIC, low- and middle-income country; PrEP, pre-exposure prophylaxis; RCT, randomised controlled trial; SRH, sexual and reproductive health; STI, sexually transmitted infection.

Eligibility

The inclusion and exclusion criteria for the study are listed below.

Inclusion criteria

We will include the following studies:

- Studies on preventive and educational SRH or SRHL interventions.
- Studies primarily involving adolescents (boys and girls) and young adults aged 10–24 years.
- Studies conducted in countries that were considered LMICs at the time of the study.[34]
- Studies assessing post-intervention changes in any SRH-related outcomes including general SRH education/SRHL, sexual risk behaviour, pregnancy,

unintended pregnancies, termination of pregnancies, family planning, birth spacing, contraception, prenatal healthcare, STIs, menstruation hygiene and management, gender-based violence and coping with puberty-related changes.
- Studies on interventions delivered by lay health workers (including community health workers, front-line health workers, trained laypersons, peers, volunteers).
- Studies on technology-based interventions such as those using technological tools like text messaging, websites, (social) media campaigns, smartphone apps, didactic games and chatbots.
- Published articles written in English.
- We will not place any restrictions on the study design, methodology, sample size or intervention duration.

Inclusion criteria were chosen to align with the above sketched PICO framework and the scope of the review. In particular, we limit our search to studies assessing preventive and educational lay health-worker delivered and technology-based interventions as these seem particularly well-suited for low-resource settings, and to studies conducted in LMICs to ensure that findings are applicable to those settings that are home to a large proportion of AYAs globally[35] and where many SRH issues faced by AYAs are particularly pronounced. We do not restrict our search to studies employing a particular design or investigating particular SRH outcomes to obtain a wide-ranging overview of available interventions.

Exclusion criteria

We will not consider the following studies:
- Commentaries, editorials, opinions and review articles. However, we will use review articles to identify additional original articles.
- Protocols of planned or ongoing intervention studies.
- Studies on interventions that do not have a relevant educational component (such as purely medical/surgical interventions or medical infrastructure interventions).
- Interventions targeted towards individuals with specific medical conditions such as adolescents and/or young adults living with HIV.
- Interventions exclusively targeting groups with specific SRH preventive and educational needs such as sex workers and sexual or gender minorities.

Data management

The database search records will be imported into Covidence (Veritas Health Innovation, Melbourne, Australia), an internet-based systematic review management software. Detection and removal of duplicates will be performed within Covidence, both automatically and manually by the reviewers.

Selection of studies

Using Covidence, we will screen titles, abstracts and full texts. All search results will first be independently assessed by two reviewers (ie, titles and abstracts) who will exclude irrelevant studies based on inclusion and exclusion criteria. Next, all articles that are included based on title and abstract screening will be screened in their entirety by two independent reviewers based on the same inclusion/exclusion criteria. The reviewers will discuss any difference of opinion. When necessary, reviewers will seek a third reviewer's opinion for tiebreaking. A study flow diagram stating the specific reasons for exclusion will be kept following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Review statement (PRISMA-ScR).[30]

Data extraction

Two reviewers will independently extract and enter data from studies included in the review. We will develop an extraction form (see online supplemental file 2) and test it on five randomly selected studies. The extraction of the initial five studies will be done by MK and DA. Extraction of data from the remaining studies will be conducted by MK, BB, CN, SN, DA, SM, ALK, DT and ND. To this end, each included study will be randomly assigned to two extractors. Those extractors will independently extract information and will subsequently resolve any discrepancies by discussion and consensus. We will extract the following information.
- Study details including title, authors (first author and corresponding author), the contact information of the corresponding author, journal (or source for unpublished reports), year of publication and source of funding.
- Study methods including the country in which the study was conducted, study type, study design, target population, sample size and analysis methods
- Intervention design process including the theoretical underpinnings of the design process, the nature of the design process, the involved stakeholders and the nature of their involvement
- Intervention including year of intervention, target population, delivery agent (digital or lay health worker including selection, training, supervision and support and incentivisation of the same), intervention setting (eg, home-based, church-based, youth centre-based), type of intervention (including content, conceptual framework and/or underlying theoretical model, timing, duration and frequency) and, if applicable, comparator/control.
- Outcomes assessed and, if applicable, details of the instruments used.
- Findings including facilitators and barriers to intervention delivery and uptake, effectiveness findings, if applicable, with point estimates and measures of variance and any other key findings related to the scoping review questions.

We will contact the corresponding author via email if there is missing or inconsistent information. We will contact the author two times at most. If any inconsistencies

regarding the extracted information remain after contacting the author, those will be discussed.

Synthesis of evidence

All included studies will be systematically synthesised in the text and in a table following the synthesis without meta-analysis guidelines.[36] This synthesis will describe, in the text and flow diagram, the number of articles screened, assessed for eligibility and included in the review, along with reasons for exclusion at each stage. Studies will be grouped based on interventions assessed, outcomes investigated and delivery agents. Methods used, barriers and facilitators to delivering the interventions will be discussed. Based on a comprehensive analysis of all identified studies, we will identify research gaps and areas for future research. Additionally, we will discuss the limitations of the review process and provide an interpretation of the results with respect to the objectives of the review, as well as possible implications or next steps. Data analysis will be done by MK, BB, CN, SS and JB.

We will follow the PRISMA-ScR checklist and guidelines to ensure a robust and replicable process.[30]

Registration and reporting

This scoping review protocol is registered prospectively with the Open Science Framework (http://osf.io/vna2z) on 7 May 2024, based on the PRISMA-ScR.[30] In the event of protocol amendments, the date of each amendment will be accompanied by a description of each change and the rationale on Open Science Forum.

ETHICS AND DISSEMINATION

The study is a scoping review which does not require ethical approval as it consists of a methodological presentation of available resources. It aims to comprehensively review the available literature and gain an understanding of existing SRH or SRHL preventive and educational interventions, delivered by lay health workers or via digital platforms and aimed at AYAs residing in LMICs. Results of the scoping review will be presented at national and international scientific conferences and relevant stakeholders' meetings. These will be of interest both to researchers as well as practitioners in the field of SRH education among AYAs in LMICs. Results can guide interested parties in identifying appropriate interventions for their designated target audience, setting and outcomes. They can provide best practice recommendations for the implementations of the chosen interventions and alert implementers to potential pitfalls.

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Contributors MK conceived the idea, developed the methods and wrote the first draft of the manuscript. BB, SS, CN and ALK contributed to the methods and supported the drafting and editing of the manuscript. ALK contributed meaningfully to the design of the search strategy. CN, BB, DA, ND, SN, SM, DT, SS, JB and DASH study collaborators supervised and reviewed the protocol. All authors revised and approved the final manuscript. MK is the guarantor.

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Competing interests None declared.

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