


BMJ Open Menstrual health needs and educational outcomes among adolescent girls living in countries in sub-Saharan Africa: systematic review protocol

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ABSTRACT

Introduction Poor menstrual health and unmet menstrual needs influence several aspects of adolescent girls' lives, including their educational outcomes. However, evidence on menstrual health needs and educational outcomes among these vulnerable girls living in countries across sub-Saharan Africa (SSA) is fragmented and inconclusive. The systematic review aims to explore the association between menstrual health needs and educational outcomes among adolescent girls (10–19 years) living in SSA.

Methods and analysis Studies (published and unpublished) will be identified from relevant electronic databases including PubMed, CINAHL, ScienceDirect, Google Scholar and LILACS without language restriction from January 2012 to December 2024. A comprehensive set of search terms and their alternate terms, together with the names of countries in sub-Saharan Africa, will be used for running the searches. We will also search Scopus, Web of Science, African Index Medicus, HINARI, African Journals Online, Academic Search Premier, MedRxiv, ProQuest, EBSCO Open Dissertations and reference lists of relevant studies. We will contact experts, identified through authorship of key publications in menstrual health research and recommendations from established research networks, for potentially relevant unpublished studies. All retrieved articles from the electronic databases and grey literature will be collated and deduplicated using Endnote and exported to Rayyan QCRI. The pre-defined eligibility criteria will be followed to screen papers for inclusion in the review. The flow of studies will be reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram. Given the anticipated volume of literature to be reviewed, at least two reviewers will independently select studies, extract data and assess the quality of the included studies for risk of bias using the Robbins-E risk of bias assessment tool. Any disagreements will be resolved through discussion between the reviewers. The Joanna Briggs Institute's Sumari Software will be used for citation management. Binary outcomes will be estimated using pooled proportions (for non-comparative studies) and odds ratio (OR) or risk ratio (RR) (for comparative studies), reported with their 95% CIs. The mean difference (MD) will be used for reporting continuous outcomes with their 95% CIs. In the case where different instruments have been

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The comprehensive search strategy includes multiple databases, grey literature sources and expert consultations to minimise publication bias.
- ⇒ This review employs rigorous methodological quality assessment using validated tools with independent evaluation from multiple reviewers.
- ⇒ The broad geographical focus across sub-Saharan Africa allows for meaningful regional and country-level subgroup analyses.
- ⇒ Anticipated methodological heterogeneity across multiple studies may limit the ability to conduct meta-analyses for some outcomes.
- ⇒ Language barriers may affect comprehensiveness despite the inclusion of non-English literature.

used to report means, we will employ standardised mean difference (SMD). Heterogeneity will be assessed graphically for overlapping CIs and statistically using the I^2 statistic, and if heterogeneity is detected to be high (>50%), subgroup analysis will be performed to assess the impact of such variation.

Ethics and dissemination While ethical approval is not required for the systematic review methodology itself, appropriate data sharing agreements and confidentiality protocols will be followed when collecting unpublished data from experts. The findings from this review will be published in a peer-reviewed journal and presented at relevant conferences. Also, the findings will be communicated to local stakeholders (eg, adolescent girls, parents/guardians, school authorities) in appropriate formats and languages to support translation into policy and practice to improve menstrual health and hygiene and education for adolescent girls in sub-Saharan Africa.
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INTRODUCTION

Girls often experience a variety of emotions, such as fear, shame, embarrassment and guilt as a result of unmet menstrual health needs, including leakage of blood and body odour

during menstruation,¹ resulting in frequently missing school.^{2 3} When suitable and affordable menstrual care products are unavailable, some girls, even women, may struggle to meet their menstrual health needs⁴ and resort to measures such as newspapers, old rags, dried leaves or socks,¹ which may not provide adequate protection or maintain proper hygiene during menstruation.⁵

Cultural taboos further exacerbate the challenges faced by girls, as they hinder them from seeking the necessary assistance or support to meet their menstrual health needs.^{6–8} To tackle these challenges, UNICEF and various non-governmental organisations (NGOs) have devised programmes aimed at addressing the issues, predominantly within the water, sanitation and hygiene (WASH) sector.⁹ Access to menstrual materials such as sanitary pads varies across low and middle income countries (LMICs): women and girls in the Democratic Republic of the Congo (17%), Kenya (14%), Ghana (10%) and Indonesia (9%) reported not using commercial sanitary pads for menstrual health and hygiene, respectively. Additionally, non-use of sanitary pads was even higher in India (54%), Ethiopia (41%), Nigeria (37%) and Uganda (36%) due to inequalities within countries according to demographics.¹⁰

The lack of comprehensive policy direction to address menstrual health needs is concerning, although some countries like India, the Philippines, Kenya, South Africa and Zambia have initiated efforts to address this issue.^{11 12} Government-led initiatives have the potential to challenge societal taboos by encouraging open discussions about menstruation and addressing the specific menstrual health needs of schoolgirls who face socio-economic disadvantages, live in rural areas with limited infrastructure or belong to marginalised communities where cultural taboos are strongest. Evidence suggests that inadequate menstrual hygiene management is associated with decreased concentration in class, school absenteeism and poor educational performance, particularly among these groups.^{13–15} Some governments have collaborated with key stakeholders to establish national guidelines on menstrual health and hygiene.¹⁶ At the grassroots level, numerous international and local NGOs have focused on improving school toilets, providing sanitary products (such as pads or menstrual cups) and offering puberty education including menstrual health and hygiene-related content. School-based interventions may improve attendance rates by 5%–10% among adolescent girls during their menstrual periods.^{17 18} While these efforts are promising, further peer-reviewed evidence is needed to assess their effectiveness.^{19 20} This systematic review aims to strengthen the evidence base on the association between menstrual health needs and educational outcomes among adolescent girls, potentially informing future policy decisions and interventions.

Rationale for this systematic review

The main purpose of the present review is to explore the association between menstrual health needs and

educational outcomes (academic performance, absenteeism and school dropouts) among adolescent girls aged 10–19 years in SSA. Educational outcomes are crucial to the overall development and future opportunities of adolescents.^{21 22} Understanding the association between menstrual health needs and educational outcomes is essential for addressing significant challenges such as high taxes on menstrual hygiene products, which affect affordability, and limited access to WASH facilities in schools.

Unmet menstrual health needs can lead to physical discomfort, infections and psychosocial stress, causing adolescent girls to miss school, perform poorly academically or drop out altogether. Cultural taboos and stigma surrounding menstruation further exacerbate these issues by making it difficult for girls to seek help or access necessary resources to meet their menstrual health needs.^{23 24} Therefore, examining how menstrual health needs impact educational outcomes can provide important information on the barriers that adolescent girls face in SSA.

The evidence generated from this review will be crucial for informing the planning of context-specific, culturally acceptable and locally sustainable programmes and policies. These interventions can mitigate the negative educational outcomes associated with unmet menstrual health needs among adolescent girls in SSA. By synthesising existing quantitative evidence, this review aims to provide a comprehensive understanding of how menstrual health needs influence educational outcomes, thereby supporting efforts to improve both menstrual health and educational attainment for girls in this region.

Moreover, the findings from this review will contribute to achieving several sustainable development goals (SDGs), including SDG 3 (good health and well-being), SDG 4 (quality education), SDG 5 (gender equality) and SDG 6 (clean water and sanitation). Highlighting the association between menstrual health needs and educational outcomes will advocate for integrated approaches that ensure girls have access to affordable menstrual hygiene products and adequate WASH facilities in schools. This, in turn, will help reduce absenteeism, improve academic performance and decrease school dropout rates, thereby promoting gender equality and enhancing the overall well-being of adolescent girls in SSA.²⁵ By focusing on the intersection of menstrual health needs and education, the study aims to support efforts towards achieving these interconnected SDGs and their specific targets.

A preliminary literature search has identified several existing systematic reviews relating to menstruation, for example, menstrual cup usage,²³ menstrual hygiene management^{3 26} and menstrual experiences of adolescent girls²⁷ and the effectiveness of menstrual health interventions in LMICs in East Asia and the Pacific region,²⁸ but none assessed the outcomes of interest in our review. Systematic reviews on this topic in the African context have focused mostly on other issues such as knowledge, attitudes and practices of menstrual health and hygiene

across English-speaking West African countries,²⁹ and the prevalence of good menstrual hygiene practices and associated factors among adolescent girls in sub-Saharan Africa³⁰ or focused on a specific country's context.⁵ A closely related systematic review addressed menstrual hygiene management interventions' ability to improve education and psychosocial outcomes for women and girls in LMICs (not SSA context). The review found insufficient evidence to establish the effectiveness of menstruation management interventions due to the high risk of bias and clinical heterogeneity in the included studies.²⁰ The review authors recommended further studies to establish the role of menstrual health and hygiene in educational performance, psychosocial outcomes and employment. Given the significant time elapsed since this review and the potential emergence of new evidence, there is a need to revisit this topic with a specific focus on adolescent girls in the sub-Saharan African region.

Aim and research questions

The aim of this systematic review is to explore the association between menstrual health needs and educational outcomes among adolescent girls aged 10–19 years in sub-Saharan Africa. By narrowing the scope to this population and geographical area, and considering only the most recent and relevant literature, this systematic review aims to provide a comprehensive and updated synthesis of the evidence to inform effective policies and interventions. The findings from this review will help address the gap identified in the previous review and contribute to informing effective policies and interventions to support menstrual health and education for adolescent girls in sub-Saharan Africa. This review will address the question, is there an association between menstrual health needs and academic performance among adolescent girls in SSA? A secondary research question is what is the relationship between menstrual health needs and school absenteeism among adolescent girls in SSA? By comprehensively reviewing and synthesising the available evidence, this review will contribute to the existing knowledge base, identify gaps in the literature and provide insights for future research and interventions.

METHODS AND ANALYSIS

This systematic review will be prepared following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Protocols (PRISMA-P) guidelines (online supplemental file 1).³¹ We have followed the Cochrane guidelines specified in the Cochrane Handbook for preparing systematic reviews³² and methods used in published works.^{33–44} The full systematic review will be reported following the checklist specified in PRISMA⁴⁵ and the study flow encompassing the searches and selection will be reported using the PRISMA flow diagram (online supplemental file 2). The full review is expected to start on 1 November 2024 and be completed by 31 May 2025.

Patient and public involvement

This review recognises the importance of involving the public, including stakeholders and relevant communities, in the research process, particularly to ensure evidence is co-produced. The insights and perspectives of relevant stakeholders in menstrual health research have informed the research question, preliminary search strategies and protocol development. To ensure relevance and applicability, we have involved teenage and adolescent girls to understand outcomes that are important to them, the general public and key stakeholders such as educators, health professionals and community leaders through stakeholder consultations.

Criteria for considering studies for this review

Eligibility criteria

The following criteria will be used to determine study eligibility for inclusion in this systematic review.

Publication types

Peer-reviewed literature

Original research articles published in peer-reviewed journals that report primary data on the association between menstrual health needs and educational outcomes.

Grey literature

Technical reports, dissertations, theses, conference proceedings, policy documents and working papers from recognised institutions, organisations or academic repositories that contain primary research data on this topic. Grey literature must have a clear methodology section and report primary empirical findings.

Inclusion criteria

Studies published between 1 January 2012 (when WHO/UNICEF Joint Monitoring Programme provided a formal definition for menstrual hygiene management) and 31 December 2024 will be eligible for inclusion. Only studies conducted in sub-Saharan African countries and focusing on adolescent girls aged 10–19 years will be considered. We will include quantitative observational studies (cohort, case-control and cross-sectional studies) that assess the association between menstrual health needs and educational outcomes. Studies published in any language will be eligible, with translation services to be used when necessary. For inclusion, studies must report at least one of our predefined primary or secondary outcomes.

Exclusion criteria

We will exclude opinion pieces, commentaries, letters to editors and narrative reviews. Case reports or case series and theoretical or conceptual papers without empirical data will not be considered. Multicountry studies that do not disaggregate data for sub-Saharan African countries will be excluded, as will studies that combine data from adolescents and adults without separate analysis for our target age group. Studies focusing exclusively on clinical aspects of menstruation without educational outcomes will be ineligible. We will exclude intervention studies

that do not report baseline observational data on the association between menstrual health needs and educational outcomes. Additionally, studies with substantial methodological limitations or inadequate reporting of methods that prevent quality assessment will not be included in the review.

Participants

This review will include studies that involve adolescent girls (aged 10–19 years) residing in sub-Saharan Africa. In this systematic review, we define an adolescent girl as a girl aged 10 to 19 years. Eligible participants will include in-school or out-of-school girls, or both, as well as those from urban and rural areas. We will consider studies involving participants from various settings such as schools, communities and healthcare facilities. If adolescent and adult data have been lumped, there is no way we could disaggregate the data, and such datasets will also be excluded.

Interventions

This systematic review is not an intervention review.

Comparison

While this is primarily a non-comparative review, we will extract data on the following comparison groups where available: girls with adequate access to menstrual products vs those without; girls with access to private, clean sanitation facilities vs those without; girls with adequate menstrual health knowledge vs those without; pre-intervention vs post-intervention measures for studies evaluating menstrual health programmes; girls experiencing menstrual-related pain or symptoms vs those who

do not; and school attendance during menstruation vs non-menstruation periods. These comparisons will allow us to analyse how different menstrual health factors are associated with educational outcomes.

Outcomes

Primary outcomes

- Academic performance: measured by grades, standardised test scores and overall Grade Point Average (GPA).
- School enrolment: measured by the number of girls enrolled during the study period.

Secondary outcomes

- School attendance: measured by the number of school days attended vs days missed due to menstrual issues.
- School engagement: measured by the extent to which students are involved, attached and committed to the academic and social activities provided in school.

Search strategy

Comprehensive search terms were identified from the PICOS-formulated review title and used to develop the search strategy (table 1). The search will involve electronic databases and other sources. Studies will be identified from relevant electronic databases including PubMed, CINAHL, ScienceDirect, Google Scholar and LILACS from 1 January 2012 (when WHO/UNICEF Joint Monitoring Programme provided a formal definition for menstrual hygiene management) to 31 December 2024, without language restriction. The search will use a combination of keywords and controlled vocabulary terms (eg, MeSH terms) related to menstrual hygiene, educational

Table 1 PubMed search strategy (to be adapted for the other databases)	
Search	Query
#1	Search: (((((((("menstrual cycle") OR (menstruation(MeSH Terms))) OR (menses)) OR (period)) OR (menstrual)) OR ("menstrual products")) OR ("menstrual hygiene")) OR ("menstrual hygiene products")) OR ("menstrual hygiene management")) OR ("period products"))
#2	Search: (((((((adolescent) OR (adolescence)) OR (teens)) OR (teenager)) OR ("young adults")) OR (youth)) OR (girls))
#3	(#1 AND #2)
#4	Search: (((((((((((("Educational status"(MeSH Terms)) OR (education)) OR (school)) OR (schooling)) OR (learning)) OR ("school attendance")) OR ("academic performance")) OR ("academic achievement")) OR ("academic engagement")) OR ("school dropout")) OR ("school disengagement")) OR ("school drop out")) OR ("school absenteeism")) OR ("school absence")) OR ("school avoidance")) OR ("school refusal behavior")) OR ("academic failure")) OR ("academic underachievement")) OR ("subpar performance"))
#5	(#3 AND #4)
#6	Search: (((((((((((((((((((((((((((((((((((Africa) OR ("sub-Saharan Africa")) OR (Algeria)) OR (Angola)) OR (Benin)) OR (Bostwana)) OR ("Burkina Faso")) OR (Burundi)) OR ("Cabo Verde")) OR ("Cape Verde")) OR (Cameroon)) OR ("Central African Republic")) OR (Chad)) OR (Comoros)) OR ("Democratic Republic of Congo")) OR ("DR Congo")) OR (Congo)) OR (Djibouti)) OR (eg,ypt)) OR ("Equatorial Guinea")) OR (Eritrea)) OR (Eswatini)) OR (Ethiopia)) OR (Gabon)) OR (Gambia)) OR (Ghana)) OR (Guinea)) OR ("Guinea-Bissau")) OR ("Ivory Coast")) OR ("Cote d'Ivoire")) OR (Niger)) OR (Nigeria)) OR ("Sao Tome and Principe")) OR (Senegal)) OR (Seychelles)) OR ("Sierra Leone")) OR (Somalia)) OR (Kenya)) OR (Lesotho)) OR (Liberia)) OR (Libya)) OR (Madagascar)) OR (Malawi)) OR (Mali)) OR (Mauritania)) OR (Mauritius)) OR (Morocco)) OR (Mozambique)) OR (Namibia)) OR ("South Africa")) OR ("South Sudan")) OR (Tanzania)) OR (Togo)) OR (Tunisia)) OR (Uganda)) OR (Zambia)) OR (Zimbabwe))
#7	(#5 AND #6)

achievement, adolescent girls and sub-Saharan Africa (see [table 1](#) for further details). We will also search Scopus, Web of Science, African Index Medicus, HINARI and African Journals Online. Grey literature sources, such as conference proceedings, Academic Search Premier, MedRXIV, ProQuest, EBSCO Open Dissertations and institutional repositories will also be searched. The reference lists of relevant articles will be screened to identify additional studies, and experts in the field will be contacted for studies published but missed by our searches and unpublished studies they may know about on the subject of discussion. Experts will be defined as researchers who have published at least two peer-reviewed articles on menstrual health and education in sub-Saharan Africa within the past 10 years or who hold leadership positions in relevant research networks or organisations focused on adolescent health in the region. These experts will be identified through bibliometric analysis of key publications and through established professional networks. When contacting experts for unpublished data, we will follow data sharing best practices by using formal data request procedures, ensuring confidentiality of shared information and obtaining written confirmation that any shared unpublished data has received appropriate ethical clearance from the original institutions where the research was conducted. No personally identifiable information from study participants will be requested.

Managing the search results and study selection

Studies retrieved from the electronic databases, grey literature and other sources will be uploaded into Endnote where duplicates will be removed. The deduplicated studies will then be exported into Rayyan where study screening and selection will be performed. The study selection process will involve two stages: title and abstract screening, followed by full-text review. Depending on the search output, at least two reviewers will independently screen the identified articles against the predetermined inclusion and exclusion criteria using a pre-tested study selection flow chart ([figure 1](#)). Any disagreements will be resolved through discussion between the independent reviewers or by involving a third reviewer.

Data extraction and management

A standardised data extraction form will be developed to elicit relevant information from the included studies. The data extraction form will capture details such as study characteristics (eg, author, year and country the study was conducted), study design (RCTs, quasi-RCTs and cluster RCTs, etc), participant demographics (age, rural or urban setting, in-school or out of school including school dropouts), menstrual information, intervention details including type (provision of menstrual hygiene products such as sanitary pads, menstrual cups etc), menstrual hygiene education and awareness programmes, access to appropriate facilities, for example, clean and private toilets and other supportive measures. The characteristics of the comparison group will also be extracted, as well

as data on outcome measures (academic performance, school attendance and enrolment), school drop-out, menstrual hygiene practices and menstrual hygiene knowledge. We will extract adverse events data and classify them as serious and non-serious where necessary. At least two reviewers will extract the data independently from the included studies, and conversions or transformations will be made where necessary. Any discrepancies will be resolved through discussion or by involving a third reviewer. In studies where there is missing information, the respective authors will be contacted to get the needed information for further analysis. The extracted data will be stored in a secure and organised manner to facilitate analysis and synthesis.

Assessment of quality in the included studies

At least two reviewers will independently assess the risk of bias in the included studies using the Cochrane risk of bias tool for non-randomised studies of exposure (Robbins-E) (V. 20 June 2023) (online supplemental file 3). The risk of bias assessment will be based on a series of signalling questions across seven risks of bias domains: confounding, selection of study participants, measurement of exposure, post-exposure intervention, missing data, measurement of outcome and selection of reported results. The signalling questions have response options 'Yes', 'Probably Yes', 'Probably No', 'No' and 'No Information'. The risk of bias will be judged as 'low' for a domain with little or no concern about bias. Where there are some concerns about bias in a specific domain, but with no certainty of an important risk of bias, we will judge the domain as 'Some Concerns'. For bias domains with some important bias concerns, we will judge them as 'High risk'. Studies with suspected serious bias will be judged as having a 'very high risk of bias'. The results from the risk of bias assessment will be presented in a table with supporting statements from the primary studies.

For observational studies, the risk of bias in the included studies will be assessed using the quality assessment tool developed by Hoy⁴⁶ (online supplemental file 4). This tool assesses 10 domains, namely, representation, sampling, random selection, non-response bias, data collection, case definition, reliability tool, prevalence period, numerators and denominators. The first four domains assess the external validity in the included studies, whereas domains 5–10 assess internal validity. Responses to each domain will be rated as 'low', 'high' or 'unclear' risk of bias, and the overall quality will be rated as 'low' or 'high'.⁴⁷ Any discrepancies will be resolved through discussion or by involving a third reviewer.

Dealing with missing data

We will not impute data when addressing missing data, but instead, we will contact primary study authors and ask for the raw data, if possible, to enable us to extract the missing information. When it is not possible to obtain missing data, only records with complete data on the outcome will be included, that is, complete case analysis.

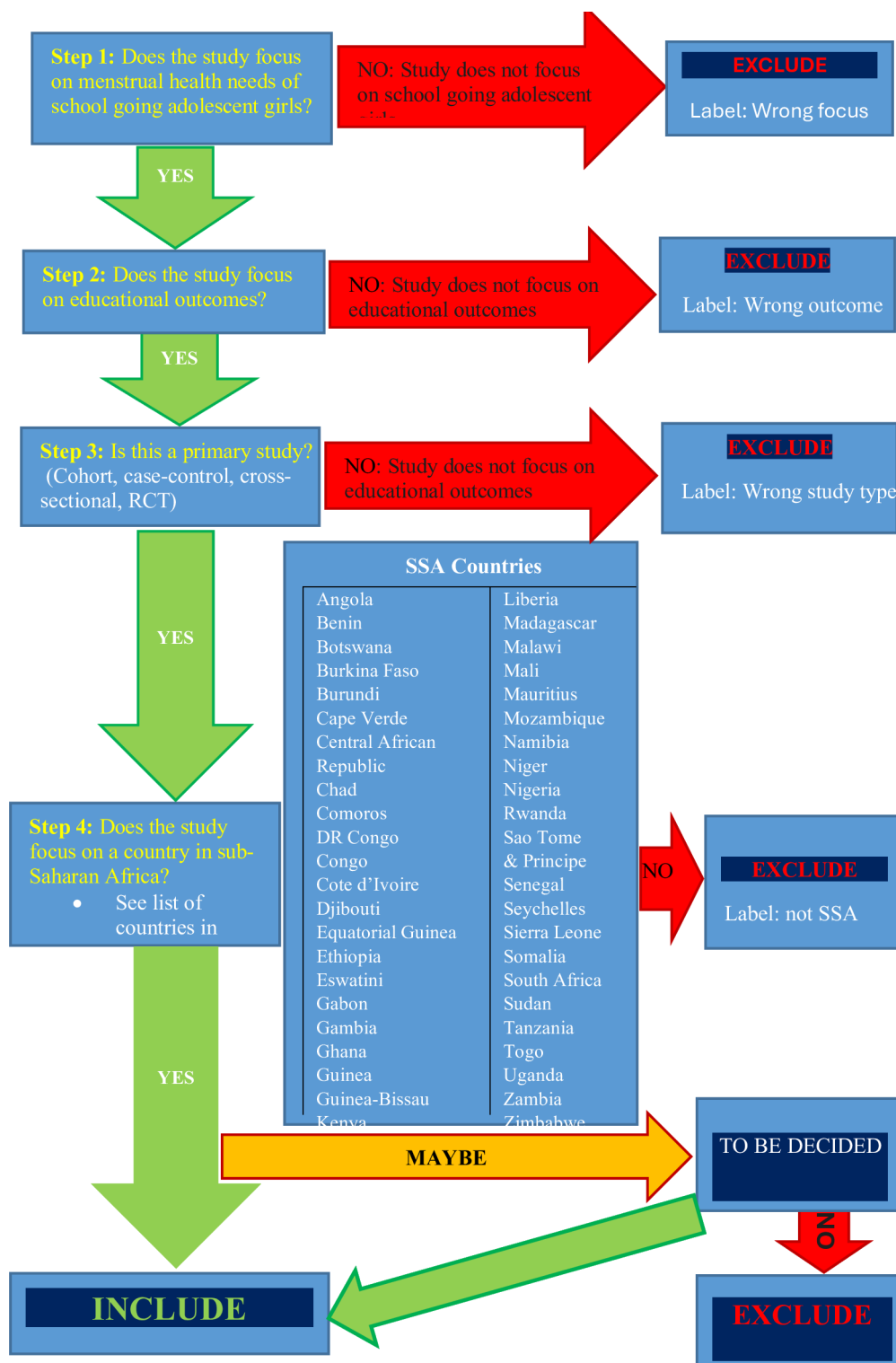


Figure 1 Study selection flow chart.

Data synthesis

We will use Review Manager (RevMan 5.4),⁴⁸ and where necessary, STATA V.18⁴⁹ for the analysis. Meta-analysis will be conducted for studies with comparable outcomes and study designs to estimate the association between menstrual health needs and educational outcomes. RR or OR will be used to pool dichotomous outcomes data and mean differences (MD) for continuous outcomes or

SMD for continuous outcomes that used different scales; all will be reported with their 95% CIs. Heterogeneity will be assessed using I^2 statistics. Random-effects model meta-analysis will be run if heterogeneity is high; otherwise, we will use a fixed-effect model. If meta-analysis is not possible due to heterogeneity among the included studies, a narrative synthesis will be conducted to summarise the findings, identify patterns and explore potential explanations

for the observed outcomes. Heterogeneity will be assessed using I-squared statistics. If meta-analysis is not possible due to heterogeneity among the included studies, a narrative synthesis will be conducted to summarise the findings, identify patterns and explore potential explanations for the observed outcomes. Subgroup analyses, if applicable, will be performed based on geographical location or specific educational outcomes.

Subgroup analysis

If appreciable heterogeneity is identified between the included studies, subgroup analyses, if applicable, will be performed on the variables responsible for the variation such as geographical location or specific educational outcomes, among others.

Grading the evidence

The overall quality and strength of the evidence will be assessed using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach.^{50 51} The GRADE approach evaluates the quality of evidence based on factors such as study design, risk of bias, inconsistency, indirectness, imprecision and publication bias. The evidence will be graded as high, moderate, low or very low quality. The GRADE assessment will be conducted independently by two reviewers with experience in evidence synthesis methodologies. Any discrepancies in grading will be resolved through discussion or by consulting a third reviewer with expertise in GRADE methodology. The reviewers will document their justifications for each judgement to ensure transparency in the assessment process. This grading will inform the confidence in the findings and the implications for policy and practice.

ETHICS AND DISSEMINATION

This systematic review primarily involves the synthesis of previously published data and, therefore, does not require formal ethical approval. For the Patient and Public Involvement (PPI) activities that informed our research question and protocol development, we followed good practice principles for public involvement including providing clear information about consultation purposes, obtaining verbal consent for participation and ensuring confidentiality. These consultative PPI activities were confirmed by our institution's research governance team to fall outside the scope of formal ethical review requirements. When contacting experts for unpublished data, we will request confirmation that the original studies received appropriate ethical approval and that data sharing complies with the original consent agreements. No personally identifiable data will be requested or used. We will establish data sharing agreements where necessary to ensure appropriate use of unpublished data.

The results of the systematic review and meta-analysis will be shared with stakeholders, presented at scientific conferences and published in a peer-reviewed journal.

The findings will also be shared on other public platforms such as X (formerly called Twitter), LinkedIn and WhatsApp. We will additionally develop tailored dissemination materials appropriate for adolescent girls, educators and health practitioners in sub-Saharan Africa.

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Contributors Protocol conceptualisation and design: SG, WKA, NK and AD-A. Drafting the work and revising it critically for important intellectual content: SG, WKA, IW, EG, PK, FH, NK, MMI, VCKD, JH, FEB, FB and AD-A. Acquisition: SG, WKA, IW, EG, PK, FH, NK, MMI, VCKD, JH, FEB, FB and AD-A. Agreement to be accountable for the accuracy or integrity of all aspects of the work: SG, WKA, IW, EG, PK, FH, NK, MMI, VCKD, JH, FEB, FB and AD-A. Final approval of the version to be published: SG, WKA, IW, EG, PK, FH, NK, MMI, VCKD, JH, FEB, FB and AD-A. Supervision: AD-A. Guarantor: AD-A.

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REFERENCES

- 1 Tegegne TK, Sisay MM. Menstrual hygiene management and school absenteeism among female adolescent students in Northeast Ethiopia. *BMC Public Health* 2014;14:1–14.
- 2 Oster E, Thornton R. Menstruation, Sanitary Products, and School Attendance: Evidence from a Randomized Evaluation. *American Economic Journal: Applied Economics* 2011;3:91–100.
- 3 van Eijk AM, Sivakami M, Thakkar MB, et al. Menstrual hygiene management among adolescent girls in India: a systematic review and meta-analysis. *BMJ Open* 2016;6:e010290.
- 4 Kambala C, Chinangwa A, Chipeta E, et al. Acceptability of menstrual products interventions for menstrual hygiene management among women and girls in Malawi. *Reprod Health* 2020;17:185.
- 5 Sahiledengle B, Atlaw D, Kumie A, et al. Menstrual hygiene practice among adolescent girls in Ethiopia: A systematic review and meta-analysis. *PLoS One* 2022;17:e0262295.
- 6 Amatya P, Ghimire S, Callahan KE, et al. Practice and lived experience of menstrual exiles (Chhaupadi) among adolescent girls in far-western Nepal. *PLoS ONE* 2018;13:e0208260.
- 7 Kpodo L, Aberese-Ako M, Axame WK, et al. Socio-cultural factors associated with knowledge, attitudes and menstrual hygiene practices among Junior High School adolescent girls in the Kpando district of Ghana: A mixed method study. *PLoS One* 2022;17:e0275583.
- 8 Mohammed S, Larsen-Reindorf RE. Menstrual knowledge, sociocultural restrictions, and barriers to menstrual hygiene management in Ghana: Evidence from a multi-method survey among adolescent schoolgirls and schoolboys. *PLoS ONE* 2020;15:e0241106.
- 9 Birdthistle I, Dickson K, Freeman M, et al. What impact does the provision of separate toilets for girls at schools have on their primary and secondary school enrolment, attendance and completion? A systematic review of the evidence. 2011.
- 10 Rossouw L, Ross H. Understanding Period Poverty: Socio-Economic Inequalities in Menstrual Hygiene Management in Eight Low- and Middle-Income Countries. *Int J Environ Res Public Health* 2021;18:2571.
- 11 Geertz A, Iyer L, Kasen P, et al. An opportunity to address menstrual health and gender equity. FSG; 2016. Available: <https://www.fsg.org/resource/opportunity-address-menstrual-health-and-gender-equity/> [Accessed 07 Jul 2024].
- 12 Sommer M, Figueroa C, Kwak C, et al. Attention to menstrual hygiene management in schools: An analysis of education policy documents in low- and middle-income countries. *Int J Educ Dev* 2017;57:73–82.
- 13 Boosey R, Prestwich G, Deave T. Menstrual hygiene management amongst schoolgirls in the Rukungiri district of Uganda and the impact on their education: a cross-sectional study. *Pan Afr Med J* 2014;19:253.
- 14 Tegegne TK, Sisay MM. Menstrual hygiene management and school absenteeism among female adolescent students in Northeast Ethiopia. *BMC Public Health* 2014;14:1118.
- 15 Vashisht A, Pathak R, Agarwalla R, et al. School absenteeism during menstruation amongst adolescent girls in Delhi, India. *J Family Community Med* 2018;25:163–8.
- 16 Sommer M, Caruso BA, Sahin M, et al. A Time for Global Action: Addressing Girls' Menstrual Hygiene Management Needs in Schools. *PLoS Med* 2016;13:e1001962.
- 17 Betsu BD, Medhanyie AA, Gebrehiwet TG, et al. Menstrual hygiene management interventions and their effects on schoolgirls' menstrual hygiene experiences in low and middle countries: A systematic review. *PLoS One* 2024;19:e0302523.
- 18 Kansime C, Hytti L, Nalugya R, et al. Menstrual health intervention and school attendance in Uganda (MENISCUS-2): a pilot intervention study. *BMJ Open* 2020;10:e031182.
- 19 Sumpter C, Torondel B. A systematic review of the health and social effects of menstrual hygiene management. *PLoS One* 2013;8:e62004.
- 20 Hennegan J, Montgomery P. Do Menstrual Hygiene Management Interventions Improve Education and Psychosocial Outcomes for Women and Girls in Low and Middle Income Countries? A Systematic Review. *PLoS One* 2016;11:e0146985.
- 21 Ansong D, Eisensmith SR, Okumu M, et al. The importance of self-efficacy and educational aspirations for academic achievement in resource-limited countries: Evidence from Ghana. *J Adolesc* 2019;70:13–23.
- 22 O'Hara E, Harms C, Ma'ayah F, et al. Educational Outcomes of Adolescents Participating in Specialist Sport Programs in Low SES Areas of Western Australia: A Mixed Methods Study. *Front Psychol* 2021;12:667628.
- 23 van Eijk AM, Zulaika G, Lenchner M, et al. Menstrual cup use, leakage, acceptability, safety, and availability: a systematic review and meta-analysis. *Lancet Public Health* 2019;4:e376–93.
- 24 WHO, UNICEF. Consultation on draft long list of goal, target and indicator options for future global monitoring of water, sanitation and hygiene.
- 25 United Nations. The 17 goals | Sustainable development. 2016. Available: <https://sdgs.un.org/goals>
- 26 Robinson HJ, Barrington DJ. Drivers of menstrual material disposal and washing practices: A systematic review. *PLoS One* 2021;16:e0260472.
- 27 Hennegan J, Shannon AK, Rubli J, et al. Women's and girls' experiences of menstruation in low- and middle-income countries: A systematic review and qualitative metasynthesis. *PLoS Med* 2019;16:e1002803.
- 28 Head A, Huggett C, Chea P, et al. Systematic review of the effectiveness of menstrual health interventions in low- and middle-income countries in the East Asia and Pacific region. *Lancet Reg Health Southeast Asia* 2024;20:100295.
- 29 Tomlinson MM, Wallis AB, Harris MJ, et al. Menstrual hygiene management among adolescent girls in West Africa: A systematic review. *Afr J Reprod Health* 2024;28:123–56.
- 30 Anbesu EW, Asgedom DK. Menstrual hygiene practice and associated factors among adolescent girls in sub-Saharan Africa: a systematic review and meta-analysis. *BMC Public Health* 2023;23:1–14.
- 31 Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4:1.
- 32 Higgins J, Thomas J, Chandler J, et al. *Cochrane handbook for systematic reviews of interventions (Version 6.4)*. Cochrane, 2023.
- 33 Danso-Appiah A, De Vlas SJ. Interpreting low praziquantel cure rates of Schistosoma mansoni infections in Senegal. *Trends Parasitol* 2002;18:125–9.
- 34 Danso-Appiah A, Eusebi P, Lo NC, et al. Optimal prevalence threshold for guiding the implementation of preventive chemotherapy in countries endemic for schistosomiasis: synthesis of evidence from mass drug administration programmes for developing this tool. *Infectious Diseases (except HIV/AIDS)* [Preprint] 2021.
- 35 Danso-Appiah A, Minton J, Boamah D, et al. Accuracy of point-of-care testing for circulatory cathodic antigen in the detection of schistosoma infection: systematic review and meta-analysis. *Bull World Health Organ* 2016;94:522–533A.
- 36 Danso-Appiah A, Oliaro PL, Donegan S, et al. Drugs for treating Schistosoma mansoni infection. *Cochrane Database Syst Rev* 2013;2013:CD000528.
- 37 Danso-Appiah A, Owiredu D, Akuffo KO. Praziquantel-related visual disorders among recipients in mass drug administration campaigns in schistosomiasis endemic settings: Systematic review and meta-analysis protocol. *PLoS One* 2024;19:e0300384.
- 38 Danso-Appiah A, Owiredu D, Asiamah M, et al. Safety of praziquantel in persons with and without schistosomiasis: systematic review and meta-analysis. *Infectious Diseases (except HIV/AIDS)* [Preprint] 2022.
- 39 Danso-Appiah A, Utzinger J, Liu J, et al. Drugs for treating urinary schistosomiasis. *Cochrane Database Syst Rev* 2008;CD000053.
- 40 Ganle JK, Baatiema L, Quansah R, et al. Barriers facing persons with disability in accessing sexual and reproductive health services in sub-Saharan Africa: A systematic review. *PLoS One* 2020;15:e0238585.
- 41 Mirzoev T, Koduah A, Cronin de Chavez A, et al. Implementation of medicines pricing policies in sub-Saharan Africa: protocol for a systematic review. *BMJ Open* 2021;11:e044293.
- 42 Abdulai M, Owiredu D, Boadu I, et al. Psychosocial interventions and their effectiveness on quality of life among elderly persons living with HIV in Africa South of the Sahara: Systematic review and meta-analysis protocol. *PLoS One* 2023;18:e0291781.
- 43 Awini E, Agyepong IA, Owiredu D, et al. Burden of mental health problems among pregnant and postpartum women in sub-Saharan Africa: systematic review and meta-analysis protocol. *BMJ Open* 2023;13:e069545.
- 44 Ohene-Adjei K, Asante KP, Akuffo KO, et al. Malaria vaccine-related adverse events among children under 5 in sub-Saharan Africa: systematic review and meta-analysis protocol. *BMJ Open* 2023;13:e076985.
- 45 Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Syst Rev* 2021;10:89.
- 46 Hoy D, Brooks P, Woolf A, et al. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. *J Clin Epidemiol* 2012;65:934–9.

- 47 Critical Appraisal Skills Program. CASP checklists. CASP - Critical Appraisal Skills Programme; 2024. Available: <https://casp-uk.net/casp-tools-checklists/> [Accessed 09 Jul 2024].
- 48 The Cochrane Collaboration. Review manager (RevMan). 2020.
- 49 StataCorp. Stata statistical software: release 18. College station. 2023.
- 50 Guyatt GH, Oxman AD, Kunz R, *et al.* What is “quality of evidence” and why is it important to clinicians? *BMJ* 2008;336:995–8.
- 51 Guyatt GH, Oxman AD, Vist GE, *et al.* GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336:924–6.