

Menstrual Hygiene Management Interventions and Their Effects on Adolescent Girls: A Systematic Review

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Abstract

Teenage girls may experience physical, social, psychological, and educational difficulties as a result of poor management of their menstrual hygiene. Researchers have carried up intervention studies to address these problems, but the results have had varying effects on school attendance. The evidence about the impact of menstrual hygiene interventions on teenage girls has been methodically gathered and assessed for this review. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, a thorough search of the literature was conducted and the results were reported. PubMed and Google Scholar were used to search both peer-reviewed publications and grey literature. Quasi-experimental research and individual or cluster randomized controlled trials were included in the search, which ran from the indexing date until January 15, 2025.

Adolescent girls' school attendance, performance, and dropout rates, as well as their menstrual knowledge, attitudes, behaviours, and emotional well-being, are all positively impacted by menstrual hygiene interventions, according to an analysis of twenty trial studies. The majority of the studies have a low to medium risk of bias. The effectiveness of treatments involving male and parental involvement, interventions addressing community misconceptions about menstruation, and the effects of infrastructure upgrades on water, sanitation, and hygiene were also disregarded in the research. By assisting adolescent girls in better managing their periods, interventions that focus on menstrual hygiene management can improve their educational outcomes as well as their menstrual knowledge, attitudes, and practices. Improvements in the physical environment at home and at school, as well as the social norms around menstruation, have been overlooked in Favor of menstrual products and education. To help stakeholders and policymakers create long-term, sustainable solutions to these issues, trial studies should adopt a comprehensive strategy that takes into account the entire sociocultural context in which menstrual hygiene management occurs.

Keywords: Menstrual hygiene management, Adolescent girls, Intervention studies, School attendance, Menstrual knowledge, Emotional well-being, Parental engagement, Socio-cultural environment.

Introduction

Menstrual hygiene management involves the practice of using clean materials to absorb or collect menstrual blood, which can be changed discreetly and as often as needed during a menstrual cycle. It includes washing the body with soap and water and having access to safe, convenient facilities for disposing of used materials. Sommer et al. expanded on this definition, emphasizing that menstruators should understand the menstrual cycle and manage it confidently and comfortably. Globally, over half of the female population is of reproductive age, yet approximately 500 million lack access to proper facilities for menstrual hygiene. Many girls experience menarche—their first menstrual cycle—without sufficient knowledge or skills to manage menstruation hygienically. In India, more than half of adolescent girls have never received information about menstrual hygiene due to cultural taboos, misinformation, and inadequate access to supplies or facilities. This lack of awareness and resources leads to feelings of fear, confusion, and insecurity when menstruation begins. Poor menstrual hygiene is linked to school absenteeism, lower academic performance, and even school dropout among girls. In Sub-Saharan Africa, 50%–70% of girls miss school for 1.6–2.1 days each month due to menstruation, while in India, more than half of girls stay home during their periods. Challenges in menstrual hygiene management extend beyond education and have adverse effects on health, emotional well-being, economic opportunities, and gender equality. These include insufficient knowledge about menstruation, inadequate access to clean water, sanitation, and hygiene facilities, lack of proper menstrual materials, and societal norms that stigmatize menstruation. Global initiatives like the "MHM in Ten Agenda" aim to improve menstrual hygiene for school-aged girls through interventions such as providing menstrual products, enhancing water and sanitation infrastructure, and offering health education. Research on the effectiveness of these interventions shows mixed results. Some studies report positive outcomes, such as improved school attendance, while others find no significant impact. These discrepancies are partly due to differences in the criteria used for these reviews, such as population, intervention, control, outcome, and time (PICOT). Many earlier reviews included studies with cross-sectional methods. This current review focuses exclusively on adolescent girls and incorporates updated research on interventions, setting it apart in terms of context, population, and timing. The review evaluates the effects of menstrual hygiene interventions on key areas, including school attendance, performance, and dropout rates, alongside emotional well-being, menstrual knowledge, attitudes, and hygiene practices. It synthesizes the latest evidence to provide a clearer understanding of how these programs influence the lives of adolescent girls and highlights the need for sustainable solutions tailored to their unique challenges.

Objectives

This systematic review's main goal was to assess how MHM interventions affected teenage girls' experiences with menstrual hygiene, including their attendance, academic performance, dropout rates, and menstrual knowledge, attitudes, practices, and mental health.

Disclaimer

The effect of menstrual hygiene management (MHM) interventions on teenage girls is assessed in this study.

Materials and methods

Source of information and search strategy

Using a combination of medical subject headings and pertinent keywords, we extracted data from the PubMed and Google Scholar databases between the indexing date and January 15, 2025. To find more citations, manual searches and citation lists were used. English was the only language we used. Shortly before the final analysis, the search was conducted again.

Inclusion Criteria:

- Research that assessed interventions related to menstrual hygiene management (MHM).
- Research carried out throughout numerous nations.
- Research in which teenage girls participated.
- Gray literature and peer-reviewed publications were taken into account.
- Included were quasi-experimental research as well as individual and cluster randomized controlled trials.

Exclusion Criteria:

- Research that did not concentrate on MHM treatments.
- Research was done in a small number of nations.
- Research in which teenage girls were not involved.
- Research that didn't pass peer review or didn't fit the requirements for inclusion.

Study selection

Every study found throughout the search method was exported to EndNote X7. Duplicates were eliminated. The titles, abstracts, and keywords were independently evaluated twice by two writers to make sure they met the eligibility requirements. The final selection of studies for the systematic review involved comparing and contrasting the results, obtaining full-text records of possibly relevant publications, and screening them using the inclusion criteria.

Data extraction process

Two reviewers manually extracted data from a prepared data extraction worksheet. The variables related to the research topic were entered into the spreadsheet. The following information was taken from every study: 1) Name of author; 2) Publication year; 3) Study design; 4) Population; 5) Sample size; 7) Intervention duration; 8) Outcome measurement time; 9) Intervention description; 10) Intervention mode; and 11) Outcome of interest.

Data synthesis

Tables and narrative synthesis were used to describe the data, which included the sort of intervention that was carried out, the target population's characteristics, the outcome type, and a synopsis of the results.

Quality assessment

To guarantee thorough and open reporting, the review complied with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria. The Newcastle-Ottawa Scale (NOS), which rates non-randomized studies according to selection, comparability, and outcome, was used to evaluate the studies' quality. Numerous study designs, including individual and cluster randomized controlled trials and quasi-experimental studies, were included in the review, which concluded that the majority of the studies had a low to medium risk of bias. The research also took into consideration the variation in study designs and circumstances.

Results

Study selection

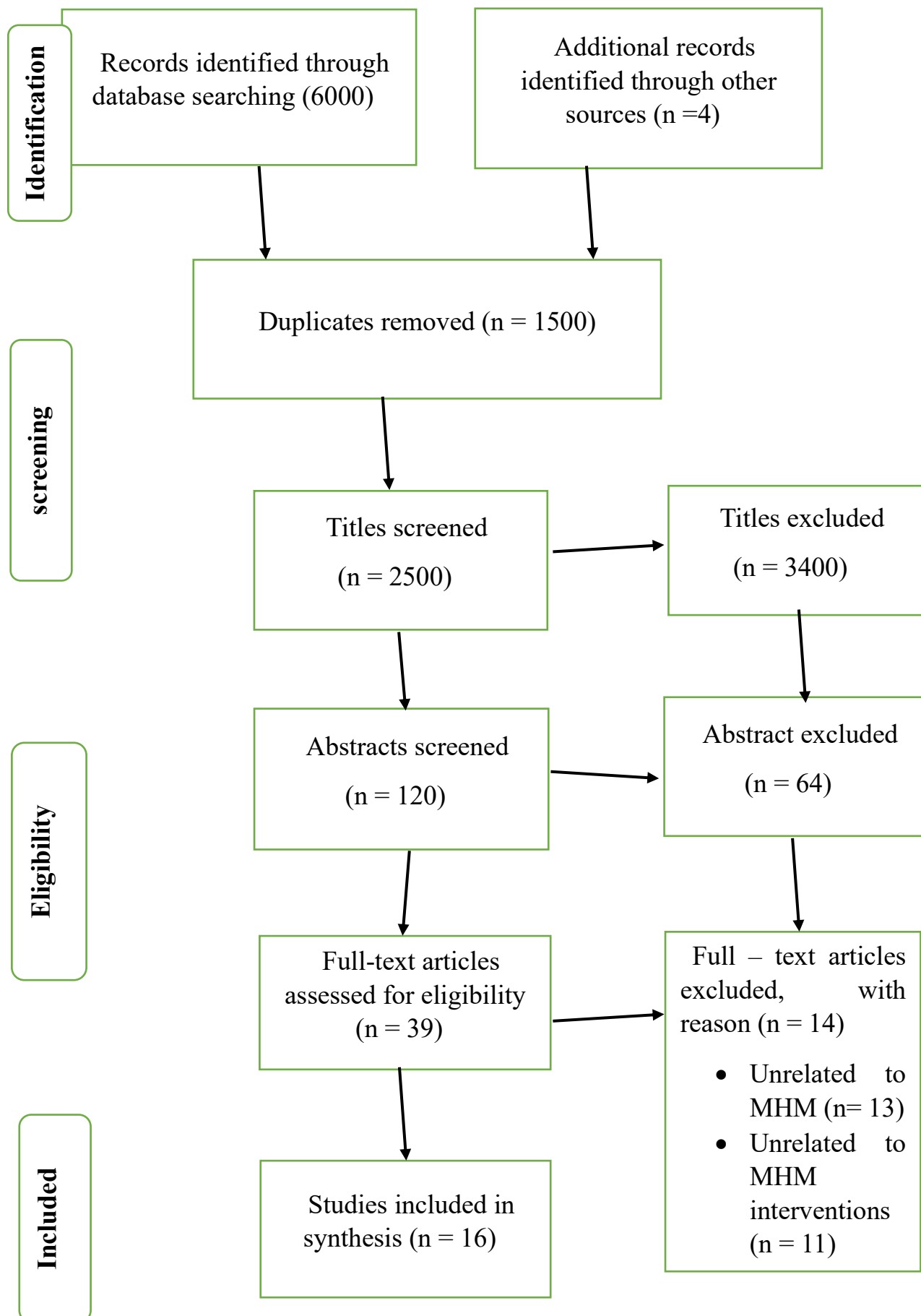
We investigated 19 trial studies that evaluated the impact of menstrual hygiene management treatments on the emotional well-being, menstrual hygiene knowledge, attitudes, and behaviours, as well as the attendance,

academic performance, and school dropout rates of teenage girls. This comprised one paper from the Gray literature and twenty-five peer-reviewed articles. In all, 21, 865 teenage girls, 5,237 mothers, and 4,850 fathers/guardians from Bangladesh, Indonesia, Ethiopia, Ghana, Uganda, Iran, Nepal, and India participated in the study. With a sample size ranging from 70 to 11,930, the studies examined teenage girls between the ages of 10 and 19. Teenage girls who were menstruating, premenarchal, or suffering from dysmenorrhea were included in the studies.

Study characteristics

- **Study Design:** Individual, cluster randomized controlled trials, and quasi-experimental studies were all included in the review.
- **Participants:** Adolescent females from several nations were the subject of the investigations.
- **Interventions:** The supply of menstruation products, education about menstruation, and enhancements to infrastructure related to water, sanitation, and hygiene were among the interventions examined.
- **Measured Outcomes:** The review evaluated a number of outcomes, including performance, dropout rates, menstruation knowledge, attitudes, behaviours, and emotional health.

Literature Search: Databases such as PubMed and Google Scholar were used to search both peer-reviewed articles and Gray literature.



Interventions and setting.

Interventions including the provision of menstruation supplies and instruction can be classified as menstrual hygiene management interventions.

- Information on managing menstrual hygiene, information about puberty and reproductive health, and instruction on using period hygiene products are all examples of menstrual education programs.
- Menstrual supply interventions include improving water and sanitation infrastructure and offering menstrual hygiene products and supplies. Products like pads, towels, tampons, and cups that absorb menstrual flow are known as menstrual hygiene materials. Analgesic drugs for period cramps, underwear, and soap and detergent are examples of menstrual supplies. Toilets, water supplies, and private areas for cleaning, changing, drying, and getting rid of menstrual waste are all examples of menstrual facilities.

Outcomes

Menstrual hygiene behaviours, emotional well-being, knowledge, attitudes, school attendance, academic achievement, and school dropout.

Type of study design

Studies comprised individual, or cluster randomized controlled trials and quasi-experimental or non-randomized controlled trials.

Data synthesis

Tables and narrative synthesis were used to describe the data, which included the sort of intervention that was carried out, the target population's characteristics, the outcome type, and a synopsis of the results.

Table:1 Characteristics, population, intervention, and outcome of studies included in the review.

Author name, year, and location	Population (P) and Sample size (SS)	Study design	Intervention Description (DI) and mode of intervention (MOI)	Duration of intervention (DOI) and Outcome measurement time (OMT)	Outcome of interest
Abedian et al. 2011 Mashhad, Iran	P: 19–25-year-old Dysmenorrheic University girls SS: 209 Actual SS: 165 (Peer-led education group n = 54; Health provider-led education group n = 50; Control group n = 61)	Randomized controlled trial	ID: self-care education Arm 1: received health provider-led self-care education Arm 2: received peer-led self-care education MOI: Small group discussions about self-care education held by health providers and peer educators	DOI: At baseline and two consecutive menstrual cycles (approximated to two months) OMT: Immediately after intervention	Menstrual knowledge significantly increased in both peer-led self-care and health-provider groups compared to the control group. Negative concepts of menstrual attitude decreased more in the peer-led self-care group. Dysmenorrhea severity decreased between intervention and control groups.
Oster et al. 2011 Chitwan District, Nepal	P: Grade 7 and 8 schoolgirls (25 girls assigned to treatment group from each school) SS: 198	Randomized controlled trial	ID: Menstrual cup branded as Moon-cup MOI: Treatment girls and their mothers were provided with menstrual cups and instructions on how to use them. Girls were provided with a booklet of time diaries that included a menstrual calendar on which they were to note the start and end date of their period in each month.	DOI: One school-year intervention OMT: Outcome assessed immediately after the intervention	The menstrual cup does not significantly increase school attendance
Paul Montgomery 2012 Ghana	P: 12–18-year-old schoolgirls SS: 120	Nonrandomized controlled trial	ID: The study provides monthly underwear and sanitary pads, along with education on puberty, menstruation, pregnancy, hygiene, and menses management, with a focus on control.	DOI: Five months OMT: At the third and fifth month (at the end of the intervention)	Arm-1 (pad + education): school attendance improved significantly among participants, ($\lambda = 0.824$, $F = 3.760$, $p = .001$) Arm-2: education only resulted in a similar school attendance level ($M = 91.26$, $SD = 7.82$) all of which were higher than

			MOI: ➤ Trained research assistants provided puberty education ➤ All participants received a daily calendar, pencil, and sharpener to record their menstrual cycles		control (M = 84.48, SD = 12.39). The effect size, partial eta-squared, was 0.094.
Fakhri et al. 2013 Mazandaran province, Iran	P: 14 -18-year-old-girls with low socio-economic status from urban and rural public high schools SS: 689 (349 intervention group and 349 control group)	Quasiexperimental (Nonrandomized controlled cluster trial	<ul style="list-style-type: none"> ID: Training about: <ul style="list-style-type: none"> personal health and hygiene during Menstruation Significance of adolescence, physical and emotional changes during adolescence, Pubertal and menstruation health and premenstrual syndrome MOD: Intervention provided by the Youth and School Health Department to the intervention arm 	DOI: (20 hrs.) 10 sessions of 2 hr. each (Not indicated for how long) OMT: At the end of the education intervention	The study provides monthly underwear and sanitary pads, along with education on puberty, menstruation, pregnancy, hygiene, and menses management, with a focus on control.
Wilson et al. 2014 Rural Kenya	P: Schoolgirls SS: 302 (143 intervention and 159 control)	Cluster randomized control	ID: Training on making reusable sanitary pads, including equipment and handouts, was provided. However, no general menstrual health education was provided to evaluate the pad's effect on menstrual health. MOI: training and provision of handout	DOI: One session OMT: One month after intervention	The mean number of days of school missed decreased or stayed constant among the treatment group while schools in the control group either stayed constant or increased
Paul Montgomery et al. 2016 Uganda	P: Grade 3–5 schoolgirls SS: 356 pre and postmenarcheal girls) from 8 rural schools	Cluster QuasiRandomized Controlled Trial	ID: The program provides reusable pads and puberty education on menstruation, early pregnancy, life skills, HIV prevention, sexual assault prevention, healthy relationships, friendship formation, and goal setting.	DOI: One session education and two times of pad distribution and soap The education session 1.25hrs OMT: two years later	Control schools had 17.1% (95%CI: 8.7–25.5) greater drop in school attendance than those in any intervention school • No psychosocial change was observed among the study arms

Phillips Howard et al. 2016 Gem District Kenya	P: 14–16 years old girls who experience at least three menses SS: Planed SS: 3165 Executed SS: (644 analyzed) from 30 rural primary schools	Cluster randomized controlled feasibility study open-level RCT	ID: Girls in all arms received puberty and hygiene training, hand-washing soap, and calendar pencils. Arm 1 received a menstrual cup, Arm 2 received 16 disposable pads, and Arm 3 received control. MOI: Nurses provided menstrual product-specific training from study nurses after enrolment	DOI: 15 months OMT: at the end of the follow-up (intervention)	The study found that cups or pads did not reduce school dropout rates, but it did lower the prevalence of STIs, particularly among girls exposed to intervention for at least 9 months or 12 months. The study also found lower bacterial vaginosis in the cup arm.
Blake et al. 2017; Oromia Ethiopia	P: Grade 6 & 7 schoolgirls SS: 636	Clusterrando mized study triangulated with a qualitative approach	ID: The Ethiopian version of the girl's puberty book Growth and Changes. The book targeted girls aged 10 to 14 years, covering puberty education, menstruation and menstrual hygiene management; and culturally tailored stories. MOI: Book delivered to the study participants to read them.	DOI: Puberty book provided to the girls for 4 weeks OMT: Four weeks after the distribution of the book (no follow-up in between)	The intervention positively impacted girls' knowledge about menstruation, reducing fear and shame post-intervention, with a medium effect size of 0.6, compared to the control group.
Sol et al. 2017 Bangladesh	P: Junior secondary school girls SS: 3862 girls 4,500 mothers/guardians and 4,500 fathers/guardians attended the Household education sessions	Cluster randomized impact evaluation	ID: Schools are constructing and maintaining menstrual health-friendly toilet facilities, incorporating puberty and menstrual health modules into curriculums, and providing 2-day sessions for parents/guardians on safe menstrual hygiene benefits. MOI: An extensive campaign to familiarize teachers, students, and parents, next to festivities, Group discussions, essay writing competitions, and screening of a TV-shows and extracurricular activities	DOI: At least twice a month from 2017–2019 OMT: Two years later (after the intervention)	The study aimed to improve the educational, psychosocial, and empowerment outcomes of adolescent girls. Results showed lower absenteeism rates and reduced school dropout rates in treatment schools. Secondary outcomes included increased knowledge about menstruation, reduced restrictive beliefs, and no treatment effects on teasing during menstruation.

Austrian et al. 2019 Kenya	P: 10–21-year-old girls SS: 3,276 schoolgirls	Clusterrando mized controlled trial (With Four arms)	ID: The study outlines four intervention options: no intervention, disposable sanitary pads, reproductive health education, and sanitary pad and education. MOI: Trained facilitators provided facilitated health education and distributed a health magazine based on UNESCO's Sexuality Education Technical Guidance, incorporating gender and power in sexuality and HIV education.	DOI: 25 sessions 18 months OMT: after 18 months (immediately after completion of the intervention)	Pads improved menstrual hygiene management, RH education enhanced knowledge, self-efficacy, gender norms, attitudes, and reduced shame/stigma, but none affected education outcomes like attendance and enrolment.
Setyowati et al.2019 Indonesia	P: 9-12-year-old schoolgirls who had not yet experienced menarche SS: 174 girls	Quasi-experimental pre and post-test with a control group design	ID: Booklet containing information about preparation for menarche, reproductive organs, physical changes during adolescence, problems during menstruation and how to deal with it, and menstrual hygiene MOI: Distribution of booklet to the intervention group	DOI: Not indicated OMT: Not indicated	<ul style="list-style-type: none"> Increased menstrual knowledge (OR = 45.1; 95% CI: 13.8–148.1) Positive emotional response (OR = 12.7; 95% CI: 5.6–28.5) Positive attitude towards menstruation (OR = 12.4; 95% CI: 5.8–26.6)
Belay et al. 2020 Tigray Ethiopia	P: Grade 7–12 students SS: 8,839 Students in 15 intervention schools	Quasi-experimental	ID: Menstrual education provided to boys and girls • Girls were provided with menstrual hygiene kits containing four locally produced, reusable menstrual pads and two pairs of underwear. MOI: The school distributed a booklet, "Growth and Changes," in English and Tigrinya, along with additional oral instruction, interactive question-and-answer sessions, pamphlets, a menstrual kit, and demonstrations on sanitary pads for girls.	DOI: one academic year MOT: immediately postintervention	Girls had 24% fewer absences as compared to the control arm during the post-intervention period.

Agbede et al. 2021 Ogun State, Nigeria	P: 10–19-year-old rural school adolescent girls SS: 120 (30 in each of 4 study arms)	Quasi-experimental	ID: Health education related to menstrual hygiene practice • Arm 1: peer-led education intervention • Arm 2: parent-led intervention • Arm 3: a combination of both • Arm 4: Placebo	DOI: 4 weeks OMT: Immediately postintervention (at 4 weeks) and 6 weeks follow-up	The intervention arms showed significant improvement in menstrual hygiene practices, with the third arm (combined peer and parent) recording the highest mean score of practice.
Maitri, et al. 2021 Gujarat, India	Adolescent girls in tribal areas of Gujarat sample size included 507 girls at baseline and 550 girls at the end-line survey	pre-post intervention design	(DOI): The intervention lasted for one year, from 2018 to 2019. (OMT): The outcomes were measured at two points - baseline (beginning of the intervention) and end-line (after the intervention).	(DI): Capacity building of government frontline health workers and teachers, (MOI): Collaborative efforts involving training, supportive supervision, and convergence with concerned departments through stakeholder meetings.	The study aimed to improve menstrual hygiene management practices and knowledge among adolescent girls in tribal areas of Gujarat by increasing the use of safe, sanitary absorbents.
Babapour et al. 2022 Sari, northern Iran	Quasiexperimental non-randomized controlled trial	P: 11th-grade single students with regular menstruation SS: 90 (30 in	ID: The study involved three groups: peers, healthcare providers, and a control group, each receiving education on menstruation, menstrual disorders, life skills, and female reproductive system. MOI: Education sessions are conducted via WhatsApp messenger, with three groups	DOI: Six, one-hour sessions twice a week in WhatsApp messenger.	The study found that the education by healthcare providers significantly decreased the Premenstrual Syndrome (PMS) score compared to the control group, and the education by peers significantly decreased the mean score of general health.

		each of the three arms)	receiving school counseling, audio and PowerPoint files, and questions, with healthcare providers/peers encouraging participation.	OMT: Not indicated	
Nyadoy et al. 2022 Uganda	P: primary school adolescent girls who reached menarche SS: 60 (30 control and 30 intervention group)	Randomized Controlled Trial	ID: Menstrual health management storying and gamification MOI: Senior Women Teachers and role models shared menstrual hygiene management facts and myths through storytelling and competitive ball games like soccer, netball, and rope work.	DOI: One-hour session twice a week, after classes for six weeks OMT: Outcome assessed immediately after the intervention ended	The treatment group of girls significantly improved their English language, Mathematics, Integrated Science, and Social Studies scores, expressing positive attitudes and liberation from boys' fear during menstruation.
Rezaei, et al. 2022 Iran	P: 13–16-year-old high school students and their mothers SS: Control: 111 (56 students and 55 mothers) Intervention: 112 (58 students and 57 mothers)	Quasiexperimental study	ID: Educational intervention based on the PRECEDE model provided. Adolescence, puberty, menstrual cycle, abnormal signs, and common problems associated with menstruation, menstrual health, exercise, nutrition, mobility, and pain control in menstruation MOI: The education was provided in 3 sessions of two hours each using lecture, face-to-face discussion, and question/answer methods for students and mothers in the intervention arm	DOI: Not indicated OMT: Immediately after intervention and three months later	The intervention group showed significantly higher menstrual health behavior scores immediately and three months after intervention, with mothers' knowledge, attitude, and practice being significant reinforcement factors.

Saadu, et al. 2024 Nigeria	P: Retaining Female Students in School	Action research design.	(DI): The researchers implemented a comprehensive educational program targeting both students and teachers. This included (MOI): Action-oriented	DOI: six months OMT: three intervals: baseline (before the intervention), midline (three months into the intervention), and endline (after six months).	<ul style="list-style-type: none"> • Knowledge Improvement: Assessing changes in menstrual hygiene knowledge among students and teachers. • Attitude Shifts: Evaluating improvements in attitudes toward menstrual hygiene management. • School Attendance: Measuring the impact of the intervention on reducing absenteeism among female students.
Farjana, et al. 2024 Bangladesh	population of schoolgirls in Bangladesh two nationally representative surveys	Longitudinal study design	(DI): Improvement of menstrual hygiene management (MHM) facilities in schools, including access to clean and private toilets, availability of sanitary products, and MHM education programs. (MOI): Collaborative efforts between government bodies, NGOs, and educational institutions, involving training teachers, distributing educational materials, and conducting awareness campaigns.	DOI: 2014 to 2018 OMT: Bangladesh National Hygiene Baseline Survey 2014 and the National Hygiene Survey 2018	The percentage of girls missing school due to menstruation, which decreased from 25% in 2014 to 14% in 2018. The average number of days missed due to menstruation, which reduced from 2.8 days to 2.5 days over the same period

The studies explored various menstrual education approaches, combining traditional methods with innovative strategies. These included teaching puberty-related topics, training girls to make reusable menstrual pads, and distributing educational materials like books, magazines, posters, pamphlets, and menstrual calendars. Menstrual health was also integrated into school curriculums. Additionally, information was disseminated through diverse channels such as WhatsApp, face-to-face discussions, TV programs, festivals, essay competitions, storytelling, gamification techniques, and interactive Q&A sessions. These efforts were delivered by trained professionals such as peer educators, teachers, healthcare providers, research assistants, and even parents, demonstrating a collaborative approach. Interventions addressing menstrual supplies focused on providing both disposable and reusable pads, menstrual cups, underwear, and soap or detergent for cleaning pads, as well as improving water, sanitation, and hygiene facilities. Such measures aimed to create an environment where adolescent girls could manage their menstruation effectively and confidently. The trials assessed a wide range of outcomes, including school attendance, dropout rates, academic achievements, menstrual hygiene knowledge, attitudes and practices, and physical and emotional health. Emotional factors explored included fear, shame, stigma associated with menstruation, and societal norms regarding gender roles. Montgomery et al. proposed using school attendance and dropout rates as indirect indicators of academic performance. However, methods of measuring these outcomes varied. Some studies relied on self-reported attendance, which risked introducing recall bias, while others cross-validated attendance using official school records and supplementary methods, like survey spot checks or individual diaries maintained by the schoolgirls. For instance, Sol et al.'s study combined school records with survey and spot checks for improved reliability. While standardized questionnaires for menstrual attitudes exist, some studies opted for non-standardized tools created by individual researchers, which impacted comparability. The small sample sizes in several trials made it difficult to definitively attribute outcomes to the interventions. Montgomery et al. conducted research in peri-urban schools but also included a remote rural area with limited infrastructure—such as no electricity or paved roads—potentially complicating comparisons and intervention consistency. Some educational interventions were brief, lasting only a single session, and not all eligible participants attended them. In Montgomery et al.'s study, only half the girls participated in the session. Additionally, follow-up data and dropout rates were inconsistently reported across studies. Despite these limitations, some trials recorded statistically significant improvements in school attendance and academic performance, though often with small sample sizes. Blinding is an important method to reduce bias in experimental studies, but it was impractical in many of these cases. Blinding participants, intervention providers, and outcome assessors often proved challenging, potentially leading to inflated effectiveness estimates and performance bias. Only two trials successfully blinded assessors, lab

staff, and statisticians. Nevertheless, debates about the necessity and practicality of blinding persist, particularly in contexts like these. Despite methodological challenges, the studies highlight the potential benefits of menstrual hygiene interventions in improving educational and health outcomes for adolescent girls. However, variability in study designs and implementation underscores the need for more rigorous research to draw definitive conclusions.

Discussion

This review analysed various menstrual hygiene management (MHM) interventions, implemented using diverse approaches, providers, and timeframes. Key outcomes studied included school attendance, academic performance, dropout rates, menstrual hygiene knowledge, practices, and attitudes, as well as emotional aspects like stigma and shame. Six trials demonstrated a positive impact of interventions on attendance, dropout prevention, and academic performance. However, methods of recording attendance, like teacher-reported data or self-kept diaries, were sometimes inaccurate or insufficient to establish firm conclusions. Additionally, mere physical presence in classrooms, as noted by Betsu et al., does not guarantee active engagement or focus. Premenstrual symptoms and mood swings further affect attention during lessons. Holistic indicators like academic achievements, participation, and promotion to higher grades could provide a more comprehensive picture of schoolgirls' progress and access to education. In Nyadoy et al.'s study, engaging activities like storytelling and games about MHM improved academic performance in the intervention group. However, this trial had a small sample size and a short follow-up of just six weeks, limiting the reliability of the findings. Conversely, studies on menstrual cups showed no effect in some instances due to prevailing myths—such as concerns about virginity and fertility—and challenges in cleaning the cups where water is scarce, affecting their practicality and outcomes. Biases posed further challenges, as highlighted by Chandra-Mouli et al., making it harder for stakeholders to rely on evidence for policy-making. The review emphasized the critical need to provide girls with accurate biological information about menstruation. Misinformation from mothers, siblings, and peers remains prevalent, especially as most premenarchal girls do not receive adequate preparation for menarche, leading to confusion and anxiety when menstruation begins. Supportive norms and environments, both at home and in schools, are vital for girls to manage menstruation safely and comfortably. However, interventions targeting parental involvement and tackling community misconceptions about menstruation are scarce. Sol et al.'s study, which involved parents, showed improved MHM and attendance, while Agbede et al. found that combining peer and parent education yielded the highest improvement in menstrual hygiene practices. Yet, discussing menstruation with male family members, particularly fathers, remains a sensitive challenge for many girls. For instance, around 13% of Tanzanian girls reported being teased about periods, and over 80% feared such ridicule, particularly from male classmates, affecting school attendance, participation, and focus. A study on men and boys revealed

generally negative views about menstruation, often seen as taboo or requiring secrecy. Religious interpretations in some cultures further perpetuate shame and restrictions tied to menstruation. Teachers themselves sometimes unknowingly reinforce harmful beliefs, such as advising girls to dry reusable pads in hidden areas due to cultural myths, as found in Ethiopia by Betsu et al. This highlights the need for better teacher training and cultural sensitivity in MHM programs. The review noted several limitations, such as reliance on self-reported data, inconsistent record-keeping for school attendance, and insufficient focus on the impact of water, sanitation, hygiene (WASH) facilities, and community-based interventions. The studies also struggled to accommodate gender-nonconforming individuals, and their conclusions were affected by biases stemming from small samples or inconsistent methodologies. Additionally, restricting the review to English-language studies may have excluded relevant research. Despite these shortcomings, the review's strengths include a broad scope, summarizing evidence from multiple countries, and covering a variety of approaches like puberty education, menstrual product distribution, and curriculum integration. Positive outcomes were noted, such as improved school attendance, better knowledge, and healthier attitudes about menstruation. This review emphasizes the gaps requiring further investigation. In terms of practical application, the findings stress the need for comprehensive menstruation education targeting not just girls, but also parents, teachers, and communities. Practical steps include incorporating MHM into school curricula, ensuring affordable menstrual products, upgrading WASH facilities, and fostering stigma-free environments. On the policy front, governments should prioritize MHM as a public health issue by developing guidelines, addressing cultural stigmas, and allocating necessary funding for effective implementation and monitoring. Future research should focus on overcoming identified limitations, including biases and small sample sizes. Larger, long-term studies are needed to assess the sustained impact of MHM interventions on education and well-being. Research should also explore the cultural and social factors affecting menstrual hygiene and create interventions tailored to diverse contexts. By addressing these gaps, stronger evidence-based policies and practices for menstrual hygiene management can be established, benefitting adolescent girls worldwide.

Conclusion

Menstrual hygiene management interventions can make a significant difference in the lives of schoolgirls, improving their attendance, reducing dropout rates, and boosting both academic performance and emotional well-being. These initiatives also play a crucial role in enhancing menstrual knowledge, attitudes, and practices. A comprehensive strategy combining accurate education about menstruation, improved access to hygiene products, better water and sanitation facilities, and involvement from parents, community leaders, and religious figures is likely to have the most substantial impact. At the heart of this effort is the need to treat menstruating individuals with dignity and reduce the stigma and shame often tied to this natural

biological process. Equally important is the standardization of intervention methods and the tools used to evaluate their success. This consistency will make it easier to identify the most effective practices and improve the overall quality of menstrual hygiene programs. To advance our understanding of how best to improve menstrual hygiene among schoolgirls, especially in low- and middle-income countries, it would be valuable to conduct large-scale, well-structured randomized clinical trials. These studies would provide robust evidence to refine interventions and better meet the needs of those who menstruate.

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