RESEARCH PAPER

Menstrual Hygiene Management and Waste Disposal Practices: A Narrative Review

Mrs. Mamta Kumari[1*], Dr. Umesh Kumar Sharma[2]

[1]Ph.D. Scholar, LN Nursing College, LNCT University, Bhopal, Madhya Pradesh, India. Corresponding Author. Email: mamtakbeauti@gmail.com

[2]Professor, LN Nursing College, LNCT University, Bhopal, Madhya Pradesh, India

ABSTRACT

Menstrual hygiene management is an important public health concern, particularly in developing countries where awareness, sanitation facilities, and access to menstrual products are often limited. Social stigma and misconceptions surrounding menstruation further influence hygienic practices among women and adolescent girls. This review aimed to summarize existing literature on menstrual hygiene management, menstrual absorbent products, and menstrual waste disposal practices. A narrative literature review was conducted using electronic databases such as Google Scholar and PubMed. Relevant studies published in English related to menstrual hygiene practices, menstrual products, and waste disposal were reviewed and analyzed. The findings indicate that menstrual practices are influenced by sociocultural beliefs, awareness, and availability of menstrual products. Women use different absorbent materials such as cloth pads, disposable sanitary pads, tampons, and menstrual cups depending on accessibility and preference. Improper disposal of menstrual waste, including flushing products in toilets or discarding them in open areas, contributes to environmental pollution and sanitation problems. Improving awareness, access to menstrual products, sanitation infrastructure, and sustainable waste disposal systems is essential for promoting safe menstrual hygiene management and protecting both public health and the environment.

Keywords: Menstrual hygiene management, Menstrual waste disposal, Menstrual absorbent products, Menstrual health, Environmental impact, Sustainable menstrual products

How to cite this article: Kumari M, Sharma UK. Menstrual Hygiene Management and Waste Disposal Practices: A Narrative Review. Int J Drug Deliv Technol. 2026;16(19s): 115-125. DOI: 10.25258/ijddt.16.19s.14

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Adolescence represents a critical developmental stage characterized by rapid physical, psychological, and social changes. The World Health Organization defines adolescents as individuals between 10 and 19 years of age, a transitional period between childhood and adulthood marked by significant growth and maturation[1]. During this stage, young girls experience several physiological changes that prepare the body for reproductive capability. One of the most significant milestones in this phase is menarche, which marks the onset of the menstrual cycle and the beginning of reproductive life[2]. Globally, the average age at menarche is generally reported to occur between 12 and 13 years, although variations may exist due to genetic, nutritional, and environmental factors[3].

Despite being a natural biological process, menstruation is often surrounded by misconceptions, social stigma, and cultural taboos, particularly in many developing societies. In several communities, menstruation continues to be perceived as impure or unclean, leading to restrictions on daily activities and limited open discussion about menstrual health[4]. As a result, many adolescent girls enter menarche with inadequate knowledge and preparedness, often experiencing fear, embarrassment, or confusion when they first encounter menstruation. Limited awareness regarding menstrual hygiene management further compounds these challenges[5].

Menstrual waste refers to the materials generated during menstruation throughout a woman's reproductive years. This includes used sanitary products such as sanitary pads, tampons, cloth materials, and other absorbents that are discarded after use[6]. The menstrual cycle itself is hormonally regulated and consists of three main phases: the follicular phase, ovulation, and the luteal phase. During menstruation, the thickened endometrial lining of the uterus sheds, resulting in bleeding that typically lasts three to five days, although in some cases it may extend up to seven days. Menstrual fluid contains not only blood but also

mucus, tissue fragments, and vaginal secretions, and its colour and volume may vary among individuals and across cycles[7]. Certain gynaecological conditions, such as hormonal imbalances, uterine fibroids, polyps, or endometriosis, can influence menstrual flow and may lead to excessive bleeding, which can contribute to conditions such as iron-deficiency anaemia[8].

Women across different regions adopt diverse methods to manage menstruation, influenced by cultural norms, socioeconomic status, access to sanitary products, education, and availability of sanitation facilities[9]. However, inadequate menstrual hygiene practices remain a major public health concern in many low- and middle-income countries. Poor hygiene during menstruation has been associated with various health risks, including reproductive tract infections, urinary tract infections, and toxic shock syndrome. Furthermore, lack of access to safe menstrual products, proper sanitation facilities, and accurate information often leaves adolescent girls unprepared to manage menstruation effectively[10].

Given these challenges, there is a growing need to address issues related to menstrual hygiene management and menstrual waste disposal, particularly in resource-limited settings. Understanding menstrual practices, types of absorbent materials used, and current waste management approaches is essential for developing sustainable and health-promoting strategies.

NEED FOR THE REVIEW

Menstrual hygiene management is an important public health, environmental, and social issue, particularly in low- and middle-income countries. Globally, about 1.8 billion people menstruate every month, yet many lack adequate sanitation facilities, menstrual hygiene products, and proper knowledge about menstrual health[11]. In many regions, adolescent girls experience menarche without prior information, leading to fear, embarrassment, and unhygienic practices[12].

Poor menstrual hygiene has been associated with several health problems. Studies indicate that 30–70% of adolescent girls in developing countries experience reproductive tract infections (RTIs) during their reproductive years, with poor genital hygiene being a major contributing factor[13]. In South Asia, around 40–50% of women report symptoms of RTIs, often related to unsafe menstrual practices such as using unclean absorbent materials or poorly maintained reusable cloths[14].

Menstrual waste also creates environmental concerns. A woman may use 10,000–15,000 sanitary pads during her lifetime, many of which contain plastic components that may take 500–800 years to decompose[15]. In India, nearly 12–13 billion disposable sanitary pads are discarded each year, adding a significant burden to solid waste systems. Social stigma surrounding menstruation further affects menstrual hygiene practices. Due to cultural taboos and lack of awareness, many girls do not receive accurate information about menstruation[16].

Studies suggest that 20–23% of adolescent girls miss school during menstruation because of inadequate sanitation facilities or fear of embarrassment[17]. Although several studies have examined menstrual hygiene practices and product use, information related to menstrual waste generation and disposal remains scattered. Therefore, a comprehensive review is needed to summarize existing evidence on menstrual hygiene practices, menstrual products, disposal methods, health implications, and environmental challenges, and to identify strategies for improving menstrual hygiene management.

OBJECTIVE:

To review existing literature on menstrual hygiene management and menstrual waste disposal practices.

MATERIALS AND METHODOLOGY:

Study Design

The present study adopted a narrative literature review design to summarize existing evidence related to menstrual hygiene management, types of menstrual absorbent products, menstrual waste disposal practices, and their associated environmental and public health implications in low-resource settings.

Literature Search Strategy

Relevant literature was identified through a comprehensive search of electronic databases and publicly available academic resources. The databases and search platforms included Google Scholar, PubMed, Scopus-indexed sources, and institutional repositories. Additional information was also obtained from reports published by international organizations such as the World Health Organization (WHO) and other public health agencies.

Search Keywords

The literature search was conducted using combinations of the following keywords:

- *Menstrual hygiene management*
- *Menstrual waste disposal*
- *Menstrual hygiene practices*
- *Menstrual absorbent products*
- *Menstrual health in developing countries*

- *Sustainable menstrual products*
- *Environmental impact of menstrual waste*

Selection of Literature

Articles and reports related to menstrual hygiene practices, menstrual product usage, waste disposal methods, and environmental and health consequences of menstrual waste were reviewed. Priority was given to peer-reviewed articles, public health reports, and studies focusing on low- and middle-income countries. Relevant studies were selected based on their relevance to the objectives of the review and published in English only.

SOCIOCULTURAL INFLUENCES ON MENSTRUAL PRACTICES:

Menstrual hygiene behaviors are shaped by a variety of social and cultural factors. Family traditions, religious beliefs, parental guidance, economic conditions, and individual preferences all influence how women and adolescent girls manage menstruation. In many communities, perceptions and attitudes toward menstruation are deeply embedded within cultural norms, which directly affect knowledge, practices, and overall menstrual hygiene management. Misconceptions about menstruation often coexist with limited access to accurate reproductive health education, creating barriers to adopting healthy practices[18-19].

Across several societies, menstruation is still surrounded by stigma and secrecy. Cultural interpretations often portray menstrual blood as impure or polluting, which leads to restrictions on the daily activities of menstruating women. As a result, many women face limitations during their menstrual period, including restrictions on cooking, participating in social gatherings, engaging in religious activities, or consuming certain foods[20-21]. In some households, women may also avoid physical contact with others or be discouraged from participating in routine household work due to long-standing beliefs associated with ritual purity[22].

Certain traditional practices also influence the way menstrual materials are handled and disposed of. In some regions, used menstrual cloths are washed discreetly and dried in hidden areas away from public view because of embarrassment or fear of social judgment[23]. In other cases, women avoid drying cloth pads in direct sunlight despite its hygienic benefits, due to concerns that others might see them. Some cultural myths even associate menstrual blood with supernatural beliefs, such as fears that it could be misused for harmful purposes. These perceptions often lead women to conceal menstrual materials and manage them in secrecy[24].

Such social expectations contribute to a lack of open communication about menstruation within families and communities. Many girls reach menarche without adequate prior knowledge, which can result in feelings of fear, confusion, and embarrassment. When menstruation is treated as a taboo topic, adolescents may develop negative perceptions about their own bodies and may hesitate to seek guidance regarding menstrual hygiene[25].

Restrictions related to menstruation tend to be more prevalent in rural and traditional settings, although they may also exist in urban communities to some extent. In several cultures, menstruating women are discouraged from entering religious spaces or participating in spiritual rituals. Some communities also impose limitations on bathing or washing hair during menstruation due to traditional beliefs about health or bodily balance[26].

Addressing these sociocultural barriers requires improved education and community engagement. Providing accurate information about menstruation to both girls and boys can help dispel myths and encourage healthier attitudes. Increased awareness, combined with supportive family and community environments, plays an essential role in promoting safe and hygienic menstrual practices.

MENSTRUAL ABSORBENT PRODUCTS AND MATERIALS USED FOR MENSTRUAL HYGIENE MANAGEMENT:

The choice of menstrual absorbent materials depends on personal preference, cultural acceptance, socioeconomic status, and availability. Rural women commonly use reusable cloths, while urban women often use disposable sanitary pads. Most disposable products are made from processed wood pulp and synthetic materials, which degrade slowly, increasing the need for biodegradable menstrual products.

a) **Reusable Cloth Pads:** Reusable cloth pads are among the oldest and most commonly used menstrual absorbents, particularly in low-income settings. These pads are usually made from cotton fabric and can be washed and reused multiple times. When cleaned properly with soap and water and dried under direct sunlight, they can be a safe, economical, and environmentally sustainable option. Sunlight acts as a natural disinfectant, helping reduce microbial contamination. However, improper washing or drying in damp environments may increase the risk of infections[27].

b) **Disposable Commercial Sanitary Pads:** Disposable sanitary pads are widely used in urban areas due to their convenience, comfort, and availability. These pads are easily accessible through pharmacies, supermarkets, and online stores. Although they provide effective menstrual protection, they are single-use products, which contributes to the generation of large amounts of menstrual waste. In addition, the manufacturing process often involves synthetic materials and chemicals that may delay biodegradation and create environmental concerns[28].

c) **Tampons:** Tampons are absorbent products designed for internal menstrual protection. They are typically made from compressed cotton or rayon and are inserted into the vagina to absorb menstrual fluid before it exits the body. While tampons provide freedom of movement and are commonly used in many countries, their use is less prevalent in some regions due to cultural beliefs, limited awareness, or concerns related to comfort and safety. Conventional tampons are also not easily biodegradable, which raises environmental considerations[28].

d) **Reusable Tampons:** Reusable tampons represent an alternative to disposable tampons and are generally made from natural fibers such as cotton, bamboo, hemp, or wool. These products can be washed and reused, making them more environmentally sustainable. However, their acceptance remains limited in many communities due to cultural norms, hygiene concerns, or lack of awareness[28].

e) **Menstrual Cups:** Menstrual cups are emerging as a sustainable and cost-effective menstrual hygiene product. These flexible cups are typically made from medical-grade silicone, rubber, or thermoplastic elastomers and are inserted into the vagina to collect menstrual fluid rather than absorb it. Menstrual cups can usually be worn for 6 to 12 hours depending on menstrual flow, after which they can be emptied, washed, and reused. Due to their long lifespan and minimal waste generation, menstrual cups are increasingly promoted as an eco-friendly alternative to disposable menstrual products[29].

f) **Bamboo Fiber Pads:** Bamboo fiber sanitary pads are a biodegradable and environmentally friendly alternative to conventional disposable pads. Bamboo pulp is used as the absorbent core instead of wood pulp, providing good absorbency and natural antibacterial properties. These pads are designed to decompose more easily in the environment and may reduce irritation or allergic reactions in sensitive users. Some bamboo-based products also include bamboo charcoal layers, which help reduce odor and improve absorption[30].

g) **Banana Fiber Pads:** Banana fiber pads are another example of biodegradable menstrual products made from agricultural waste. In India, low-cost sanitary napkins produced from banana plant fibers have been developed to improve access to menstrual hygiene products for rural women. These pads are environmentally sustainable and can decompose within a relatively short period compared with conventional plastic-based products[31].

h) **Water Hyacinth-Based Pads:** Innovative biodegradable menstrual pads have also been developed using water hyacinth fibers. These products are designed to be cost-effective, eco-friendly, and easily decomposable, offering a sustainable solution for menstrual hygiene management in resource-limited settings[32].

i) **Traditional and Alternative Materials:** In remote or economically disadvantaged communities where commercial menstrual products are unavailable, women sometimes rely on locally available natural materials such as cloth, plant fibers, leaves, or other absorbent materials. However, the use of unsafe materials may pose hygiene risks and highlights the importance of improving accessibility to safe menstrual hygiene products[32].

j) **Emerging Trends in Sustainable Menstrual Products:** Recent innovations in menstrual hygiene management emphasize the development of biodegradable, reusable, and environmentally sustainable products. Increasing awareness about environmental pollution caused by disposable sanitary products has encouraged research into alternative materials such as organic cotton, plant-based fibers, compostable polymers, and reusable menstrual technologies. Promoting sustainable menstrual products can help reduce waste generation while improving menstrual health outcomes[33].

MENSTRUAL WASTE DISPOSAL PRACTICES :

Proper disposal of menstrual waste remains a challenge in many parts of the world. Despite improvements in sanitation systems, menstrual waste management has received limited attention. As a result, many women dispose of used menstrual materials such as sanitary pads, tampons, or cloths along with household waste, which eventually becomes part of municipal solid waste[34].

In urban areas, where disposable sanitary pads are widely used, women generally discard them in dustbins or through municipal waste systems[35].

However, flushing sanitary pads into toilets is a common practice, which can cause blockages in sewage systems because these products contain plastic and superabsorbent materials that do not degrade easily[36].

In rural areas, many women rely on reusable cloth materials that generate less waste. When disposable products are used, common disposal methods include burning, burying, or discarding them in garbage areas or pit latrines. Cultural beliefs, privacy concerns, and social stigma may also influence disposal behavior[37].

In schools and public places, the lack of disposal bins, water supply, and adequate sanitation facilities creates difficulties for menstruating girls. As a result, some girls may dispose of used pads in toilets or other hidden places, which contributes to unhygienic conditions and sanitation problems[38]. These challenges highlight the need for improved menstrual waste management systems and greater awareness of safe disposal practices.

ENVIRONMENTAL AND PUBLIC HEALTH IMPLICATIONS OF MENSTRUAL WASTE DISPOSAL :

The management of menstrual waste presents significant environmental and sanitation challenges in many regions. Most conventional sanitation systems were primarily designed to handle human excreta such as urine and feces, and they are often not equipped to manage solid absorbent materials used during menstruation. When menstrual products such as sanitary pads, tampons, or cloth materials are flushed into toilets, they can obstruct drainage systems because these products do not easily disintegrate in water. As a result, sewer pipelines may become clogged, leading to drainage blockage and sewage backflow[39].

Many disposable menstrual products contain plastic components, synthetic fibers, and superabsorbent polymers, which degrade very slowly in the environment. While organic materials such as cotton or paper may gradually decompose in pit latrines or landfill sites, the plastic layers found in commercial sanitary pads remain in the environment for extended periods. In on-site sanitation systems, complete decomposition of disposable sanitary pads may take several months or even longer due to the presence of non-biodegradable materials[40].

In rural areas where pit latrines are commonly used, waste management practices often involve covering filled pits with soil and constructing new pits. However, this method is not always feasible in densely populated urban environments where space limitations restrict such practices. Additionally, some women wrap used menstrual materials in plastic bags before disposing of them in pit latrines or waste pits. Although this practice provides privacy, the plastic covering further delays decomposition and contributes to long-term environmental accumulation[41].

The increasing use of disposable sanitary pads and tampons has further intensified the problem of menstrual waste. Many modern menstrual products contain superabsorbent polymers such as polyacrylate, which expand when exposed to liquids. When these materials are flushed into toilets, they swell and may block sewage pipelines, increasing the risk of drainage overflow. In many urban areas, sewer blockages are frequently associated with the disposal of sanitary products along with other solid wastes[42].

Chemical components used during the production of sanitary products may also contribute to environmental pollution. Certain disposable pads are manufactured using bleaching agents and chemical additives that may contain compounds such as organochlorines. When such products are discarded in soil or landfill sites, these chemicals can interfere with soil microorganisms and slow the natural decomposition process[43].

Improper disposal of menstrual waste can also affect water bodies and public health. In some communities, menstrual waste is discarded into rivers, streams, or other open water sources. Such practices contribute to water contamination and environmental pollution. Blood-contaminated materials may provide favorable conditions for the growth of microorganisms and pathogens. If the menstrual waste originates from individuals with infectious diseases, pathogens may survive in the environment for extended periods and pose potential health risks[44].

Incineration is sometimes used as a method for disposing of menstrual waste, particularly in institutional settings such as schools or hospitals. While controlled incineration can reduce waste volume, improper burning of sanitary products may release toxic gases and harmful pollutants into the atmosphere. When menstrual waste containing plastic materials is burned at low temperatures, it can produce hazardous compounds such as dioxins, which are known to have toxic and carcinogenic effects[45].

Overall, inadequate menstrual waste management has environmental, infrastructural, and public health consequences. Addressing these issues requires improved waste disposal systems, increased awareness about appropriate disposal practices, and

the promotion of environmentally sustainable menstrual products.

STAKEHOLDER ROLES IN IMPROVING MENSTRUAL HYGIENE MANAGEMENT :

Effective menstrual hygiene management requires collaborative efforts from multiple sectors of society. Various stakeholders, including families, educational institutions, community organizations, healthcare providers, and government authorities, play crucial roles in promoting awareness, improving sanitation infrastructure, and ensuring safe menstrual waste disposal. A coordinated approach can help reduce stigma, improve access to menstrual products, and support healthier practices among women and adolescent girls.

- **Role of Family:** Families are often the primary source of information and support for adolescent girls during menarche and throughout their reproductive years. Parents and guardians play an essential role in providing accurate knowledge about menstruation, encouraging hygienic practices, and ensuring access to appropriate menstrual products. Open communication within families helps reduce embarrassment and misconceptions associated with menstruation. Additionally, family members can support girls by ensuring access to clean water, private sanitation facilities, and proper disposal options within the household[38,42,44,46].
- **Role of Schools and Colleges:** Educational institutions play a significant role in shaping attitudes and knowledge related to menstrual health. Schools and colleges can promote menstrual hygiene management by incorporating reproductive health education into the curriculum. Teachers and health educators can provide accurate information about menstruation, hygienic practices, and proper disposal of menstrual products. Furthermore, educational institutions should ensure the availability of gender-sensitive sanitation facilities, including separate toilets for girls, adequate water supply, disposal bins, and menstrual waste management systems such as incinerators. Such measures help create a supportive environment that reduces school absenteeism among menstruating students[11].
- **Role of Community and Social Organizations:** Community leaders, local organizations, and non-governmental organizations (NGOs) can contribute significantly to improving menstrual hygiene awareness. Community-based awareness programs, workshops, and campaigns can help challenge cultural taboos and promote open discussions about menstruation. NGOs often play a vital role in distributing low-cost menstrual products, supporting sustainable menstrual hygiene initiatives, and educating communities about proper menstrual waste disposal practices. Engaging community members also helps foster supportive attitudes toward menstrual health[47].
- **Role of Healthcare Professionals:** Healthcare providers, including nurses, community health workers, and public health professionals, play a critical role in educating women and adolescents about menstrual health and hygiene. Through health education programs, counseling sessions, and community outreach activities, healthcare workers can provide reliable information about menstrual physiology, hygiene practices, and potential health risks associated with poor menstrual hygiene. Healthcare professionals can also guide women in choosing safe and appropriate menstrual products and encourage early medical consultation when menstrual problems occur[48].
- **Role of Government and Policy Makers:** Government institutions are responsible for developing policies and programs that support menstrual hygiene management. This includes ensuring the availability of affordable menstrual products, improving sanitation infrastructure, and establishing proper waste management systems. Governments can implement policies that promote menstrual health education in schools, subsidize sanitary products, and encourage the production of biodegradable menstrual products. Public health campaigns and national programs can also play a key role in reducing stigma and promoting awareness at the population level[49-50].
- **Role of Media and Public Awareness Campaigns:** Mass media and digital platforms can significantly influence public attitudes and knowledge about menstruation. Television, radio, social media, and print media can be used to disseminate accurate information regarding menstrual health, hygiene practices, and safe disposal methods. Public awareness campaigns can help normalize conversations around menstruation, reduce stigma, and encourage community participation in promoting menstrual hygiene management[51].

RECOMMENDATIONS FOR SUSTAINABLE MENSTRUAL WASTE MANAGEMENT :

Effective management of menstrual waste is essential for protecting public health, maintaining environmental sustainability, and ensuring dignity and safety for women and adolescent girls. Inadequate disposal systems and limited awareness about proper

menstrual hygiene practices continue to create challenges in many regions. Therefore, coordinated efforts involving policymakers, educational institutions, healthcare providers, communities, and product manufacturers are necessary to improve menstrual waste management practices. The following recommendations highlight key strategies that can support safe and sustainable management of menstrual waste.

- **Promotion of eco-friendly menstrual products:** Manufacturers should prioritize the development of biodegradable sanitary products and minimize the use of plastics, synthetic polymers, and harmful chemicals in absorbent materials.
- **Transparency in product composition:** Companies producing menstrual hygiene products should clearly disclose the chemical composition and materials used in sanitary products to support environmentally appropriate disposal and treatment methods.
- **Encouragement of biodegradable alternatives:** Greater emphasis should be placed on promoting environmentally sustainable products such as pads made from bamboo fiber, banana fiber, water hyacinth, and other plant-based materials that decompose more easily.
- **Menstrual hygiene education:** Comprehensive menstrual health education should be incorporated into school curricula and community health programs to improve awareness regarding hygienic practices and safe disposal methods.
- **Improved access to menstrual products:** Governments and institutions should ensure the availability of affordable or free menstrual products in schools, colleges, and community health initiatives to support proper menstrual hygiene management.
- **Development of gender-sensitive sanitation infrastructure:** Toilets in schools, workplaces, and public spaces should be designed with adequate water supply, soap, private changing areas, and disposal facilities to support menstrual hygiene needs.
- **Installation of dedicated disposal facilities:** The placement of covered bins, sanitary disposal units, and vending machines in toilets can facilitate hygienic handling and disposal of menstrual waste.
- **Regular maintenance of disposal systems:** Waste bins and sanitary disposal units should be emptied frequently and maintained properly to prevent unpleasant odors, insect breeding, and environmental contamination.
- **Establishment of separate menstrual waste collection systems:** A dedicated collection mechanism for menstrual waste can prevent mixing with general household waste and allow safer waste handling and treatment.
- **Protection of sanitation workers:** Individuals involved in waste handling should be provided with protective gloves, equipment, and safety training to reduce exposure to potentially harmful biological and chemical materials.
- **Strengthening policy and regulatory frameworks:** Governments should develop clear policies and guidelines for menstrual waste management, similar to existing regulations for biomedical or municipal waste.
- **Community awareness and engagement:** Government bodies and non-governmental organizations should conduct community-based awareness campaigns to reduce stigma and encourage safe menstrual hygiene practices.
- **Support for research and innovation:** Institutions should promote scientific research on sustainable menstrual products and waste management technologies through funding and collaborative initiatives.
- **Budget allocation for menstrual hygiene programs:** Educational institutions and public health systems should allocate resources for menstrual hygiene infrastructure, awareness programs, and waste management systems.
- **Controlled incineration for waste disposal:** Where appropriate, incinerators may be used for menstrual waste disposal, provided they operate under controlled temperatures and environmental standards to minimize toxic emissions.
- **Promotion of reusable menstrual products:** Sustainable options such as reusable cloth pads and menstrual cups should be encouraged to reduce the overall generation of menstrual waste.
- **Safe disposal practices:** Used menstrual materials should be properly wrapped and disposed of in designated bins, which helps prevent contamination and protects waste handlers from potential health risks.

CONCLUSION

Menstrual hygiene management remains an important public health and environmental issue, particularly in developing countries where awareness, sanitation facilities, and waste management systems are often inadequate. Social stigma, limited knowledge, and lack of access to affordable menstrual products affect the ability of women and adolescent girls to manage menstruation safely. Improving education through schools and community programs, promoting awareness through media, and ensuring

access to affordable and sustainable menstrual products are essential steps. Additionally, the provision of proper sanitation facilities, disposal bins, and environmentally safe waste management systems is necessary to address menstrual waste challenges. Coordinated efforts from policymakers, educators, healthcare professionals, communities, and families are crucial to promote safe menstrual hygiene practices and improve the overall health and dignity of women and girls.

Limitations of the Study

The present review has certain limitations that should be considered while interpreting the findings.

- The study relied on secondary data from previously published literature, and therefore the conclusions depend on the quality and accuracy of the included studies.
- Variations in study design, population characteristics, and geographical settings across the reviewed literature may limit direct comparison of findings.
- Only studies published in the English language were included in this review; therefore, studies published in other languages were not considered.
- As a narrative review, the study did not apply a systematic review protocol or meta-analysis, which may introduce selection bias in the literature included.

Conflict of Interest- None to declare by author(s).

Financial Aid- Self financed and no financial aid applied or received.

Acknowledgement - The authors would like to acknowledge the researchers and authors whose published work contributed to this review.

References

1. World Health Organization: WHO. Adolescent health [Internet]. 2019. Available from: https://who.int/health-topics/adolescent-health
2. Lacroix AE, Gondal H, Shumway KR, Langaker MD. Physiology, Menarche [Internet]. StatPearls - NCBI Bookshelf. 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470216/
3. Nishan MdNH, Ferdous A, Ahmed MZEMNU, Akter K. Understanding age at menarche: Environmental and demographic influences over a quarter century in India. PLOS Global Public Health [Internet]. 2025 Sep 17;5(9):e0005133. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12443301/
4. Ganguly M, Mondal P, Dey S, Jana S, Chattaraj M, Ganguly A, et al. Exploring menstrual taboos, myths and restrictions in Paschim Medinipur district of West Bengal, India. Discover Public Health [Internet]. 2026 Feb 20;23(1). Available from: https://doi.org/10.1186/s12982-026-01524-x
5. Shah V, Nabwera HM, Sosseh F, Jallow Y, Comma E, Keita O, et al. A rite of passage: a mixed methodology study about knowledge, perceptions and practices of menstrual hygiene management in rural Gambia. BMC Public Health [Internet]. 2019 Mar 7;19(1):277. Available from: https://doi.org/10.1186/s12889-019-6599-2
6. Kaur R, Kaur K, Kaur R. Menstrual Hygiene, Management, and Waste Disposal: Practices and challenges faced by Girls/Women of Developing Countries. Journal of Environmental and Public Health [Internet]. 2018 Jan 1;2018:1–9. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC5838436/
7. Reed BG, Carr BR. The normal menstrual cycle and the control of ovulation [Internet]. Endotext - NCBI Bookshelf. 2018. Available from: https://www.ncbi.nlm.nih.gov/books/NBK279054/
8. Jain V, Chodankar RR, Maybin JA, Critchley HOD. Uterine bleeding: how understanding endometrial physiology underpins menstrual health. Nature Reviews Endocrinology [Internet]. 2022 Feb 8;18(5):290–308. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9098793/
9. Tshivule MZ, Rasweswe MM, Mothiba TM, Bopape MA. Factors influencing menstrual hygiene knowledge, attitudes, and practices among adolescent girls in African rural schools: scoping review. Frontiers in Reproductive Health [Internet]. 2025 Aug 12;7:1553101. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12378722/
10. Worku Y, Kassa GM, Mekonen B, Desta M, Bishaw KA, Gedfaw M, et al. Menstrual hygiene management practice and associated factors among high school and preparatory school adolescent students in Debre Markos town, Northwest, Ethiopia: a mixed-method study. BMC Women S Health [Internet]. 2024 Jul 25;24(1):420. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11270815/
11. Betsu BD, Medhanyie AA, Gebrehiwet TG, Wall LL. Menstrual hygiene management interventions and their effects on schoolgirls' menstrual hygiene experiences in low and middle countries: A systematic review. PLoS ONE [Internet]. 2024 Aug 22;19(8):e0302523. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11340951/
12. Sundari T, George AJ, Sinu E. Psychosocial Problems of Adolescent Girls during Menstruation [Internet].

2022. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9202820/
13. Mcharo O, Kapesa A, Materu J, Luwayi J, Nahay F, Basinda N, et al. Effects of a comprehensive menstrual and sexual reproductive health intervention on RTI symptoms among adolescent girls in the Mwanza region: a mixed-methods analysis. Reproductive Health [Internet]. 2025 Nov 12;22(1):224. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12607135/
14. García-Egea A, Pujolar-Díaz G, Hüttel AB, Holst AS, Jacques-Aviñó C, Medina-Perucha L. Mapping the health outcomes of menstrual inequity: a comprehensive scoping review. Reproductive Health [Internet]. 2025 Sep 2;22(1):156. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12406439/
15. Aujla M, Logie C, Hardon A, Narasimhan M. Environmental impact of menstrual hygiene products. Bulletin of the World Health Organization [Internet]. 2025 Mar 1;103(3):223–5. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11865846/
16. Sreekumar S, Pandey A. Menstrual waste behaviour of young adolescents: a theory of planned behaviour approach. Journal of Water Sanitation and Hygiene for Development [Internet]. 2024 Sep 1;14(9):833–44. Available from: https://doi.org/10.2166/washdev.2024.090
17. Agarwalla R, Vashisht A, Pathak R, Patavegar B, Panda M. School absenteeism during menstruation amongst adolescent girls in Delhi, India. Journal of Family and Community Medicine [Internet]. 2018 Jan 1;25(3):163. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6130156/
18. Manimaran S, Ramanathan R, Subramanian S. Investigating Menstrual Hygiene Behaviors: Analysis of demographic and social factors among adolescent school girls. Cureus [Internet]. 2024 Oct 3;16(10):e70799. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11531532/
19. Tshivule MZ, Rasweswe MM, Mothiba TM, Bopape MA. Factors influencing menstrual hygiene knowledge, attitudes, and practices among adolescent girls in African rural schools: scoping review. Frontiers in Reproductive Health [Internet]. 2025 Aug 12;7:1553101. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12378722/
20. Dutta A, Chakraborty A, Sarkar O. Experiences of menstrual restrictions: Freedom lost and never regained. International Journal of Educational Research Open [Internet]. 2024 Mar 12;7:100347. Available from: https://doi.org/10.1016/j.ijedro.2024.100347
21. Thapa S, Bhattarai S, Aro AR. 'Menstrual blood is bad and should be cleaned': A qualitative case study on traditional menstrual practices and contextual factors in the rural communities of far-western Nepal. SAGE Open Medicine [Internet]. 2019 Jan 1;7:2050312119850400. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6537045/
22. Park JS. Family Context Matters: Exploring family environmental factors that influence the development and performance of Religio-Cultural menstrual practices in Far-West Nepal. Journal of International Development Cooperation [Internet]. 2022 Nov 1;17(2):31–77. Available from: http://dx.doi.org/10.34225/jidc.2022.17.2.31
23. García-Egea A, Pujolar-Díaz G, Hüttel AB, Holst AS, Jacques-Aviñó C, Medina-Perucha L. Mapping the health outcomes of menstrual inequity: a comprehensive scoping review. Reproductive Health [Internet]. 2025 Sep 2;22(1):156. Available from: https://doi.org/10.1186/s12978-025-02103-0
24. Yaliwal RG, Biradar AM, Kori SS, Mudanur SR, Pujeri SU, Shannawaz M. Menstrual Morbidities, Menstrual Hygiene, Cultural Practices during Menstruation, and WASH Practices at Schools in Adolescent Girls of North Karnataka, India: A Cross-Sectional Prospective Study. Obstetrics and Gynecology International [Internet]. 2020 Jul 16;2020:1–8. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7593755/
25. Gold-Watts A, Hovdenak M, Daniel M, Gandhimathi S, Sudha R, Bastien S. A qualitative study of adolescent girls' experiences of menarche and menstruation in rural Tamil Nadu, India. International Journal of Qualitative Studies on Health and Well-Being [Internet]. 2020 Jan 1;15(1):1845924. Available from: https://doi.org/10.1080/17482631.2020.1845924
26. Elliason EK, Khajuria A, Monday S, Kamanda JS. Menstrual exclusions and their psychological impact: A quantitative study on religious and cultural restrictions among women in South India. Santosh University Journal of Health Sciences [Internet]. 2025 Jan 1;11(1):15–22. Available from: https://doi.org/10.4103/sujhs.sujhs_6_25
27. Kumari S, Muneshwar KN. A review on initiatives for promoting better menstrual hygiene practices and management in India. Cureus [Internet]. 2023 Oct 16;15(10):e47156. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10651805/
28. Patel K, Dwivedy S, Panda N, Swain S, Pati S, Palo SK. Is menstrual cup a sustainable and safe alternative in menstrual hygiene management? A qualitative exploratory study based on user's experience in India.

Clinical Epidemiology and Global Health [Internet]. 2022 Dec 30;20:101212. Available from: https://doi.org/10.1016/j.cegh.2022.101212

29. Singh R, Agarwal M, Sinha S, Chaudhary N, Sinha HH, Anant M. Study of adaptability and Efficacy of menstrual cups in managing menstrual health and hygiene: a descriptive longitudinal study. Cureus [Internet]. 2022 Sep 28;14(9):e29690. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9517956/
30. Pawar S, Farshi R, Karegowda AG, Bhat P, S PM. Affordable, biodegradable, and environmentally friendly sanitary napkins for rural women, with a focus on degradation study. Results in Engineering [Internet]. 2024 Sep 27;24:102988. Available from: https://doi.org/10.1016/j.rineng.2024.102988
31. Achuthan K, Muthupalani S, Kolil VK, Bist A, Sreesuthan K, Sreedevi A. A novel banana fiber pad for menstrual hygiene in India: a feasibility and acceptability study. BMC Women S Health [Internet]. 2021 Mar 26;21(1):129. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7995390/
32. Paul SC, Islam MdS, Kaikobad Md, Sadman MS, Emon MH, Zaman B, et al. Exploring biodegradable fibers as sustainable alternatives for sanitary napkin: A comprehensive review. Environmental Technology & Innovation [Internet]. 2025 Dec 30;41:104735. Available from: https://doi.org/10.1016/j.eti.2025.104735
33. Sharma V, Poulose J, Mahajan Y, Kapse M. EcoFlow choices: factors influencing sustainable menstrual hygiene product decisions. Cogent Business & Management [Internet]. 2026 Jan 19;13(1). Available from: https://doi.org/10.1080/23311975.2026.2614363
34. Anand U, Vithanage M, Rajapaksha AU, Dey A, Varjani S, Bontempi E. Inapt management of menstrual hygiene waste (MHW): An urgent global environmental and public health challenge in developed and developing countries. Heliyon [Internet]. 2022 Jul 1;8(7):e09859. Available from: https://doi.org/10.1016/j.heliyon.2022.e09859
35. M G. MENSTRUAL HYGIENE HABITS AND WASTE DISPOSAL PRACTICE AND CHALLENGES FACED BY WOMEN IN SALEM DISTRICT FROM 1947 TO 2000 [Internet]. 2022. Available from: https://www.jrmds.in/articles/menstrual-hygiene-habits-and-waste-disposal-practice-and-challenges-faced-by-women-in-salem-district-from-1947-to-2000-96514.html
36. Briain OÓ, Mendes ARM, McCarron S, Healy MG, Morrison L. The role of wet wipes and sanitary towels as a source of white microplastic fibres in the marine environment. Water Research [Internet]. 2020 Jun 10;182:116021. Available from: https://doi.org/10.1016/j.watres.2020.116021
37. Elledge M, Muralidharan A, Parker A, Ravndal K, Siddiqui M, Toolaram A, et al. Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature. International Journal of Environmental Research and Public Health [Internet]. 2018 Nov 15;15(11):2562. Available from: https://doi.org/10.3390/ijerph15112562
38. Ikogho DE, Onoharigho FD. Menstrual waste management practices among female students in Niger delta development commission hostels in educational institutions in Niger delta, Nigeria. BMC Women S Health [Internet]. 2025 Feb 11;25(1):60. Available from: https://doi.org/10.1186/s12905-025-03549-x
39. Elledge M, Muralidharan A, Parker A, Ravndal K, Siddiqui M, Toolaram A, et al. Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature. International Journal of Environmental Research and Public Health [Internet]. 2018 Nov 15;15(11):2562. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6266558/
40. Aujla M, Logie C, Hardon A, Narasimhan M. Environmental impact of menstrual hygiene products. Bulletin of the World Health Organization [Internet]. 2025 Mar 1;103(3):223–5. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11865846/
41. Capone D, Buxton H, Cumming O, Dreibelbis R, Knee J, Nalá R, et al. Impact of an intervention to improve pit latrine emptying practices in low income urban neighborhoods of Maputo, Mozambique. International Journal of Hygiene and Environmental Health [Internet]. 2020 Feb 18;226:113480. Available from: https://doi.org/10.1016/j.ijheh.2020.113480
42. Blignaut J, Visser HG, Erasmus E, Schutte-Smith M. Review: sanitary pads—composition, regulation, and ongoing research to address associated challenges. Journal of Materials Science [Internet]. 2025 Jul 22;60(31):13109–55. Available from: https://doi.org/10.1007/s10853-025-11151-7
43. Upson K, Shearston JA, Kioumourtzoglou MA. Menstrual Products as a Source of Environmental Chemical Exposure: A Review from the Epidemiologic Perspective. Current Environmental Health Reports [Internet]. 2022 Mar 17;9(1):38–52. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9876534/
44. Seo. Menstrual Hygiene Management – Waste disposal techniques [Internet]. Citron Hygiene. 2024. Available

from: https://citronhygiene.com/resources/menstrual-hygiene-management-waste-disposal-techniques/

45. Parthasarathy S, Jayaraman V, Jeganathan S, Lakshminarayanan AR. Menstrual hygiene and waste management: The survey results. Materials Today Proceedings [Internet]. 2022 Jan 1;65:3409–16. Available from: https://doi.org/10.1016/j.matpr.2022.05.531
46. Patil S, Deshpande T, Gharai S, Patil S, Durgawale P. Menstrual hygiene among adolescent girls – A study from urban slum area. Journal of Family Medicine and Primary Care [Internet]. 2018 Jan 1;7(6):1439. Available from: https://pubmed.ncbi.nlm.nih.gov/30613539/
47. Joshi K, Mendhe D. Navigating Menstrual Health and Hygiene: Challenges and Solutions for adolescent girls. Journal of Pharmacy and Bioallied Sciences [Internet]. 2025 Mar 6;17(Suppl 1):S88–91. Available from: https://doi.org/10.4103/jpbs.jpbs_1637_24
48. Gupta A, Khan S. Importance of community health workers for maternal health care management. Public Health Reviews [Internet]. 2024 Feb 22;45:1606803. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10917972/
49. Observer Research Foundation. Towards an inclusive national policy on menstrual health and hygiene [Internet]. orfonline.org. Available from: https://www.orfonline.org/research/towards-an-inclusive-national-policy-on-menstrual-health-and-hygiene
50. Sudhakar H. Beyond the Bin: A critical review and strategic framework for sustainable menstrual waste management in India. Social Sciences & Humanities Open [Internet]. 2025 Jan 1;12:102226. Available from: https://doi.org/10.1016/j.ssaho.2025.102226
51. Thakur S, Suri CS, Askari N, Kochhar HK, Verma A. ROLE OF MEDIA CAMPAIGNS IN SHAPING MENSTRUAL HYGIENE BEHAVIOURS IN ADOLESCENTS. ShodhKosh Journal of Visual and Performing Arts [Internet]. 2026 Feb 17;7(1s). Available from: https://doi.org/10.29121/shodhkosh.v7.i1s.2026.7167