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Original Article

Menstrual Health and Hygiene in Developing Countries: Waste Management and Disposal Practices

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Abstract

Menstrual hygiene management has recently attracted attention, resulting in the publication of several literature reviews. This audit looks for to address a noteworthy crevice within the water, sanitation, and cleanliness division by particularly looking at the secure transfer of menstrual cleanliness items in moo- and middle-income nations. We conducted a review of literature published since 2002, emphasizing menstrual waste management and the disposal of menstrual absorbents in LMIC. Methodology included database searches for both peer-reviewed and grey literature, as well as a manual review of references from pertinent earlier literature reviews. Ultimately, identified 152 articles and reports, of which 75 met the inclusion criteria for the final review. Additionally, assessed existing policies on MHM, Centering on India and South Africa. The audit uncovered that the transfer of menstrual squander is habitually neglected inside MHM and sanitation esteem chains, coming about in disgraceful transfer hones that antagonistically influence clients, sanitation frameworks, and the environment. The discoveries emphasize the require for encourage investigate to improve understanding of MHM squander streams, transfer practices, retentive materials, and squander administration innovations, eventually advancing wellbeing, security, versatility, and respect for ladies and young ladies.

Keywords: *water and sanitation, menstrual cleanliness administration, menstrual cleanliness squander transfer, natural wellbeing, sterile squander.*

Introduction

Women and men have different sanitation needs, preferences, access requirements, and usage habits and experiences [1]. Good menstrual hygiene means that women and teenage girls use clean menstrual products to collect menstrual blood, that they can change in private as often as they need during their period, using soap and water to wash themselves as required, and having safe and easy-to-use places to throw away used menstrual products [2]. Poor menstrual hygiene management can harm the health and mental well-being of women and girls [3–5]. Menstrual cleanliness administration within the water and sanitation division isn't formally characterized within the Maintainable Advancement Objectives.

A woman menstruates from puberty (ages 11–24) to menopause (ages 45–55), experiencing about 459 cycles in her lifetime [6]. With rapid urban growth, rising incomes, more product availability and distribution, and increased movement, the use of disposable sanitary pads is growing quickly [7]. A Path study estimated that the yearly solid waste from disposable sanitary pads was more than any other menstrual hygiene product approximately 44,254 cm^3 per female per year [8]. Shared and open restroom upkeep is regularly a source of natural wellbeing dangers due to destitute cleanliness. In nations with numerous marks of disgrace and taboos around monthly cycle, terrible squander administration on-site causes uneasiness and push. The issue of restroom upkeep, combined with the truth that urban squander collection frameworks confront numerous issues in numerous moo- and middle-income nations makes introduction dangers and natural contamination in swarmed urban zones.

A possible reason is the lack of clarity and agreement on how menstrual waste is categorized (such as solid waste, hazardous waste, or bio-medical waste), making it hard to provide clear guidance on how to properly throw away used products, which leads to unsafe disposal methods [9]. House states that menstrual hygiene-friendly infrastructure includes "clear ways to collect and dispose of menstrual waste," but does not clarify what those methods might be. Including MHM concerns in waste management when planning for WASH will help achieve goals that ensure safety, respect, and provide designs based on women's and girls' needs by addressing their biological needs comprehensively [10]. Improved access to culturally suitable MHM in sanitation facilities allows women and girls to fully participate in education and the workforce [11].In many communal toilets, the disposal of menstrual waste has often been ignored, which leads to improper waste disposal [12].

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Methodology:

The essential accentuation of the look was on the transfer and administration of menstrual squander. Key subjects inspected included: the sorts of absorbents utilized and transfer strategies in urban and peri-urban districts of creating nations; socio-economic components influencing transfer hones; the affect of secure transfer on strengthening and nobility, as well as sanitation hones; natural and open wellbeing risks related with menstrual squander; wellbeing and natural concerns related to cremation; social states of mind towards the utilize and acknowledgment of cremation; transfer hones in open and regulation settings within the creating world; and existing approaches or rules for menstrual squander transfer

Look Strategy:

The databases looked included PubMed, Web of Science, Google Researcher, EMBASE, Conference Papers List, and Scopus. The Unused York Foundation of Medication Dim Writing Database was moreover included within the look. An natural audit for more dim writing was done utilizing Google.com and by straightforwardly checking particular websites of pertinent organizations to discover additional reports that were not as of now found through the database and Google searches Key words utilized to form database look strings included: Menstrual cleanliness administration, Menstrual cleanliness squander administration, Menstrual squander administration, Menstrual cleanliness administration transfer, Menstrual squander transfer, Menstrual cleanliness administration transfer hone, Menstrual squander transfer hone, Menstrual cleanliness, administration transfer innovation, Menstrual, squander transfer innovation, Menstrual cleanliness administration burning, Menstrual squander cremation, Menstrual cleanliness administration retentive, Menstrual retentive, Menstrual cleanliness administration wellbeing, Menstrual cleanliness administration hazard. The search strategies included a blend of these watchwords, in conjunction with pertinent database-specific subject terms like Restorative Subject Headings in PubMed. An illustration look string included: (menstrual OR monthly cycle) AND (squander OR cleanliness) AND (oversee OR arrange OR a disposal practice OR disposal technology OR burn OR burn OR retentive OR superabsorbent OR wellbeing OR chance).

Writing from the looks was assembled, and 152 article abstracts were screened for beginning consideration utilizing the screening criteria recorded underneath in Figure 1. A determination of full content articles and reports were at that point checked on to check in case they met the consideration criteria after looking into the abstracts. In the event that there was any instability, a moment individual looked at the article and a joint choice was made approximately its incorporation.

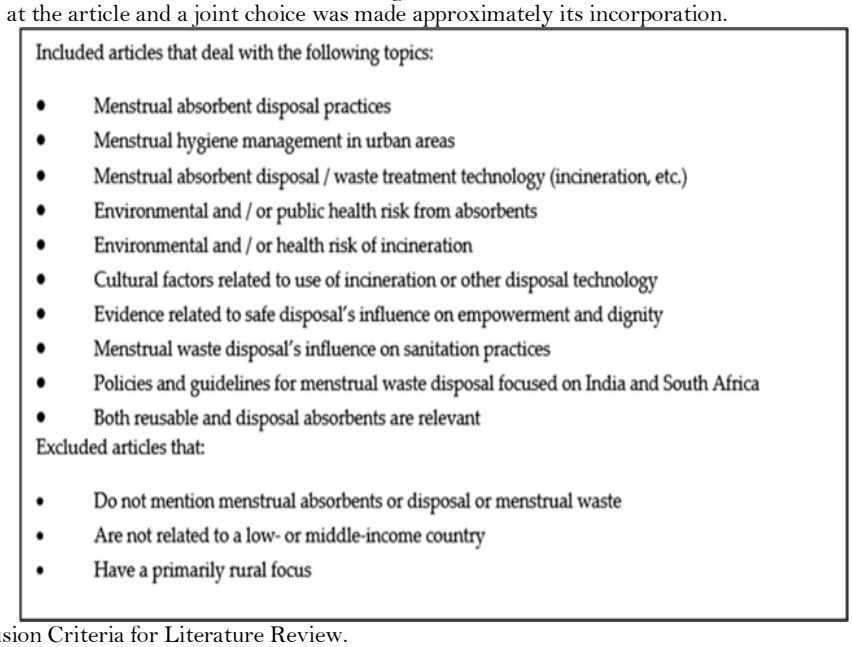


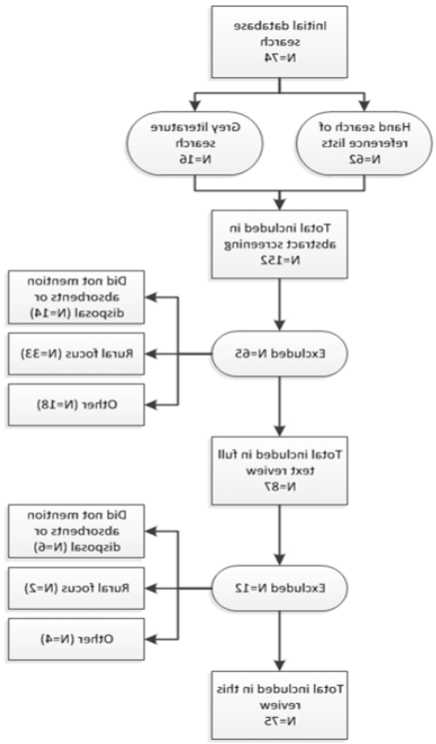
Figure 1. Inclusion/Exclusion Criteria for Literature Review.

Criteria for Inclusion and Exclusion:

The investigation was carried out on an international level, focusing on low- and middle-income countries. During the database search, only full-text articles published in English from the year 2002 and later were taken into account. Correspondence, including letters to the editor, opinion articles, and editorials, was excluded. In the search of grey literature through Google, reports, reviews, and a variety of articles were included, whereas presentations, opinion articles, and letters to the editor were not considered

Search Results:

The process and outcomes of the search are illustrated in Figure 2. The database search yielded 74 articles. Additionally, 16 articles were discovered through grey literature searches, and 62 articles were found by manually reviewing the reference lists of relevant articles, resulting in a cumulative total of 152 articles. Following the screening of abstracts, 65 articles were eliminated from further consideration due to various reasons: 14 articles did not address menstrual absorbents or their disposal, 33 articles primarily focused on rural contexts, and 18 articles were excluded for reasons such as concentrating on product development and safety, addressing disasters or emergencies, conducting acceptance studies or interventions for specific absorbent types, and including training materials. After a thorough review of the full texts, another 12 articles were discarded for similar reasons: 6 articles did not mention menstrual absorbents or disposal, 2 articles had a rural focus, and 4 articles failed to provide new data or insights, did not differentiate between urban and rural data, or described a product without discussing its usage or



associated behaviours. Ultimately, 75 articles were included in the final review.

Figure 2. Literature Search Process Flow.

Types of Absorbents Utilized :

The literature review performed did not reveal a universally recognized classification or typology for menstrual hygiene products; categorization may differ based on type, quality characteristics, or hygiene parameters. For the purposes of this review, we have categorized menstrual hygiene products into three groups: commercial sanitary napkins, which encompass disposable pads and low-cost locally produced reusable pads; traditional absorbents, including cloth, clothing, cotton wool, and toilet paper; and unconventional commercial products, such as tampons and menstrual cups (refer to Table S1).Further details regarding the literature on menstrual absorbents can be found in Table S2, while Figure 3 depicts the distribution of studies by country. The quality of menstrual hygiene products is evaluated based on criteria such as leak protection, absorbency, dryness, comfort, size, thinness, potential for allergies, and biodegradability. Some researchers classify menstrual hygiene products as hygienic (e.g., sanitary pads) or unhygienic (e.g., cloth, tissue paper, and cotton wool) based on their potential to induce infections.

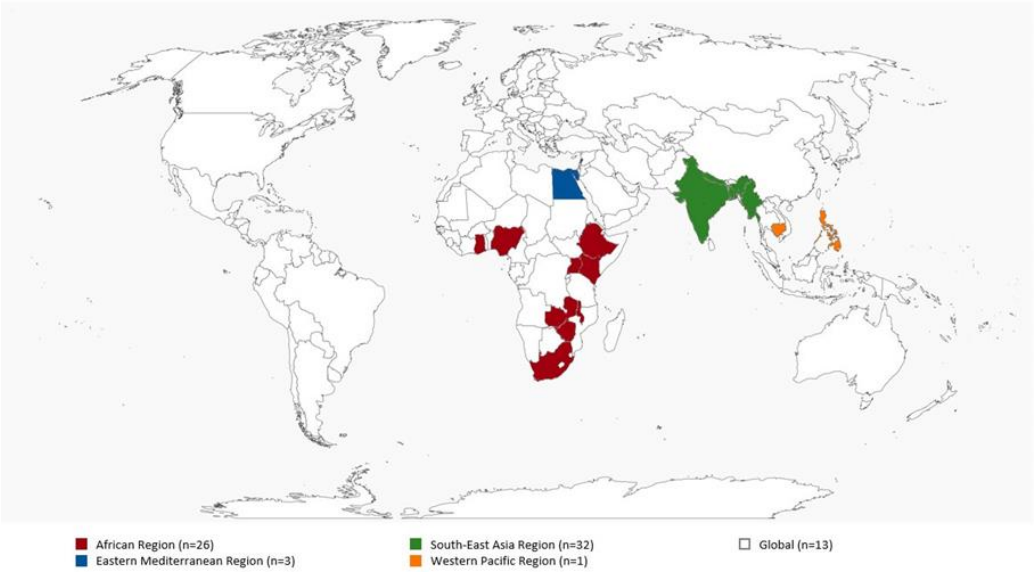


Figure 3. LMICs Country & Regions for Articles Reviewed on Menstrual Absorbents.

Research in city areas of LMIC has shown that sanitary pads, cloth, and tissue paper are the most popular menstrual hygiene products [3,17–20]. Moreover, other items like homemade pads, clothing, underwear, sponges, and cotton wool were also mentioned [3,17–20]. Table S1 outlines the types of menstrual absorbents used in low- and middle-income countries (LMIC). Despite small sample sizes, these studies reveal key trends in absorbent usage. Research from African nations like Ghana [21], Nigeria [15,22,23], and Egypt [24,25] showed that secondary school girls mostly used sanitary pads. In contrast, schoolgirls from Malawi [26] and Ethiopia [13,27] mainly relied on cloth or homemade pads. Asian countries showed a higher usage of cloth or clothing during periods (Table S1). Specifically, Anand et al. [16] examined census data from India and found that cloth was the main menstrual hygiene product for women aged 15–49 years. However, urban India has a higher usage of sanitary pads, and

this trend is likely to grow in the future [7]. Research in Nigeria [14,15], South Africa [28], Uganda [29], and India [7] found very few tampon users. Trials for menstrual cups in Zimbabwe [30] and South Africa [28] received positive feedback, but the acceptance of inserts like tampons and menstrual cups may be affected by cultural views on virginity and fertility [1,7,29,31]. While cloth pads may be traditional, many users aspire to use disposable sanitary pads because they provide protection against leaks and odors while being comfortable and safe, even though they are not always affordable [20,26,29,32]. Although sanitary pads offer comfort and leak-proof protection, their materials (cellulose, superabsorbent polymers, plastic) affect how they can be disposed of [13,17,20,26,31,32].

The cost of pads, social norms, knowledge, and differences in menstrual flow influenced how women and girls use both pads and cloth or other traditional materials [7,14,15,17,19,25,29,33–35]. In a study of secondary school girls in Zagazig City, Egypt, 44% said they used sanitary pads for the first two days of their period when the flow was heavier and switched to cloth for the last few days [25]. In two studies in India, girls preferred to use sanitary pads at school and cloth at home [35,36]. A study in Durban, South Africa indicated that women used cloth when they were younger but shifted to sanitary pads as they got older [37].

In a city resettlement area of New Delhi, the use of sanitary pads was more common among young women compared to older women and with those whose mothers were more educated, as they share more information with their daughters [38]. Among high school girls in Mansoura, Egypt, using sanitary pads was linked to being from a higher social class, living in cities, and having access to media [24]. Some studies found that students in private schools used sanitary pads more than those in public schools [15,39], possibly because private school students may come from richer families [20].

Similar to Kuhlmann and colleagues, this review also highlights that most studies on menstrual hygiene management are focused in Sub-Saharan Africa and South Asia, with fewer studies in other low-income areas of the world [20].

Menstrual Waste Disposal Practices:

Two studies of schoolgirls in Ethiopia reported particularly high disposal rates in latrines at 69.3% [40] and 77.5% [27]. In low-income communities in Bangladesh, some women discarded their used cloth in drains and ditches, while others who felt uncomfortable throwing menstrual cloth in public instead placed them in toilets, seeing that as a more discreet option [41].

Dustbins with lids and liners placed inside the toilet stalls have been successfully tested in shared toilets in a slum in Dhaka, Bangladesh [41]. Women using CABs in the PATH study often asked for such bins [8]. However, in South Africa, women said they do not throw used pads in public dustbins because they are worried that dogs will dig them out, and people will see them and think badly of them [37]. Women who had no way to throw away their pads kept them at home under their bed for days until they found a way to throw them away with other household trash [37]. The type of absorbent could affect how it is disposed of. Nair et al. [35] point out that female students in a South Indian city used both cloth and pads, noting that 76% of girls burned used cloth. While many articles say that girls simply throw away used materials without wrapping, a few studies found that some girls wrapped used pads in paper or plastic before throwing them away [25,33,37].

However, few studies clearly called for disposal facilities to be included in WASH or sanitation facilities in schools [17,24,27,32,42–44]. In Accra, Ghana, Sommer and Ackatia-Armah [18] found that schools had too few toilets, lacked privacy in toilets, and did not have proper disposal facilities for used absorbents. A UNICEF study in the Philippines reported that toilet stalls rarely had bins and that girls were often asked to take their trash home [32]. In Malawi, users of sanitary pads found it "awkward" to dispose of them without bins or incinerators, which made them carry their used pads or cloth with them and keep them under their bed [26]. In Nepal, 28.2% of girls mentioned the lack of disposal facilities in schools as a reason for missing school days, especially on days when they needed to change their absorbents more often [44]. In Ethiopia, 69.3% of schoolgirls said they felt uncomfortable at school during their periods mainly because they lacked a private space to change their absorbents (39.2%), didn't have water for washing (19.1%), and lacked disposal facilities (10%) [40]. Another study in Ethiopia found that 8.5% of girls said they stayed home from school during menstruation due to the lack of disposal facilities for used pads and cloth [27]. While many studies have looked at menstrual health management (MHM) in schools and communal spaces, research on MHM in workplaces is still lacking [10].

Incinerators have been set up in places like homes, [45,46] public toilets, [45] and schools [12,26,47–49]. In a study by Elawati [47] about incinerators in schools in Nepal, 46% of girls said that using the incinerator was easy, while 5% felt uncomfortable using it, and 49% had not yet used the incinerator facilities [47]. Cultural beliefs about how to dispose of and burn menstrual blood might explain why some girls did not throw away used pads in the school incinerator. Girls in one study highlighted several advantages of having an incinerator in school, including ease of changing pads at school (34%) and better overall sanitation facilities (42%), showing a clear preference for incinerators to get rid of menstrual waste rather than other methods [47]. During a workshop, schoolgirls from Malawi pointed out the need for sanitary pads (26%), water (17%), and incinerators (11.4%) to help them manage their periods better [26]. While incinerators are seen as helpful and allow for on-site disposal, there are also reports of broken school incinerators not being used [13], issues with smoke and odor from simple incinerators in schools [12], and concerns raised about the emissions from incinerators [50,51]. Women using a public toilet in Tamil Nadu were hesitant to leave menstrual waste in shared bins because it was unclear when the waste would be burned [45]. Most participants were okay with communal incinerators, but the study in Tamil Nadu found that the incinerators in a communal toilet were not being used due to a lack of signs [45]. In some communities, burning menstrual blood is considered taboo, based on the belief that it can harm a woman's ability to have children [52]. However, findings from Nigeria contradicted cultural norms against burning menstrual blood—over half of the girls interviewed said they burned their pads, believing it was the only way to completely eliminate all traces of menstrual blood [23]. The issue of privacy has often been ignored in the design and placement of incinerators [17]. To ensure privacy, incinerators should have a chute that goes directly from the toilet room to the incinerator; this design has been tested in Tamil Nadu [49].The need for privacy might also explain why some women throw pads in toilets [40,41]

Disposal Practices:

The availability of disposable sanitary pads has significantly increased, highlighting the necessity for proper disposal facilities. Various initiatives focused Studies indicate that health education in schools has improved access to and use of disposable sanitary pads for menstrual hygiene management. These initiatives have also encouraged girls to change their pads more frequently, recommending a change of 2 to 3 times daily, and advised that used reusable cloths should be disposed of after several months of use. Evaluations of two such initiatives revealed that a greater number of girls discarded their reusable cloth absorbents after 3 to 4 months of use, rather than waiting for a year before disposal. Furthermore, these studies indicated that following the interventions, more girls reported changing their cloth and disposable sanitary products more often, with some changing their

disposable pads 3 to 4 times daily post-intervention. Several studies have pointed out that inadequate water, sanitation, and hygiene infrastructure, including disposal options, hinder girls' ability to manage their menstruation in schools. However, few studies have explicitly acknowledged the necessity of incorporating disposal facilities into WASH or sanitation provisions in educational institutions. Sommer and Ackatia-Armah in Accra, Ghana, pointed out the shortcomings of educational institutions in toilet facilities, privacy, and disposal methods for used absorbents. They urged for better WASH facilities in schools to help girls manage their menstruation with dignity and hygiene.

The Impact of Waste Disposal Methods on the Health and Wellbeing of Women and Girls, as well as the Environment:

Improper menstrual hygiene and product use can increase women's health risks, including infections in the urinary and reproductive areas. However, scientific proof of this connection is limited and does not give clear evidence linking poor (MHM) to negative health effects [3,5,16,55]. An overall pooled Odds Ratio (OR) of 1.07 was calculated, considering only high-quality studies that included laboratory-confirmed cases; however, this result was not statistically significant. Three more studies released after Sumpter et al. (2013) [3] are included here. A case-control study by Das et al. [5] in Odisha, India discovered that women who used reusable pads were 2.3 times more likely to show symptoms of urinary infections and 2.8 times more likely to be diagnosed (through lab tests) with at least one infection (bacterial vaginosis (BV) or urinary tract infection (UTI)) than women who used disposable pads. After adjusting The study found that higher income and adequate space for menstruation reduced the risk of bacterial vaginosis (BV). Lower income, poor water access, and lack of a toilet in the home were associated (though not significantly) with testing positive for BV (Adjusted Odds Ratio = 0.5) and BV/UTI (Adjusted Odds Ratio = 0.6) [5]. A cross-sectional study in India by Balamurugan and Bendigeri [55] showed similar findings: 38% of women who used cloths during their periods had a lab-confirmed RTI like BV compared to 15% of women using sanitary pads. A study by Anand et al. [16] in India found that women who used unclean methods during menstruation, including anything other than sanitary pads or locally made pads, were 1.04 times more likely to report any symptom of RTI and 1.3 times more likely to report unusual vaginal discharge than those using clean methods, such as sanitary pads. In rural India, there were significant connections between the type of menstrual absorbent used and school absenteeism among adolescent girls during their periods (OR 1.43, 95% CI: 1.04–1.97; $p < 0.001$) due to a lack of proper disposal facilities at school [56].

Several studies in this review talked about the relationship between menstrual waste and sanitation systems, mentioning that throwing away used menstrual products in toilets is difficult for both onsite sanitation setups and sewage systems, especially in cities [8,12,17]. Two key factors of menstrual products affect their disposal and have effects on the sanitation systems: the material type and the usage type [8,37]. Sewage systems are made to carry water and waste; tossing in solid waste like pads and cloth can clog pipes, create problems for wastewater plants, and lead to high costs and issues for workers and dignity. Onsite facilities like pit latrines are built to help break down organic waste. Throwing away non-biodegradable pads and synthetic cloth goes against this process, disrupting the breakdown of waste in the leach pit [12]. Furthermore, when used products are wrapped in plastic before being thrown away, it can slow down or prevent the breakdown of biodegradable parts of the pad [12]. In Dar es Salaam, Tanzania, there are about 150 sewer blockages each month costing the Dar es Salaam Water and Sewerage Corporation US$25,000, with menstrual waste being a common cause [12,17]. Likewise, in Eastern Kenya, the Mavoko Water and Sewerage Company reported that menstrual pads make up about 40 percent of the waste removed from blocked sewers [12,17]. The eThekwini Water and Sanitation utility in Durban, South Africa, frequently faces blockages of suction hoses used for pit emptying mainly due to menstrual products in the latrines [12,17].

To comply with these rules, manufacturers have begun supplying plastic wrappers for disposal, but this has led to a greater strain on the environment and waste management systems due to the added menstrual waste wrapping [50]. However, the absence of standards for small incinerators, lack of monitoring or enforcement of emission rules, and possible risks from poor emission control or ineffective thermal treatment raise concerns [51,57].

For instance, some types of sanitary pads often have chlorine bleach (to look white), which releases dioxins, a substance that can cause cancer and affect development and reproduction [58], For medical waste, the WHO suggests that small incinerators should reach at least 850 °C according to EU and South African standards or 1000 °C based on Indian and Thai standards [59]. The European Waste Incineration Directive advises that incinerators should hit at least 850 °C for at least two seconds to ensure complete breakdown of harmful substances [60].

Policy Considerations:

A policy analysis for school WASH and MHM in India observed that MHM is included in school guidelines, but often lacks details on how to implement it or consider local or cultural differences [61].

Providing guidance on performance criteria and quality standards, the use of incinerators on-site, and greater awareness of cultural views, stigma, and taboos surrounding menstrual disposal and the use of on-site incinerators could help promote better usage[12,62].

Discussion:

Managing menstrual cleanliness in connection to water and sanitation is associated to and underpins the Economic Improvement Objectives (SDGs).

Availability and utilize of menstrual cleanliness items: The assortment of menstrual cleanliness items, both single-use and reusable, permits clients to form choices based on their physical needs, circumstance, and social and financial variables Expendable cushions come in numerous sorts, a few with uncommon highlights, and are prevalent in numerous places for their comfort and unwavering quality. This wide run of expendable cushions makes MHM a complex issue since of the distinctive sorts of menstrual squander created.

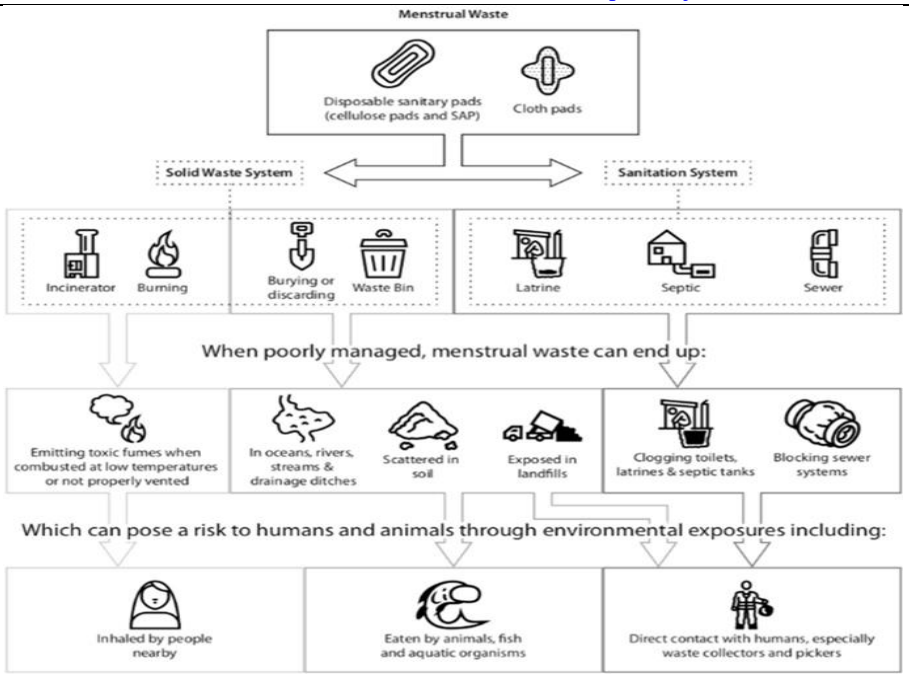


Figure 4. Waste disposal pathways and potential environmental and health hazards.

Effects of Disposal on Health and the Environment:

Studies examining the relationship between (MHM) and women's health mainly depend on self-reported results [16] that focus on the use of absorbents rather than disposal methods. Other stronger clinical studies are often one-time surveys and also emphasize absorbent use [5], and therefore cannot prove a direct connection between menstrual hygiene practices, especially product use, and health effects. Open wellbeing data on the wellbeing dangers for sanitation labourers and natural risks connected to menstrual squander and its germs isn't accessible within the examined writing. In spite of these holes within the writing, the survey clues that it isn't as it were the sort of retentive utilized that impacts ladies cleanliness and wellbeing amid their period, but moreover how they are utilized, and variables like having a private space, water, and cleanser for menstrual administration. Utilizing lab-verified cases could be a noteworthy advancement over self-reported indications, and ought to incorporate considers that offer assistance construct the prove related to item utilize, how long they are utilized, and legitimate administration hones.

Waste from single-use sanitary pads can be handled and waste amounts lowered by using incinerators. Incineration needs careful control of the equipment to make sure everything burns completely, kills germs, operates at safe temperatures, is installed properly, and has controlled emissions; otherwise, it can pose risks to people and the environment. This method is used in many places to handle menstrual waste in schools and public areas, but it has its own environmental risks and cultural issues.

Decentralized standalone incinerators available in the market also offer limited information on the Different pads suitable for incineration, including required temperatures, airflow for efficiency, and expected pollution control measures and levels. fits well with decentralized waste management systems and may be an appealing option for managing waste, especially in public restroom areas in communities where trash collection services are poor, as well as in schools and workplaces. However, basic incineration devices may burn at low temperatures, creating harmful emissions and may not effectively kill germs. Additionally, incineration devices at the location may be poorly set up to direct air emissions outside the restroom.

Recommendations

The disposal of used absorbents cannot be understood or done without considering user-centered design thinking. This means taking into account social and cultural beliefs about menstruation, the availability and quality of products, and the current sanitation systems. In institutions and communities, sanitation systems must adapt to include plans for disposing of menstrual waste.

Inquire about to Educate Approach, Hone, and Innovation Development:

- Public and natural wellbeing inquire about appearing dangers of germs spreading from squander that's arranged of transparently or dealt with by squander or sanitation labourers.
- Examination of materials and quality of menstrual products (disposable, compostable, and reusable) and health effects of additives and hygiene practices.
- Research to assess the health and environmental impacts of waste management methods
- More research and development on heat treatment methods and technologies, looking at types of incinerators used, how they are installed and maintained, their operating temperatures, and the emissions they release.
- Country-specific inquire about on utilizing incinerators for menstrual squander transfer in open toilets and organization settings.
- Approach inquire about on how governments handle menstrual squander administration, their obtaining forms, and financing for menstrual squander arrangements.

Comprehensive MHM Programs to Address Item Utilize and Menstrual Squander Transfer Hones in Open Settings:

- MHM programs should focus on informing users about product choices as well as information on and solutions for safely managing menstrual waste in communities, institutions, and public areas.

- Ensure proper operation and maintenance of waste management options, especially incinerators, in different settings, with thorough Training and guidance for operators and institutions are essential to guarantee the efficient operation of the technologies.
- Provide clear instructions and operational guidance on managing menstrual waste from the moment users segregate and dispose of it, through to collection, transport, and final treatment and disposal.
- Actualize investigate and checking markers for mediations that incorporate consideration to menstrual squander administration hones and arrangements.
- Understand and consider the specific menstrual hygiene needs of girls and women with disabilities or those in vulnerable situations, including their challenges with disposal, within the MHM programs and waste management strategies.
- The WASH and MHM sectors should create global and national platforms for sharing knowledge and learning about menstrual hygiene products and Waste management solutions that engage industry, government, and non-government stakeholders.
- 7.3. Arrangement Promotion for Secure and Legitimate Taking care of Catamenial Squander
- Menstrual waste handling should remain recognized as a key concern for all governmental agencies that deal with MHM in different, with suggestions on how these departments can work together to support complete programming on MHM.
- The government ought to make and apply execution guidelines and rules for menstrual cleanliness items and squander taking care of arrangements and advances, and actualize customary checks to guarantee quality and compliance with these measures.
- Subsidizing ought to be enough apportioned through government approaches and programs for all parts of MHM, counting menstrual cleanliness items and squander dealing with arrangements.
- Worldwide rule records ought to pay more consideration to MHM and incorporate squander taking care of.
- Global and national forums for promoting sanitation and MHM should focus on menstrual waste management, especially through research, technology development, and putting interventions into action.

Conclusions:

The disposal of used absorbents cannot be understood and managed alone. It requires user-focused design thinking to consider social and cultural beliefs about menstruation, the availability and quality of products, and current sanitation systems.

This should provide suitable, discreet, and effective solutions that reduce negative health effects on girls, women, and sanitation workers, as well as lessen broader environmental impacts. Thermal treatment is one way to manage waste and treat germs, and with careful use, it may be socially accepted in many situations.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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