

Research Article

Towards Sustainable Menstrual Management in India: Practices, Products, and Perceptions

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In India, stigmatization and inappropriate knowledge of menstrual hygiene practices and waste handling exist. Though women's mindset shifts from traditional to new approaches, there is a lack of appropriate understanding. The present work reviews the literature on menstrual health and further tries to understand the perception of menstruating Indian women on different issues, such as their preference for a menstrual item, their awareness, and their cultural and religious beliefs. For this research, 75 women (urban = 40 and rural = 35) were contacted with a questionnaire. The list asked about their preferences and included twelve categories of menstrual items. Various demographic and socio-economic indicators were involved in the study. Comfortability is the most deciding factor in their product choice in both urban (97.5%) and rural (71%). Family income and awareness impact the choice of product. Awareness of different products and their environmental impacts was comparatively higher in urban areas than in rural areas. However, there is less acceptance. Unlike rural women, very few urban females face social restrictions, taboos, or discrimination during menstruation. In comparison, 100% of rural women agree not to visit auspicious and religious places during their periods.

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Highlights

The present work:

- Identifies stigmatization and knowledge gaps in menstrual hygiene in India.
- Highlights differences in product awareness and practices between urban and rural women.
- Reveals comfort as the primary factor in product choice for urban (97.5%) and rural (71%) women.

- Shows the influence of family income and awareness on product preferences.
- Discusses the prevalence of cultural restrictions faced by rural women during menstruation.

Introduction

Women menstruate for 4–7 days per month during their reproductive age. It is a simple physiological cycle. However, menstruation is not seen as a normal biological process because it is embedded with symbolism and stigma. Different perceptions, taboos, and myths regarding the process and menstrual blood persist globally, which govern the menstrual practices (usage and disposal) of users accordingly. Additionally, socio-cultural secrecy suppresses its importance and makes this issue vulnerable to related infrastructural development and a holistic policy framework^[1]. Being associated with taboo and stigma, menstrual hygiene issues are not discussed openly. This leads to a lack of awareness and knowledge, leading to misinformation and distraction from the appropriate practices, which pose several social issues and health risks^[2]. The problems related to poor menstrual hygiene practices are more prominent in lower-income and rural families. Consequently, they face various health issues where urogenital infections are prevalent, which affect their economy and families^[3]. Unsuitable waste disposal without proper treatment leads to poor menstrual waste management (MWM). MWM is associated with menstrual hygiene management (MHM) and is an important aspect for women, society, and the ecosystem. Inappropriate menstrual management (IM) and related issues are very common worldwide^[4]. The situation is worse in developing countries. Women from Sub-Saharan Africa and South Asia struggle for privacy, safe menstrual products, cleaning agents, and disposal of sanitary waste^{[5][6]}. Most women from rural areas of developing countries like India prefer to use either reusable, unhygienic rags or clothes as absorbents^[7]. As per the May 2019 WaterAid Report on Menstrual Health, access to a clean absorbent and disposal of used products are basic necessities for a menstruating woman. Several awareness programs, campaigns, and policies are also encouraged to tackle menstruation-related concerns. Despite menstrual hygiene management being associated with the socioeconomic status of a family, initiatives and a change in mindset have accelerated the one-time use and discard of sanitary napkins, tampons, and menstrual cups both in urban and rural areas in the last few years^[8].

A comparison is given in Figure 2; there has been a huge shift in rural women from cloth to other means of menstrual practice in the last five years. However, acceptance of usage and disposal in a suitable manner is still a matter of concern due to inappropriate understanding and fallacies. The secrecy of the topic creates a web of misconceptions that lead to poor menstrual management^{[9][7]}. It is essential to evaluate the facts,

which have been assumed to be taboo but might have some scientific approach, or vice versa. All kinds of taboos and misconceptions formulate a different mindset and hinder the use, disposal, and treatment of such products. Additionally, there is a need for an extra thrust of awareness and knowledge programs in rural areas, both for the benefits of appropriate menstrual materials and waste disposal, as these topics are untouched and unsaid in most of these areas. The main source of the information is just verbal communication through elderly ladies in the family and friends, without any scientific logic or understanding^[3]. Discarded sanitary waste handling and management are other aspects that need attention in rural areas. The secrecy and taboo associated with this topic restrict women's ability to act considerably. Billions of metric tons of plastic-loaded waste are generated annually (Figure 1), which is nearly 11,300 metric tons and mostly disposed of untreated^[10]. So, a holistic policy framework is needed to manage menstruation safely for society and the environment. The framework necessarily considers socio-cultural-economic aspects, merging points of view and responsibilities of all stakeholders.

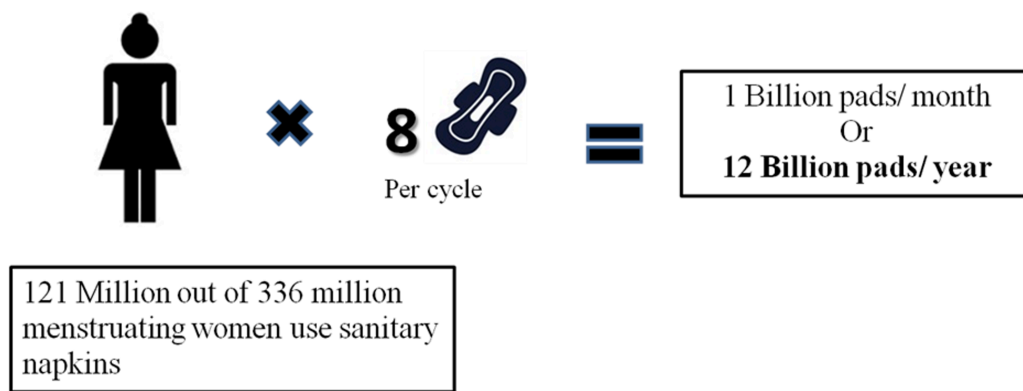


Figure 1. Status of use of sanitary napkins in India per year (Source: WaterAid India 2018)

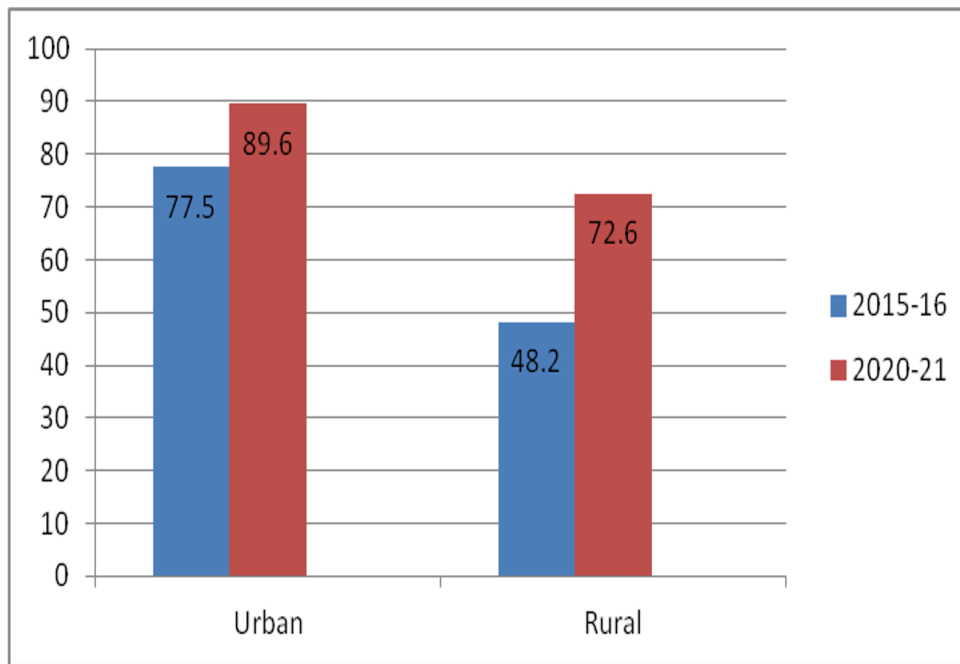


Figure 2. A comparative study of the usage of sanitary napkins and tampons (%) in the urban and rural populations of India in 2015-16 and 2020-21, respectively (Source: <http://rchiips.org/nfhs/NFHS>)^[11].

Literature Survey

Menstrual Practices in Rural Areas

Menstruation, being a taboo and stigmatizing area, is ignored and not discussed openly, neglecting the science and necessity of the process. Above the myths and misconceptions, menstruation is a biological process that is commonly unknown to women, particularly their offspring or all reproductive females^[12]. During this cycle, females require good hygienic practices, such as the cleanliness of their bodies and sanitary products, and the safe disposal of waste. Menstrual hygiene management (MHM) practices comprise the selection of an absorbent or blood collector, the frequency of after-use product changes whenever needed, cleaning and drying measures, privacy, and options for safe disposal^{[13][14]}. At the same time, the struggle to project the importance of accurate management and supply-demand chains exists in most rural areas^[12].

Types of Products Used in Menstruation

Standard menstrual products are of different types, like cloth (where absorbents are made of cotton), hybrid pads (with a non-cloth layer), synthetic microfibre, and PUL (polyurethane laminate). Alternatively, all sanitary napkins primarily consist of cellulose-based absorbent with a plastic barrier, and a few types have a cellulose-based plastic barrier along with SAP (super absorbent polymer). On the contrary, fully compostable sanitary pads are also available on the market. Nonwoven fabrics, paper pulp, artificial cellulose, rayon, and sometimes a combination of all these materials are common raw materials^[15]. Reusable pads have a comparatively smaller amount of chemical and plastic matter and are more appropriate for safe disposal, as well as creating fewer loads on the environment. Similarly, menstrual cups (main component: silicon) and tampons (main component: cellulose) can be used numerous times, last for 1–10 years, and are grouped under the "reusable" category^[16]. Though it does not completely eradicate the issues related to menstrual waste disposal, improperly sanitized, reusable sanitary napkins are unhygienic and unhealthy. On the other hand, biodegradable napkins contain negligible chemicals and plastic content. For example, napkins are made of water hyacinth and natural fibers such as banana and bamboo fibre, and sea sponges are used as sanitary materials. Additionally, a few entrepreneurs, for instance, of Sathi pads, made by Aakar Innovations Ltd., a manufacturer of low-cost and compostable sanitary napkins called Anandi pads, claim, "These pads use virgin wood pulp sheets with no super absorbent polymer (SAP); no risk of carcinogenic harmful effects or lifelong complications."^{[7][17]}

Awareness of sanitary products has been initiated from time to time by different government and non-government sectors globally^[13]. A campaign initiated by Procter & Gamble and UNICEF in low-income settings, "Always! Keeping Girls in School," supported girls with free pads^[18]. As per the recent menstrual hygiene scheme 2016, implemented by the Ministry of Health and Family Welfare, India, adolescent girls in rural areas should receive a subsidized rate of sanitary pads.



Figure 3. Types of Sanitary Products (1) Hyacinth pads; (2) reusable tampons; (3) commercial sanitary pads; (4) reusable cloth pads; (5) menstrual cups; (6) bamboo charcoal pads; (7) menstrual pants; (8) menstrual discs; (9) crocheted and knitted sanitary pads; (10) sea sponges used as sanitary material; (11) pads made from wool; (12) pads made from banana fibre.

A survey says 56.6% of females in the age group between 15 and 24 use hygienic menstrual absorbents. Among these, 75.5% belong to urban areas, whereas 48.2% belong to rural areas (India, 2015-16). The kinds of menstrual absorbents used are commercial pads (45%), cloth (50%), cloth pads (13%), cotton or homemade disposables (4%), and a few only use underwear (6%)^[5].

A study says menstrual cups and tampons are very rarely accepted in rural areas due to myths, stigma, and the cost attached to these products^[7]. However, there is a huge gap in understanding menstrual hygiene

practices. Understanding the grim situation, several companies started working on skin and environment-friendly products. A few such companies make Vivanion pads, which are fully degradable and also contain an anion band to reduce bacterial growth and smell. Another organic cotton-based sanitary napkin company is Purganics. Heyday and Carmesi napkins not only produce sanitary pads using bamboo fibre and corn starch but also make biodegradable covers to dispose of. Encouragement of new sustainable and frugal innovations in the field of the treatment of disposed sanitary waste is needed. For instance, Saneco, an eco-friendly product of PadCare Labs, treats used pads in a hygienic, odorless, and smokeless way^[19]. While there are other new firms also, they not only focus on all feminine-related eco-friendly products but also encourage sustainable ways to run their companies, for example, Everteen.^[20]

Sanitary Waste Disposal

"Women's health rights" reports say that around 36 million women in India use sanitary napkins, i.e., 12% of 300 million women use menstrual products. "A woman uses around 10,000 pads, on average, in around 30–40 years; this sums up to 58,500 million pieces per year," or over 200 metric tons every day^[21]. The Menstrual Health Alliance estimates that 9,004 tons of sanitary waste are produced annually in India^[22].

This figure can give an idea of the disaster when this percentage leads to 100% usage. Furthermore, the latest featured sanitary products, i.e., deodorized or non-deodorized, are common on the market. The organochlorines in these products disturb the microbiology and prevent the sanitary waste from decomposing^[2]. Nevertheless, sanitary napkins are convenient to use but have several adverse effects. 90% of sanitary pads are made up of super absorbent polymer (SAP), plastic, and glue, which are harmful to the skin and last 500–800 years in the environment after they get discarded and enter the food chain. Though there is no specific category for such waste, it falls under the dry solid waste category, which makes its management more challenging^[23]. Additionally, the increased consumption of unsustainable sanitary pads results in an enormous waste generation. Though modern menstrual practices are still less in rural areas than in urban, they constitute 68.84% (As per 2011 Census) of the Indian population and face a very dangerous situation owing to the absence of appropriate solid-liquid waste management.

Women in rural areas dump menstrual waste along with their other domestic waste into nearby landfills, canals, rivers, etc., throw it in toilets, or burn it openly. Current studies say that sanitary waste is a major problem because it does not get any special attention besides having biological residues and fluids. Without segregation, the waste gets mixed with other solid waste and disposed of without any treatment.

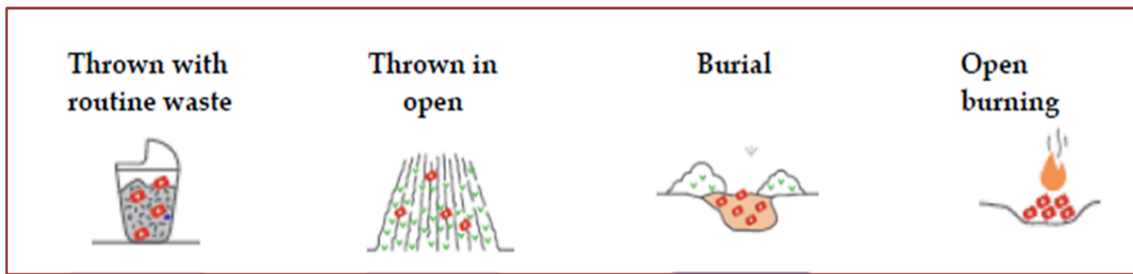


Figure 4. Current status of menstrual waste disposal^[24].

As per the Swachh Bharat Mission's (SBM) Menstrual Waste Disposal Guidelines for 2021, incinerators are an essential tool for managing sanitary waste. Additionally, as per the operational guidelines of SBM (G) Phase II, 2020–2025, small-scale incinerators have been approved under menstrual waste management (incinerators CPCB/SPCB) at the block level, under the 15 Finance Commission-tied funds on sanitation.

Besides all the proposals, the actual status is grimmer in rural parts of India, where the realistic side contradicts the approved recommendations. There are no mandatory rules for waste disposal. Therefore, to examine the character of rural menstrual practices, it becomes necessary to understand the process of product and waste handling and extract the loops where it fails to consider the problem of sanitary waste disposal^[25].

Factors That Affect Menstrual Practices

Experiences of comfortability, rashes, odor, cleanliness, water access, spotting shame, and cleaning and disposal of waste during menstruation shape confidence, anxiety, and distress like mental blockage, as well as social, work, and school engagements^[26]. Menstrual-related issues are, therefore, severe as they govern the psychology of menstruating women^[3]. These issues are more prevalent in lower-income families, and thus they relate to poor menstrual management.^[3] The traditional process of disposing of sanitary products using bleach decreases immunity, causing reproductive problems and cancer through its by-product dioxin^[27].

Hence, how women from rural areas practice menstruation and manage their waste plays an important role in society and the ecosystem.^[3] Menstrual hygiene management encompasses all the given aspects (Figure 5).



Figure 5. Essential aspects of menstrual hygiene practices

Socio-cultural Issues

Taboo, myth, superstition, and secrecy on menstrual-related issues—are substantial hindrances that create an obstacle to its dignified and appropriate management in various ways in different countries. Taboos and myths are two different but important aspects that challenge menstrual health and waste management practices, as these reasons dictate human behavior. Emotional pressure, fear of discussing the issues, shyness to open up, and obliged conventional traditions force them to obligate the method in the same manner from generation to generation without knowing much about the facts and details. Several women in developed countries such as the UK and the US consider that using tampons could make a lady impure by rupturing her hymen. Moreover, females resist bathing during that period^[19]. In China, menstruating females, called "*dayima*,"the great aunt", the old friend" (laopengyou) cannot participate in several rituals, such as worship and funerals. They are prohibited from washing their heads and subject to many other

restrictions, such as in eating habits, etc.^[28]. Many women link sin and curses with disposal practices; they believe that anatomical waste (like menstrual blood) should not be thrown in the waste bin as it is, so they flush that out or burn that waste^[19]. In developing countries such as India, girls observe restrictions while visiting places of worship, touching religious items, or praying. They found food restrictions: not touching special food or people, they were supposed to sit and sleep in separate households, etc.^[3].

Socio-economic Issues

In addition to the socio-cultural mindset, affordability can also hinder the process of menstrual management. Poor economic status in low-middle-income countries limits the supply of sanitary products and hygienic processes needed for good menstrual practices^[5]. According to a study, 57% of cloth users are willing to switch to sanitary pads, whereas only 36% of the total sample of the low-income population are^[18]. Menstrual hygiene management has monetary promises, whether the cost of sanitary products or related hygiene maintenance means.

Additionally, the struggle for low-cost pads subsequently compromises the product's quality, raising concern for women's health^[18]. Good-quality, low-rate pads and accessibility are the foremost requirements for rural, low-income women to switch from cloth to pads. This transition needs a systematic approach, much more than awareness and knowledge alone.

Education and Awareness

Inadequate knowledge regarding the menstrual process and related concerns are prevalent in the rural population. A mother's attitude, education, and knowledge play a significant role in building understanding in young girls. As in most rural schools where vernacular language is used to teach, teachers and students hesitate to talk about these issues^[29].

Menarche and Awareness

The first experiences during menarche are very critical for women. Menarche is a crucial stage when females enter their reproductive age and get their first period^[30]. Lack of appropriate knowledge and awareness towards the practice and disposal leads to misconceptions in young girls; this lasts throughout their lives and carries forward to the next generation^[31]. According to a study, more than 50% of girls are not aware of menstruation before menarche.

Commonly, adolescent girls struggle with dysmenorrhoea and premenstrual syndrome (PMS), both menstrual issues^[32]. Misinformation or a lack of information regarding menstruation for pre-menarche girls is also a generic problem.^[33] Adolescent age is a fragile stage, particularly during menarche. So, misguidance and unawareness both equally affect the menstrual health and waste management practices of a girl. So there is a need to explore the differences in behavior between girls and women who have achieved menarche without any information and those who had awareness and knowledge of the same before puberty.

Gender Inequality

Differences in girls' requirements have always been neglected. Their preferences remain the least important for society, family, and even females themselves. This inequality is very much reflected in menstruation-related discourse. Menstrual products have been the least prioritized for rural families. The attitude of men towards different menstrual-related issues has been ignorant and insensitive. A study says these insensitivities of male teachers and boy classmates lead to the absenteeism of young girls during their period^[29].

Infrastructure Lack of Toilets / Lack of Accessibility

Poor sanitation structures are one of the major concerns in rural areas in India and other developing countries. Almost 23 billion women worldwide have no basic sanitation facilities for menstruation^[34]. It not only directly affects the health and mishandling of waste but also has implications for other social issues. The lack of infrastructural facilities, such as toilets in schools, discourages girls from missing school during their period. It mainly results in the discontinuity of their schooling and, consequently, early marriage^[35].

Business and Media

A systematic marketing strategy impacts the consumers of any product. One of the tools in the marketing mix is the "4 Ps": product, price, publicity, and place. Marketing strategies govern the route a product takes from the market to customers. However, the most crucial factor for low-income women is the price^[36] and how the product is displayed. The marketing of sanitary napkins made the product an aspiration for young girls^[37]. Social media, videos, video blogs, and influencers influence adolescents most.

Additionally, with subsidized rate pad schemes, most of the rural female population shifted to using and throwing away sanitary products despite their physical, economic, and environmental consequences.

Policy Frameworks Related to Different Aspects of Menstruation

Menstrual hygiene and waste management need special attention for the well-being of women. Concerning practices, regulations, policies, and initiatives play an important role in this field. Some policies encompass several aspects of equal importance in this domain. Product standards, accessibility, and availability of free sanitary pads for distribution in rural schools, menstrual leave policies, product taxation (VAT-free or reduced price), awareness-building, and capacity-building on crimes against women related to sanitation issues are major concerns. Besides having such policies, the grass-roots situation is different. The rules for the disposal of sanitary waste recommended by the CPCB and Swachh Bharat Mission Guidelines are partially implemented, and the actual scenario is different from the prescribed ones. This domain must delineate the missing link between the proposed policies and their execution.

In 1996, former President Nelson Mandela stated, "As long as women are bound by poverty and as long as they are looked down upon, human rights will lack substance." speech delivered on Women's Day (1996) (www.sahistorv.oro.za/archives/speech).

As per an article published in "The Statesman" titled "Managing India's Sanitary Waste" on April 10, 2020, *"India's indifference in dealing with sanitary waste is evident by the fact that we don't have any reliable numbers to look at while deciding policy."*^[21]

Not only in India, but there is a lack of policies in this sector throughout developing countries. A report in Down to Earth, April 2019 by Naigaga says, *"The policies and guidelines for menstrual hygiene management, products, and waste disposal are quite limited in the entire sub-Saharan African region."* *"There should be documentation of laws to facilitate affordability and accessibility to sanitary pads."* ^[6].

Lack of strict rules, funds, and policies on free or subsidized menstrual products provokes unwanted deeds. As per a report on rural Kenya, women used to engage in the sex business for pads so that they could go to school on those days^[38].

Menstruation is not a choice for a woman, and it gets managed under any circumstances. Policymakers and other associated entities need to consider this necessity.

Understanding the Perception and Awareness of Indian Women Towards Sustainable Menstrual Practices

A survey was conducted to determine Indian women's perspectives on various aspects of menstrual hygiene awareness and practices. A cross-sectional analysis of urban and rural settings was conducted. Using Google Forms, two identical survey questionnaires in Hindi and English were created. There were 15 questions on the survey forms in total. The English version of the form was distributed to women in urban areas, while the Hindi version was sent to women in rural areas. Each category included a total of 50 participants. The survey was completed by 40 urban women (a response rate of 80%) and 36 rural women (a response rate of 72%). A questionnaire-based survey was designed to study and compare menstrual practices in rural and urban settings. The questions were meant to understand the status of awareness, usage of menstrual management products, waste disposal, and knowledge of the environmental impacts. Seventy-five interactions with women of different menstruating age groups were selected to understand their perspectives.

Rural Settings

Thirty-five women of menstruating age have been randomly selected from the rural setups. More than 90% of the samples are from a lower income group than INR 25000 per month. Most were homemakers, and the remaining 20% and 24.5% were students or working in unorganized sectors, respectively. The education level was low; more than 90% of females had not completed higher secondary exams. Most females (85.7%) use cotton clothes as sanitary products from rural areas. At the same time, 62.9% of females use commercially available sanitary pads. Both options were prevailing, but pads made of wool also have 34.3% popularity in rural settings compared to other options available in the market. Comfort (71.4%) and availability (31.4%) were the governing factors in their choice. The study says cultural pressure, suggestions from family, or cost influence fewer women in rural areas. 77% of rural women face restrictions and discrimination during their period by society.

Urban Settings

In urban settings, 40 samples of menstruating age were randomly selected, where 90% of women were graduates with higher qualifications, and 60% worked in the organized sector. 17.5% were students, and 17.5% were homemakers; the rest of the group worked in unorganized sectors. Most of the sample population's family income was above 25000 rupees per month, and 7% of women had incomes below

25000 rupees per month. 95% of the population uses sanitary pads for menstrual management, and 10% of women use tampons and menstrual cups. Comfort is the most influential factor in urban settings. Half of the population segregates their sanitary waste before disposing of it in bins.

What sanitary item do you most commonly use?	Urban (U)	Rural (R)
Old rags/clothes	0	85.7
Cotton	0	2.9
Sanitary Pads	95	62.9
Tampons	5	0
Menstrual Cups	8.6	0
Reusable sanitary pads	2.5	0
What are the factors affecting your sanitary item choice?	U	R
Price	20	11.4
Cultural Acceptance	5	22.9
Comfort-ability	97.5	71.4
Availability	17.5	31.4
Suggestion by Family & Peers	5	14.3
Which of the following sanitary items are you aware of?	U	R
(1) Hyacinth pads	5	0
(2) reusable tampons	65	5.7
(3) commercial sanitary pads	97.5	45.7
(4) reusable cloth pads	75	51.4
(5) menstrual cups	87.5	2.9
(6) bamboo charcoal pads	15	0
(7) menstrual pants	50	0
(8) menstrual discs	10	0
(9) crochet and knit sanitary pads	10	0
(10) sea sponges used as sanitary material	2.5	2.9
(11) pads made from wool	15	34.3
(12) pads made from banana fibre	12.5	0

(13) hemp	2.5	0
How do you dispose of the used sanitary items?	U	R
Always throw it in the open	0	14.3
Sometimes, throw in open	2.5	5.7
Flush it into the toilet	0	0
Burn it	2.5	2.9
Dump it with other house waste	35	22.9
Throw in nearby water bodies	0	8.6
Wash it and reuse it again	2.5	57.1
Segregate at the time of disposal as dry waste	50	37.1
Use local incinerator	5	0
Dump it a few months after reusing	0	8.6
other (cover with paper/polythene)	7.5	0
Do you face any social restrictions, taboos, or discrimination during the menstrual period?	U	R
Yes	27.5	77.1
No	62.5	14.3
May be	10	8.6
Do you visit places of worship or participate in holy events during your periods?	U	R
No, I don't do so	52.5	100
Yes, I do so	17.5	0
Sometimes, I do so	30	0

Table 1. Responses in percentage

4. Discussion

Comfortability is the most deciding factor in their product choice in both urban (97.5%) and rural (71%). Family Income and awareness indirectly impact the choice of product. Awareness of different products and

their environmental impacts was comparatively higher in urban areas than in rural areas. However, there is less acceptance. Unlike rural women, very few urban females face social restrictions, taboos, or discrimination during menstruation. In comparison, 100% of rural women agree not to worship God or visit auspicious places these days. Though the usage of sanitary napkins is increasing among rural adolescent girls, poor management and insufficient knowledge regarding the use and disposal of these products do exist. This increases the risk to the health of women and the environment. Understanding the sources and factors that govern their perspective is required. This will guide them in framing an appropriate platform or policy to make them understand the sustainable and proper usage of menstrual products.

5. Conclusion

Menstrual-related issues have reached a certain pace globally. Various affirmative actions have been initiated related to products, hygiene, health, disposal, and treatment. Menstruation-related issues directly govern the mental and physical health of a woman. Additionally, appropriate management of menstrual practices covers the potential impact on society and the environment. Several policies and programs have also been encouraged to promote awareness regarding menstrual hygiene and waste management. However, there is a vast gap in their incorporation. As the shift in users' choice of product increases, sensibility and awareness regarding this become more vital. This study would help to understand the perception of women while making a choice for sanitary items and other factors for their experiences during menstruation. The research insights will help to implement a sustainable and feasible approach that considers communities of all categories and converges for the betterment of women, society, and the environment.

Statements and Declarations

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Contributions

N.B. conceptualized the study, wrote, reviewed, and edited the article. C.M.S. wrote, reviewed, and edited the article. V.M.C. reviewed and edited the article.

Data Availability

The data is available and can be provided on a reasonable request to the corresponding author and

Conflicts of Interest

The authors declare that there is no conflict of interest.

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