Menstrual Products & their Disposal
ABOUT TOXICS LINK

Toxics Link is an Indian environmental research and advocacy organization set up in 1996, engaged in disseminating information to help strengthen the campaign against toxics pollution, provide cleaner alternatives and bring together groups and people affected by this problem. Toxics Link's Mission Statement is “Working together for environmental justice and freedom from toxics”. We have taken upon ourselves to collect and share both information about the sources and danger of poisons in our environment and bodies, and information about clean and sustainable alternatives for India and the rest of the world.

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Menstrual Products & their Disposal
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<td>Bisphenol S</td>
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<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
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<tr>
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<td>SWM</td>
<td>Solid Waste Management</td>
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<td>ULB</td>
<td>Urban Local Body</td>
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<td>UNICEF</td>
<td>United Nations International Children’s Emergency Fund</td>
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<td>USD</td>
<td>United States Dollar</td>
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<td>VOC</td>
<td>Volatile Organic Compound</td>
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<td>WASH</td>
<td>Water, Sanitation &amp; Hygiene</td>
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<td>WHO</td>
<td>World Health Organization</td>
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We would like to thank Mr. Ravi Agarwal, Director, Toxics Link for his continued guidance and encouragement. We are grateful to Mr. Satish Sinha, Associate Director, Toxics Link who guided us through the entire research process and helped us in shaping the study. We would also like to thank Sherry Pande who worked on this study. Our sincere thanks is due to all team members of Toxics Link for their valuable inputs and suggestions.

We will also like to extend our thanks to all the respondents of our online survey.
WHY TALK ABOUT MENSTRUAL WASTE?
Menstruation is an important part of the reproductive cycle in a woman’s life. In normal parlance, it is referred to as periods. Menstruation, occurring as a part of the menstrual cycle, is the regular discharge of blood and mucosal tissue (known as menses) from the inner lining of the uterus through the vagina. The start of the menstrual cycle is known as menarche. It is attained generally between 10-12 years of age, though it may also start as early as 8 years but it is not a life-long process. When a woman does not menstruate for 12 consecutive months, it is termed as menopause and marks the end of her reproductive age. It occurs between 45-55 years of age, but can develop before or after this age range. An average woman today has far more periods than she would have had centuries ago. This is not just because modern girls get their first period at a younger age, but also because they also tend to have fewer children. In earlier times, women spent most of their fertile years pregnant, which puts menstruation on hold. On an average, a woman will have approximately 400-500 periods, which would mean around 2000-2500 days of menstrual bleeding over a lifetime.

There are a variety of products used by women across the globe to absorb the menstrual flow. These products in general are known as menstrual products. They include sanitary napkins/pads, tampons, menstrual cups and period panties. The nature of these products is either disposable or reusable. The choice of products varies from women to women, and is dependent on their knowledge, preference, availability and ease of buying. Plastic has become an essential material in modern life, and menstruation is no exception. Since almost a century, most commercial menstrual products have contained somewhere between a little and a lot of plastic in their basic design.
On any given day 800 million women in the world have their period. Many of them use disposable sanitary products such as menstrual pads, which can take over 800 years to decompose. As per the 2011 census of India, women constitute 48.43% of the total population of India and around 336 million girls and women are of reproductive age in India, meaning that they may be going through menstruation\(^1\). Every month, these 336 million women and adolescent girls across India use sanitary products and generate menstrual waste. Nearly 70 per cent of women living in urban India use sanitary pads compared to 48 per cent women in rural India. There has been varying data regarding the percentage of females in India who have access to commercially available sanitary products. According to the The Menstrual Hygiene Alliance of India, roughly 121 million out of 332 million females use disposable sanitary napkins (with an estimation of 8 pads per month), leading to 1.021 billion pads being disposed monthly or over 12.3 billion disposable sanitary pads every year. This would mean an annual menstrual waste generation of around 113,000 tones\(^2\). Disposable sanitary napkins are generally made of 90% plastic and keeping in mind the adhesives, packing, etc., each pad is equivalent to around 4 plastic bags\(^3\).

Though the use of menstrual products has greatly benefited menstrual health in the country, one of the primary and emerging concerns is how these pads are disposed of and their impact on the environment. As with menstruation, the issue of menstrual waste disposal also remains shrouded in silence due to the social stigma and taboos surrounding it. Disposal practices followed by females are guided mostly by their socio-economic status and cultural beliefs. They range from burning of the absorbent cloth to burying it in the fields as many cultures relate menstruation with witchcraft and infertility. New technologies like sanitary waste incinerators installed in schools and colleges finds limited usage as girls are shy in using such facilities\(^4\), but are now being backed under many government schemes.

The lack of proper mechanism and awareness in the area of menstrual waste generation, disposal techniques and poor sanitation facilities is leading to

\(^1\) [https://www.census2011.co.in/](https://www.census2011.co.in/)

\(^2\) [https://path.azureedge.net/media/documents/ID_mhm_mens_waste_man.pdf](https://path.azureedge.net/media/documents/ID_mhm_mens_waste_man.pdf)

\(^3\) [https://www.cps.iitb.ac.in/disposable-sanitary-napkins-a-case-of-single-use-plastic/](https://www.cps.iitb.ac.in/disposable-sanitary-napkins-a-case-of-single-use-plastic/)

an alarming situation, creating not only a burden of unknown magnitude, but also putting our environment at risk.

**Menstruation & Sustainable Development Goal**

As per the Brundtland Commission, sustainable development has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”\(^5\). To achieve this, sustainable development goals also called global goals were adopted by the United Nations in 2015 following the Millennium Development Goals. The goals act as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.\(^6\) In 2018, the United Nations (UN) reported that the shame, stigma, and misinformation that surround periods can lead to serious health and human rights concerns. That’s why they declared menstrual hygiene as an issue that affects public health, gender equality and human rights. It’s also why the United Nations has added it to the 2030 agenda. This is a 15-year plan for sustainable social and economic development that creators believe can help end poverty, hunger and lack of access to healthcare.

Issues related to sanitation facilities in middle and low-income countries like India have gained increased recognition among the WASH (Water, Sanitation And Hygiene) sector globally, as they are a hurdle in the achievement of the Sustainable Development Goals, 2030. Menstrual health & hygiene is defined by UNICEF as women and adolescent girls using a clean material to absorb or collect menstrual blood, and this material can be changed as often as necessary for the duration of the menstrual period. MHM includes soap and water for washing the body as required, and access to facilities to dispose of used menstrual management materials is directly related to Goal 6 of the Sustainable Development Goals.

**Goal 6: Ensure availability and sustainable management of water and sanitation for all.**

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\(^5\) https://sustainabledevelopment.un.org/content/documents/5839GSDR%202015_SD_concept_definition_rev.pdf  
\(^6\) https://www.undp.org/content/undp/en/home/sustainable-development-goals.html
Types of menstrual products

In 1896–97, Lister’s towels were introduced by Johnson & Johnson as the first mass-produced and disposable menstrual pads. These were thick pads of material worn inside undergarments and very different from the period pads of today. Between 1854 and 1915, twenty patents were taken out for menstrual products, including the first menstrual cups (generally made of aluminum or hard rubber), rubber pants, and Lister’s towels. The adhesive sticky pads used today weren’t introduced until the 1980s. Since then, they’ve been honed and updated to meet our changing lifestyle, flow and shape needs. A wide variety of products catering to menstrual hygiene are available in the global as well as Indian market. These options are availed, based on the availability, affordability and awareness regarding the product. The product available in a geographical location can also vary depending on the setting i.e. urban, semi-urban or rural.

Sanitary napkins/pads

These are the most commonly used menstrual products owing to their easy availability in the market. In some countries, they are also known as sanitary towels. They are used externally and come with an adhesive strip which sticks to the undergarment. The top layer is made from a polymer either polypropylene or polyethylene, an absorbent layer made up of cellulose (the exact nature of the absorbent material is not generally disclosed by the manufacturer) and a polyethylene bottom layer for leak-proofing. New brands have also added components like plastic wings and plastic packaging for “more suitability”. Each pad can be used once for a 4-6 hour duration depending on the flow and then has to be discarded.7 Usage of the same pad for a longer duration can lead to leakage, irritation and infection. Disposable pads contribute to the highest waste generation and are a concern due to their high plastic content which is non-biodegradable.

Tampons
These are absorbent materials made from cotton or rayon and generally coated with an outer layer of polyethylene or polypropylene to prevent fiber loss. They are inserted inside the vagina and come with an applicator made from either cardboard or plastic to aid in insertion. Tampons also have a cord attached to help in removal which is made of plastic. They can be used for 4-8 hours and are disposable in nature.

Menstrual cups
These have to be inserted in the vagina for menstrual fluid collection and are made up of medical grade silicone or rubber. They have to be sanitized after every cycle, stored in a dry place, are reusable and can last up to 10 years. These are more expensive than the sanitary pads, but have a longer lifespan and are environment friendly due to minimal waste generation. Their usage is limited among women currently, as most females are not comfortable with the idea of inserting a product inside their body.

Reusable pads
They are worn outside the body and attached using poppers and are made up of layers of natural absorbent materials like cotton, bamboo. Some reusable pads have synthetic materials like polyester for leak proof lining at the base. They can be used for 4-6 hours and have to be washed and dried for reuse. They can last up to 5 years. Nowadays, low-cost sanitary pads for rural women made from waste banana tree fibre and also using water hyacinth are available in India. They are cost-effective, easily biodegradable and ecofriendly in nature.

Menstrual cloth
They are reusable pieces of cloth used externally to absorb menstrual flow. They are either newly purchased clothes (mostly cotton) or old discarded clothes from the household. There is no guideline available for their length of usage but it is advised to not use them for more than a year.8

Among these disposable sanitary napkins or pads have been the most popular choice, mainly because of the convenience. The major disadvantage with reusable pads and menstrual cloths is its dependence on availability of soap, water and private spaces for drying.

Others
A large number of women in India, particularly the ones in rural areas or economically weaker sections do not have access to the above-mentioned products. These women generally use makeshift products out of the materials available to them. These include old rags, sacks, mattress foam, leaves, husks and discarded cement bags to name a few.

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**Figure 1: Sanitary Products- Waste Impact**

1. **REUSABLES**
   - Products that can be used **Multiple times**
   - Life span of **1 - 10 years** resulting in minimal disposal impact.
   - Hygienic use **requires care and maintenance**.
   - **One time cost maybe high but** life cycle cost is usually lower than disposables.
   - ▶ Cloth pads
   - ▶ Hybrid pads (with non-cloth barrier)
   - ▶ Menstrual Cups

2. **COMPOSTABLE DISPOSABLE**
   - Disposable products with **high degree of compostable content**.
   - One-time use and materials conductive to composting: **Limited impact on disposal**.
   - Currently **higher cost** than non-compostable.
   - ▶ Sanitary pads - Banana fibre or wood pulp
   - ▶ Tampons

3. **NON-COMPOSTABLE DISPOSABLE**
   - Disposable products with **minimal compostability**.
   - **One-time use** with compostable absorbent layer typically within non-compostable layers.
   - Can take **250 years** to fully decompose.
   - **Largest market share** and reach in India with multiple players (MNCs), social enterprises, SHG units, Government network.
   - ▶ Cellulose-based sanitary pads with plastic barriers or with plastic barriers and SAP
   - ▶ Cellulose-based panty liners

(Source: Https://Path.azureedge.net/Media/Documents/Id_mhm_mens_prod_India.pdf)
Plastic & chemical composition in menstrual products

Different menstrual products are of different compositions, most containing plastic and harmful chemicals at varying levels and percentages, not only as part of the packaging but also as an integral part of the product itself. However, most brands all throughout the globe, do not mention the components of the sanitary products on their packaging (disposable products mostly), nor do they mention the percentage composition of the products.

Disposable sanitary pads - They are made up of polypropylene as a top sheet to keep the pad dry, the super absorbent polymer (SAP) acts as an absorbent material along with fluffed cellulose pulp while the back cover is made up of polythene to act as barrier for leakage. The fluffed cellulose pulp at times also contains dioxins as a result of the bleaching process the cotton is subjected to during processing. Over a period of time, thin polyester fibers are weaved into the pad to aid in flowing the menstrual fluid to the absorbent core. The pads also contain adhesives which hold all the layers of the pad together. These adhesives are generally made up of polyromantic/polyolefin copolymer, hydrocarbon resins and mineral oil. Thus, the plastic component of a commercially available sanitary pad is the back cover (low density polyethylene film), the core, the wings, the external product packaging in which the pads are packed and contain brand label and displayed in stores, where each packet generally contains 7-10 pads each individually wrapped in plastic pouches. Roughly every packet of sanitary napkin contains roughly 36 gms of plastic, which is about 2.4 gms plastic per pad.

**Figure 2:** Change in composition of tampons over the years

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Tampons- A lot of people believe that tampons do not contain plastic, but that is not true. The applicator that comes with mostly all tampons are made up of plastic. They are made up of polyethylene or polypropylene. The strings in the tampon are also made up of plastic. Rest of the tampon is made up of either cotton or rayon or a combination. Some tampons may also contain a small amount of plastic as a component of the absorbent part to hold the cotton part tightly together. An analytical study done in the United States figured that in addition to the regular ingredients tampons may also contain dioxins, furans through pesticide residue, phthalates (as a part of 3,000 chemicals used to create fragrance), alcohol ethoxylates, unnamed anti-bacterial agents and cancer causing chemicals like styrene, pyridine and methyl eugenol.

Reusable pads- Although reusable pads are made up of natural materials, some of the products contain a base sheet made up of polyethene for leak-proofing.

Organic disposable pads- Though highly recommended and marketed these days, due to their negligible plastic & chemical content and compostable nature, certain articles claim that this is not true. These pads are generally made of corn starch, banana fibers, bamboo or corn-based bioplastic. Some organic disposable pads also contain bleached white cotton treated by various chemicals which are harmful for our health and are as bad as regularly available inorganic disposable sanitary pads. A study where these organic compostable products were composted, took more than 6 months to decompose and few of them could not be decomposed fully owing to the fact that they contained plastic layers which do not decompose.

Apart from the plastic content, most menstrual products contain chemicals to attain increased absorbance, fragrance and whiter appearance. However, as per reports, most brands do not specify the quantities of various components or their composition.

Market size

In recent years, the global sanitary product market has seen tremendous growth due to increased awareness regarding female hygiene, knowledge dissemination and efforts taken by government and non-governmental organizations to procure and distribute these products. According to allied market research the feminine hygiene products market is expected to garner $42.7 billion by 2022, registering a CAGR of 6.1% during the forecast period 2016-2022 globally. The feminine hygiene products market in India, which was valued at INR 25.02 billion in 2018, is expected to reach

INR 58.62 bn by 2024, expanding at a rate of 14.92% during the 2019-2024 period. The increasing awareness among the consumers regarding menstrual hygiene along with the growing number of working women and expanding income levels are some of the major factors stimulating the growth of the feminine hygiene products across the country. The increasing female literacy rate across both rural as well as urban areas has also played a major role.

**Figure 3: Sanitary products market**

According to reports, the majority of women and girls in India still use homemade products to manage their menstruation. Commercial pads are expensive for low income users. Among the commercial products, the Indian market is dominated by sanitary napkins or pads, as evident from Figure 3 and is set to remain the same in the coming years as well. Availability of sanitary napkins in various packaging sizes and price ranges has also helped this growth. Disposable pads are considered as “aspirational” by girls and tend to symbolize mobility and freedom from worry. Even in households where girls predominantly use homemade cloth, they turned to commercial pads for important occasions like travelling or writing an exam. In fact, although the majority of sanitary pads sales occur in urban areas, rural areas still accounted for 32% share in 2014.

Key players which dominate the Indian menstrual products market are Procter & Gamble, Hygiene and Health Care Limited, Johnson & Johnson Private Limited, Kimberly Clark Lever Private Limited, Saathi Eco Innovations India Private Limited and Sudh Plus Hygiene Products Private Limited. Most products are projected by the manufacturing companies, during promotions, as culturally appropriate, cost effective and with reduced environmental impact. However, most of these claims are not backed by credible data.

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Menstrual products: Health concerns

Many menstrual products cause various health issues as they contain chemicals or are made up of substances which can have a direct effect on one’s health. As the vagina’s ability to absorb is 10-18 times more than oral absorption, the addition of harmful components becomes a serious health concern.21

Figure 5: component of sanitary pad and human exposure

Source: https://www.mdpi.com/2071-1050/10/11/4146/htm

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The menstrual products have BPA and BPS which can cause hindrance in embryonic development. In order to absorb more wetness, most commercially available menstrual products have a synthetic fiber called rayon added to the cotton. During the process of rayon bleaching, dioxin is released which is a well-known carcinogen. Several research studies suggest that even a short duration of exposure to dioxins can cause liver dysfunction.

In a study conducted in The United States of America after a media report in South Korea regarding harmful chemicals found in sanitary products made up of synthetic materials, volatile organic compounds were found in two brands while Toluene was found in nine and Xylene in all the eleven products that were considered for the study. VOCs are harmful to humans in the short and long term. Short term exposure can lead to irritation of the eyes and respiratory tract, headaches, dizziness, visual disorders and memory problems. Long term exposure can induce irritation of the eyes, nose and throat, nausea, fatigue, loss of coordination, dizziness, and damage to the liver, kidneys and central nervous system and can also cause cancer.

A study on 64 sanitary napkins brands in China found that Phthalates were present in 98% of the products. Diethyl phthalate, Dibutyl phthalate, and BIS (2 ethyl-hexyl phthalate) formed more than 60% of the concentrations. Phthalates are known to cause reproductive toxicity and are also considered potentially carcinogenic. Phthalates have also been identified to have a possible association with fertility impairment, early puberty in girls, asthma and thyroid effects.

In order to give a “feeling of freshness” many sanitary pad manufacturers add deodorizing agents or scents to the product. This may involve usage of chemicals like synthetic musk which are potential hormone disruptors, cancer causing chemicals like styrene, pyridine, methyl eugenol, and butylated hydroxyanisole. In South Korea, 15,000 females filed a class action lawsuit against the sanitary napkin brand Lillian as a result of its harmful effects on their health after using their product. These women suffered from rashes, irregular periods, cramping and infection. The lawsuit resulted in the brand being removed from the market.

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WHAT DO WE DO WITH MENSTRUAL WASTE
Globally, there is increasing attention towards menstrual hygiene management (MHM). The most common intervention, in the majority of cases, is distribution of menstrual materials to adolescent girls and women. Although this is essential, their distribution represents only one component of a complete MHM. One key component which is missing is menstrual material disposal and waste management. Left unaddressed, this can cause serious concerns—both to the whole menstrual hygiene movement as well as to the environment.

As stated in the earlier section, most commercially available sanitary products contain plastic. In the initial designs of these products, plastic was used only as a leakproof barrier while the major components were made of cellulose cotton. As technology advanced, plastic found more integrated usage in the form of plastic applicators, plastic wings for better attachment to the undergarments, as composition of the absorbent material and even individual packaging for better privacy. These additions, according to manufacturers, not only made the sanitary product more portable, but also provided discreet usage and disposal options owing to the social stigma attached with menstruation. This was important, as there were many myths and taboos around menstruation, especially in developing countries. But this resulted in a huge increase in plastic waste.

The data on the percentage of female population in India using different sanitary products is quite varied, thus a clear idea on the amount of sanitary waste being generated through various disposal practices is not clear. Different studies and published reports in the public domain establish different numbers and percentages. According to a report by FSG in 2016, a Boston-based research consultancy, only 12% of the females in India use sanitary napkins while the remaining 88% women were dependent on clothes, rags, plastics, newspapers, and dried leaves etc.
to absorb the menstrual flow. According to the National Family Health Survey (NFHS) 2015-16, 62% of Indian women used cloth during their periods. Overall, 58% of women used hygienic methods, in which 42% used sanitary napkins and 16% used locally manufactured products. These varied numbers also indicate that there is no proper data available on the quantum of menstrual waste generated in the country.

**Table 1: Contrasting numbers on sanitary napkin usage in India**

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<th>Study Source</th>
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<tr>
<td>FSG Boston, Study Report (2016)</td>
<td>Only 12% females in India use sanitary napkins while others use cloth or other means</td>
</tr>
<tr>
<td>National Family Health Survey (2016-2017)</td>
<td>58% of Indian females in the age group of 15-24 years use hygienic methods out of which 42% use sanitary napkins</td>
</tr>
<tr>
<td>Management of Menstrual Waste, WaterAid India, Menstrual Health Alliance India</td>
<td>36% of women in India use sanitary pads.</td>
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**Current disposal practices**

Menstrual waste disposal practices among females vary - major factors being the surroundings, socio-economic status, residence in urban or rural areas, cultural beliefs and taboos associated with menstruation and menstrual blood. Though there have been no comprehensive studies to understand the disposal patterns, there have been some studies which indicate its improper disposal practices in the country. A number of surveys conducted by different organizations like MHM, show that, even today, a large quantity of menstrual product waste finds its way to water bodies, burial pits, drains and landfills.

**Figure 6: Different methods of disposal of sanitary products**

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<thead>
<tr>
<th>Method of Disposal</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Disposed along with routine waste</td>
<td>28%</td>
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<tr>
<td>Disposed in open</td>
<td>28%</td>
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<tr>
<td>Buried</td>
<td>33%</td>
</tr>
<tr>
<td>Burnt in open</td>
<td>28%</td>
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Source: MHM guide, Ministry of Drinking Water & Sanitation

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A systematic review and meta-analysis conducted in India suggested that practices like openly throwing of menstrual cloth/pads, throwing in pit latrines and open burning (burning the waste in open areas) are commonly seen in rural settings and slum areas. There are many instances reported when used menstrual products are buried in the ground at night outside the village boundaries as menstrual blood is related with witchcraft and if disposed of near the house can cause infertility in women. Studies have also reported that many women throw the waste in water bodies directly, thus causing contamination of unprecedented scale. A pilot study conducted in West Bengal highlighted that 78% out of the 1000 women interviewed would discard their menstrual waste by either burying them or throwing them near ponds. According to a study done in Bihar, roughly 60% women dispose of their menstrual waste in open defecation grounds. This is largely done to avoid discarding the waste in their house, or the fear of male members in the family spotting it.

In urban and semi-urban settings, menstrual products are generally wrapped in covers, newspapers or plastic and thrown in domestic waste or garbage bins. In the absence of regular disposal facilities, the waste, at times, is wrapped and kept under the bed or at rooftops of houses, until women can find ways to dispose of them discreetly. It is also seen that women deal with menstrual waste differently at home and outside. Girls in school tend to throw the menstrual waste in toilets (on window panes and side walls) in the absence of dustbins. Another common practice seen in schools and community toilets is the flushing of the waste which in turn blocks the sewage system causing severe backflow. Some females tend to throw away their menstrual cloth without washing them due to lack of proper washing facilities. A lot of menstrual waste is wrapped in plastic packages before disposing, which gets deposited in the landfills, being mistaken for other solid waste.

Incinerators are also gradually becoming a mode of sanitary waste disposal. They are mostly installed in schools and communal facilities. These are fuel-assisted burning chambers made up of tin, brick, terracotta, small-scale electric incinerators or commercial incinerators. The technology of incinerating menstrual waste is relatively new and has few takers, as many females are shy in using it. In a study conducted among women, at three different locations in India- Ahmedabad, Coimbatore and Delhi by SEWA, P&G and Wateraid India respectively, who use community toilets, it was found that the usage of incinerators had mixed reviews. One section of women found it to be a convenient method of disposal, especially in areas where proper sanitation facilities like covered dustbins, soap etc. were not available. Another section was skeptical about its usage due to socio-cultural norms against burning of menstrual blood containing products. Menstruation still faces many socio-cultural and religious restrictions which acts as a barrier to safe disposal practices.

Decentralised incinerators

Incinerators are believed by many to be a sterile and scientific method of disposing sanitary waste. Decentralised incinerators are being promoted at various levels as they are considered to be a disposal method at source, whose end products post controlled burning should be ash residue and limited smoke. CPCB recommends the low cost, locally made incinerators and electric incinerators for disposal of napkins and other waste, to be used in rural schools, colleges, institutions, hostels etc. The Central Pollution Control Board in its “guidelines for managing sanitary waste” under Solid Waste Management Rules 2016 states that many schools and institutions across the country have installed incinerators and they are a “sign of relief” for the female students and working staff in these bodies.34

The specifications specified in the guidelines are as follows:35

Low-cost locally made incinerators

▶ Design as given in MHM guidelines, technical guide 2
▶ It should be manually operated, with minimum size 3’ * 3’ * 3’ and made of brick masonry and capacity should be ~ 200 napkins/day
▶ Comprised of 2 chambers (for firing and ash collection), with emission control system along with a door for firing - operation temperatures reaches up to 300°C
▶ The incineration chamber designed to include an auxiliary gas and oil burner to be used as necessary to maintain the prescribed minimum combustion temperatures
▶ Opacity of the smoke shall not exceed 20%
▶ All the emissions to air other than steam or water vapor shall be odorless and free from mist, fume and droplets.
▶ Compliance to general emission standards for air pollution notified under E (P) Act, 1986 or as may be prescribed by SPCB/PCCS

Electric incinerators

▶ Ensure instant disposal in a scientific and hygienic way, in a fully automatic way and burn completely.
▶ Burn 150 to 200 napkins/day, can be programmed for cycles/day.
▶ Ash generation should not exceed more than 5% per napkin and ash should be collected in a separate tray
▶ Auto power & thermal cut-off and automatic temperature maintenance should be there for safety of the user.
▶ The residence time for gaseous products in the combustion chamber will be designed to be at least 2 seconds to ensure complete combustion.
▶ The emission from incinerators shall comply with the general emission standards mentioned under standard for incineration section in SWM Rules, 2016
As per a study report, the New Delhi Municipal Council has installed 35 incinerators in the city, while the Tamil Nadu government is planning to install around 4000 incinerators all through the state in schools, colleges and other public places. Even the state of Maharashtra, plans to equip every gram panchayat in the state with at least one decentralized incinerator. Though there have been a lot of organizations supporting the usage of decentralized incinerators for disposing menstrual waste, there are also reports about problems from smoke and smell from incinerators installed in school along with concerns about the emissions released from incinerators. As per a study, various stakeholders (manufacturers and civil society bodies) told that the guidelines put forward by the CPCB and the MHH were not enforceable in ground level situations. The commercial incinerators present in the market in the small scale and medium scale category, are often not complying with minimum standards thus causing more harm to the environment as gained from discussion with various stakeholders. Mini small scale incinerators, as per law need to be approved by CPCB, but as of now no guidelines and monitoring provisions for emissions from such incinerators are in place. It has come to light via discussions that there are presently little to no consequences if incinerators do not comply with the emission standards as prescribed by the CPCB. There is also no provision regarding disposal of ash residues that are generated as a result of burning of sanitary products in such incinerators. As clearly quoted by one author

“Many incinerators are not really incinerators, they are just facilities to burn trash.”

The Global Alliance for Incinerator Alternatives suggests that precautionary principle should be applied suggesting that even in high temperature (>800°C), if not maintained uniformly can cause dioxins & furans to form in cooler pockets during start up or shut down periods. On the contrary, the guidelines issued by CPCB for small scale incinerators recommends the maximum temperature to be 300°C. There is a very strong possibility of dioxins and furans being emitted from these low-cost, low temp incinerators.

In a study conducted to investigate the performance of single chamber sanitary napkin incinerators with emphasis on CO and CO₂ emissions, it was found out that two commercially available incinerators on which the study was carried out failed to meet the standard emission norms required for such incinerators. The study revealed that the commercial incinerators were not suited for the 5 batch sanitary napkins as recommended by the manufacturer. The study also analyzed the quality of combustion which was not at par with the Indian standards for MSW treatment.

37 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6266558/
41 https://ecofemme.org/sanitary-waste-in-India/
42 https://ecofemme.org/breaking-the-silence-on-the-incineration-of-menstrual-waste/
According to Allforasmile, the 12 small scale incinerators installed in Pune, by the city’s municipal corporation for disposal of menstrual waste, are operating at a temperature of 350-450°C, which is much less than the recommended temperature by WHO, thus releasing potentially carcinogenic emissions during the process. It is to be noted that when any chlorine bleached materials like, most commercially available sanitary waste products are burned at temperatures of 200-400°C it leads to emissions of dioxins which are potent carcinogens even in smaller quantities.

In spite of the present market products not complying even with basic norms, these incinerators are being procured in large numbers by both government and private organizations under national programs like Swachh Bharat Mission, Sarva Siksha Abhiyaan or as part of CSR activities by private organizations. 19 states in India are planning to install such incinerators in various places including school, colleges, hostels, gram panchayats etc.  

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45 https://www.huffingtonpost.in/richa-chaturvedi/the-real-meaning-of-menstrual-pollution_a_22129820/
What happens next?

Most women have no idea what happens to the menstrual waste once it’s discarded. The strong taboo system does not let them ponder over the question. They find relief in the fact that it is out of their sight, hence it is out of their mind but, unfortunately, it isn’t out of the environment. A large number of women shift to disposable products due to lack of sufficient water facilities required to wash reusable products. The communal toilets are also not designed in a way to support adequate washing or waste disposal facilities, leading to improper waste disposal.49

When flushed in toilets, disposable menstrual pads and tampons swell up as they are made up of polyacrylate superabsorbent polymer which are capable of absorbing extremely large volumes of water relative to their own mass and blocking the sewage lines.48 Sewage systems in India are designed to carry out excreta, tissue papers and water but not menstrual waste (MW) and thus, these ultimately end up getting blocked and causing backflow of sewage which is a health hazard. This generally happens in areas with low water pressure where less water is available for flushing, thus there is not enough force to carry out the waste which builds up.

A large number of sanitation workers have reported finding sanitary pads and tampons while unclogging the sewage systems.49

In other cases, they enter the wastewater treatment plant and subsequently end up in the lakes, rivers, seas and oceans. According to an interview with a manager of a sanitation service company in Cochabamba, Bolivia, menstrual waste, mainly pads, cause about 30% of all the sewage blockages in the city. In schools, 60% of the blockage is caused by menstrual waste.50

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Certain manufacturers market their product as “flushable”, so many women believe that the product will disintegrate once it is flushed. The “flushable” tampons take roughly 6 months to biodegrade while such pads break down only partially due to plastic components present in them. According to a report by the European Commission, sanitary waste is the fifth most common type of waste found washed up on the beaches. Plastic tampon applicators have even been found inside the stomach of dead sea birds.

The most common disposal method adopted, as discussed in the previous section, is disposing of the menstrual waste products in garbage bins along with other household waste. Most women simply wrap the waste in newspapers or polythene bags. As these bags/papers are not marked, they cannot be distinguished from other household solid waste. Rag pickers or waste collectors who are mostly devoid of personal protection equipment like masks and gloves open them up for manual segregation and are exposed to harmful microorganisms like staphylococcus, e. coli, salmonella typhus which can cause diseases like tetanus and hepatitis. Hepatitis C is caused by HCV which can be transmitted via blood and blood products. The virus can survive on surfaces outside the body for three weeks, making it vital to dispose of menstrual waste with caution. Sanitary waste products discarded openly in public or school toilets become breeding grounds for flies or mosquitoes and generate filthy odor so other females are not able to use it.

In most cases, segregated or unsegregated waste ends up in the landfills where the plastic component present in these products sits back for the next 500-800 years while annual generation of menstrual related waste is enough to cover 24 hectares of landfill in India. A survey conducted in New Zealand revealed that roughly 27% of the participants wrapped their pads or panty liners in papers and burned them.

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Open burning of menstrual waste is an age-old tradition supported by various folklores. Certain technologies like incineration also use the same principle but in a sophisticated manner. When a menstrual product is burned or incinerated it releases harmful gases which may be threatening to patients with respiratory illness along with contributing to poor air quality and climate change.

In India, lack of proper guidelines and monitoring facilities coupled with ignorance on the part of the consumers has led menstrual waste management to become a mammoth task. The Ministry of Environment & Climate Change has amended the Solid Waste Regulations, 2016 mandating the disposal of menstrual waste in packaging provided by the manufacturer, but the implementation and monitoring of this regulation has not seen widespread use.

**Price the environment pays**

Improper management of menstrual waste has many long-term implications. In the United Kingdom alone, one year worth of menstrual waste products generates a carbon footprint equivalent to 5.3 kg CO$_2$ emissions per person per year.$^{56}$ This equates to the emission created by 49,020 cars per year!$^{57}$ Blood-soaked pads when flushed down the toilets or discarded in water bodies comes in direct contact with water. These products are breeding grounds for bacteria which contaminate the drinking water directly. Most of the products also contain dioxin and furans which if released into the water bodies can interfere with the flora and fauna.$^{58}$ Furans are generally present in components such as cellulose and wood pulps which are a component of commercially available sanitary products as furans are mostly a component of pesticide which are sprayed while growing cotton while dioxins are present as a result of the chlorine bleach process used to bleach the cotton used in sanitary pads.$^{59}$

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They also bring about the introduction of harmful organisms in the food chain. Even if the flushed/disposed products are retained and decomposed by the wastewater treatment plant, the microplastic components of these non-biodegradable products are released with wastewater effluents. These micro plastics found their way to our crops when the sludge reaches the soil for agricultural re-use.60

Incinerators are considered a sustainable way to handle menstrual waste and are being promoted by various stakeholders. Ironically, as per Ecofemme, many incinerators operating throughout the country are not as per the CPCB recommendations, thus causing more damage than repair.61 Products containing SAP when incinerated release carcinogenic gases like dioxin and furan which are harmful even in trace quantities.62

**Photo 1: Small scale sanitary waste incinerator**

Dioxins are known to damage the immune system and cause hormonal imbalances. When it lands on water, it is immediately absorbed by aquatic life. Fishes are known to have 10,000 times more levels of dioxins compared to their surrounding water. Being fat-soluble in nature it gets rapidly dissolved and gets biomagnified in the body and travels up the food chain.63

The plastic components of the waste require 400 years to degrade in the landfill, but this time frame works when the waste is decomposed in an organic open-air environment. Waste which is discarded in polyethylene bags devoid of air, may take almost double the time or may never biodegrade at all.64 The chemicals present in these products, namely dioxin, furans, rayon and chlorine penetrate the landfill and pollute the groundwater table. Some of the manufacturers

even add pesticide residues which when coming in contact with the soil, may affect its fertility.\textsuperscript{65} Deodorizing components added to the product during manufacturing of pads involves incorporating certain organochlorines, when such pads get buried in the soil post usage, it further delays the process of decomposition as it alters the soil microflora.\textsuperscript{66}

The single usage plastic components in these products mostly find their way to the landfill where it stays back for the next 500 years. It has also been established by research that marine sediments adjacent to waste water treatment plants have been strewn with white micro plastic fibers identical with the ones found in commercially available sanitary napkins.\textsuperscript{67}

Unfortunately, toilet facilities in India lack bins for disposal of pads and adequate washing facilities for menstruating women to handle menstrual hygiene.\textsuperscript{68}

\begin{itemize}
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Life cycle assessment of sanitary products

Detailed studies\textsuperscript{69} have been already done for a cradle-to-grave analysis of different sanitary products right from the basic components of these products, to the amount utilized per year as per their absorbency and usage by females on a yearly basis (for simplification) and post-disposal situation.

**Tampon**

Tampons are made up of a rayon absorbent core (brand used for assessment in the study-U Kotex) with a non-woven layer of polythene, while the tampon applicator is made up of polyethylene, polypropylene and colorants. As these plastic products do not degrade, they end up in the landfill. The CO\textsubscript{2} emissions associated with tampons are more than 80%. Tampon usage has the largest impact on health and environment in terms of resource depletion, climate change and human toxicity. Its impact on resource depletion is due to the fact that the production of rayon requires a lot of raw material. Tampons have 40% less environmental impact when compared to sanitary pads. The chief contribution to environmental impact is the release of zinc. The net greenhouse emissions for tampons per woman per year is 4.62 kg carbon dioxide equivalent.

Sanitary pads

These are composed of wood pulp (cellulose) which may or may not be treated using chlorine bleaching process thus containing some amount of dioxins which are carcinogens. Some brands contain superabsorbent polyacrylate polymer foam instead of wood pulp as the absorbent material. They also contain colorants, polythene and adhesives. The CO₂ emissions associated with these are around 70%. The processing of low density polythene causes maximum environmental impact. The processing of the raw material also requires oil, thus causing a depletion in fossil fuel reserves as well. Waste water generated post-cellulose processing is also disposed thus causing pollution. Sanitary pads have also had a bad impact in terms of human toxicity, eutrophication and climate change. Eutrophication as an impact is considered at the disposal stage when disposed sanitary pads or their components reach the water system and cause significant changes in the microflora and micro fauna of the water bodies. A similar situation has been observed during the disposal of tampons. Sanitary pads when compared to tampons and menstrual cups have the worst of all environmental impacts. The net greenhouse emissions for sanitary pads per woman per year is 3.03 kg carbon dioxide equivalent.

Menstrual cups

These are generally composed of mostly medical grade and BPA-free silicone only, though some brands also use rubber, latex or thermoplastic elastomer. The CO₂ emissions associated with cups is least at around 20%. They have 99.6% less environmental impact when compared to the sanitary napkins and tampons. Menstrual cups have a lower cost also on a per year basis due to its 10-year life cycle thus making its cost 10% compared to sanitary pads and tampons. A user may need between 4 to 32 cups a lifetime depending on the type and usage. Menstrual cups in a research study came out to be the most environment-friendly option.

Regulations on menstrual products disposal

There are not a lot of laws to regulate the disposal of sanitary waste across the globe. The focus in a lot of regulations is towards provisioning of pads to the population and setting up of standards for more sustainable and environment-friendly products.

United kingdom: It is a legal requirement as part of “duty of care” towards female employees, visitors, patients, etc. to have a sanitary waste facility. “The ‘Duty of Care’ Act 1990 Section 34 is underpinned/endorsed by the Water Industries Act 1991, which states that “sanitary waste should not be flushed down toilets where they could cause a blockage within the sewer or drain”. Other than warning of the harms of flushing down of used sanitary waste, the law has not specified any other suitable forms of disposal. Other acts governing the same are the Workplace (Health, Safety & Welfare) Regulation 1992, and the Environment Protection Act 1990. The Workplace (Health, Safety & Welfare) Regulation 1992 ensures the provision of separate washing facilities for men and women containing conveniences.

Ethiopia: A guideline was released by the Federal Democratic Republic of Ethiopia (Ministry of Health) in 2016 to support the work done by organizations working on MHM (menstrual health management). The guideline specified that the disposal of sanitary pads, involves a lot of steps, i.e., “The waste chain is likely to include: a discrete, washable container with lid for temporary storing of used sanitary materials, collection, transfer and emptying of the containers and final destruction of the sanitary materials. The latter could include burying, incineration or burning, disposal into a regular waste management collection and disposal system, disposal into a pit latrine and composting (for biodegradable sanitary materials).”

76 https://www.principalhygiene.co.uk/sanitary-waste-faq
**Kenya:** A prototype County Environmental Health and Sanitation Bill was released in April 2016. It has specified that there should be “arrangements for safe and hygienic disposal of sanitary pads and other menstrual waste management materials which shall be collected at regular intervals.”[^79]

**Canada:** The government proposes free menstrual products to support equality in the workplace, “providing workers with access to free menstrual products is expected to support better health outcomes and workplace productivity while helping to reduce the stigma often associated with menstruation, which continues to persist despite the progress we have made towards gender equality.”[^80]

**India:** Sanitary waste disposal in India comes under the Solid Waste Management Rules, 2016. In context with menstrual waste disposal, the SWM Rules (2016) specify in “Rule (4) (B) (duties of waste generators): Wrap securely the used sanitary waste like diapers, sanitary pads etc., In the pouches provided by the manufacturers or brand owners of these products or in a suitable wrapping material as instructed by the local authorities and shall place the same in the bin meant for dry waste or non-biodegradable waste”[^81]

Further the rules had identified and defined the roles of the manufacturers or brand owners of disposable products and sanitary napkins and diapers. It requires them to provide necessary financial assistance to local authorities for establishment of waste management systems and also put in place a system to collect back the packaging waste generated due to their production. The manufacturers or brand owners or marketing companies of sanitary napkins and diapers are also expected to explore the possibility of using all recyclable materials in their products or they shall provide a pouch or wrapper for disposal of each napkin or diaper along with the packet of their sanitary products. Further, the brands are supposed to educate the masses for wrapping and disposal of their products.

The manual on municipal solid waste management has further specified that “sanitary waste should be collected in separate bags and handed over separately on a daily basis to the waste collector to avoid manual handling of sanitary waste. Once collected, this waste should be sent directly to biomedical waste incineration facility or to material recovery facility (MRF) for collection and further sent to the biomedical waste incinerators.”[^82]

As per the guidelines for implementation of bio-medical waste management rules by healthcare facilities, it has been mentioned that “used sanitary waste like diapers, sanitary pads etc. generated from hospitals should preferably be wrapped in the pouches provided by the manufacturers or brand owners of these products or in a suitable wrapping material and disposed along with soiled waste (yellow C) category waste for incineration.”

[^82]: http://mohua.gov.in/upload/uploadfiles/files/Part2.pdf
In 2015, national guidelines were released by The Ministry of Drinking Water and Sanitation for menstrual hygiene management. Menstrual health management is an integral part of Swachh Bharat Mission Guidelines (SBM-G). The guidelines outlined roles and responsibilities of different state governments, district administrators, engineers and technical experts and also teachers at school level. As per the guidelines, “options for on-site disposal include disposal, deep burial, composting, pit burning and incineration. The right option depends on key factors such as amount and type of materials, the available budget (investment and O&M costs) and environmental considerations.”

In 2014, The Swachh Bharat Swachh Vidyalaya National Mission was launched. The aim of the mission was to ensure that every school in India has a set of functioning and well-maintained water, sanitation and hygiene facilities. As per this mission, an essential component of girls' toilet blocks is that at least one incinerator (to digest the used sanitary products) should be installed. But there have been no standards or regulations specified or mentioned for the same in the mission guidelines.

The guidelines for management of sanitary waste, under The Solid Waste Management Rules, 2016, have detailed out mechanisms to handle sanitary waste.

I. AT CONSUMER LEVEL

A. The consumer shall wrap the sanitary waste using self-wrapping straps or keep the sanitary waste in leak-proof pouches provided by the producer and dispose the same along with dry waste or keep the waste in a separate bin provided at the time of door-to-door collection by local agency. In case a separate bin is not provided by an authorized waste picker, the wrapped/pouched sanitary waste should be placed in the dry-waste bin for collection by authorized waste picker (during door-to-door collection).

B. In case producers do not provide wrapper or pouch, the used sanitary waste should be wrapped in old newspaper

II. AT PRODUCERS LEVEL

A. Provide wrapping pouches or provide suitable self-wrapping (sealing straps) for the used sanitary waste

B. Work with local agencies for achieving segregated collection and disposal of sanitary waste.

C. Indulge in providing mass education and awareness in proper handling, segregation and disposal of sanitary napkins.

D. Explore the possibility of using recyclable materials in their products.

83 http://unicef.in/CkEditor/ck_Uploaded_Images/img_1397.pdf
III. BY PRIVATE AGENCIES

A. Segregated sanitary waste can be disposed by incineration through authorised common biomedical waste treatment and disposal facilities.

B. In small cities, the sanitary waste can be composted if cotton/clothes are separated from the products. Otherwise, the sanitary waste will go along with dry waste for disposal.

C. In Class 1 cities sanitary waste can be landfilled. The sanitary wastes also can be utilized in waste-to-energy or co-processed in cement kilns/power plants.

IV. AT SPCBs/PCCs LEVEL

A. SPCBs/PCCs may allow sale and operation of mini and modular incinerators for disposal of sanitary napkins. Modular incinerators can be promoted only in case of remote locations (military establishments, camps etc.) or for the areas having no access to common incinerators. For allowing such modular incinerators, SPCBs shall ensure the following:

B. Depending on the type of technology provider, modular incinerators can be based on twin chamber incineration, magnetic pyrolysis furnaces, plasma pyrolysis furnaces, electrically operated furnaces, clay-pot (matka incinerator) etc..

C. Modular incinerators may have to demonstrate compliance to general emission standards for air emissions notified under E (P) Act, 1986 or as may be prescribed by SPCBs/PCCs.

D. Considering low volume of flue gases, the cleaned flue gases after complying with standards shall be vented through stacks of at least 2m height above the roof or the nearest building or as may be decided by SPCBs.

E. SPCBs may randomly verify functioning of such incinerators, and in case of non-compliance to emission standards, they shall direct the manufactures/producers to not to place their products in the market.

V. AT ULB/LOCAL LEVEL

As per the mandate, the ULBs in association or assistance with producers shall make necessary arrangements for collection and disposal of sanitary waste.

Villages and panchayat areas not having access to common incinerators, may dispose used homemade sanitary napkins made of natural tissues/paper/cloth/cotton as well as reusable commercial cotton napkins in small burial pits of more than 50 cm deep or into pit latrines. In case of commercial sanitary napkins made with plastic and liners, low-cost incinerators like matka incinerator kept in open areas (such as open backyard, open fields, terrace of the house, etc.).
Implementation

Currently, there is little or no implementation of the provisions which have been listed out in the rules and the guidelines. Though, it is suggested that the waste containing blood and blood components may be treated at CBWTF facilities, which deals with biomedical waste, a significant amount of sanitary waste in India finds its way to the landfill, water bodies or is discarded openly. One of the major reasons for this is the lack of segregation of such waste from the point of generation or waste dumping sites. Even though cities like Panaji and Pune did start the process of segregation of sanitary waste, the project could not gain momentum due to various factors like lack of awareness among the masses and behavioral practice of not separately handing over sanitary waste /marking it, lack of proper monitoring and implementation mechanisms, high cost of treatment of waste at the facilities with large scale incinerators and limited capacity of these incinerators leading to overloading.84

OBJECTIVES

The overall objective of the study is to bring information on disposal practices of menstrual products followed by Indian women and their awareness on different menstrual products available in the market. In the first phase of the study, we have these specific objectives.

Disposal of sanitary waste at the household level with special focus on commercially available inorganic pads.

Perception of users regarding menstrual waste disposal and related concerns.

Gauging awareness and perception on different menstrual products available in the market and sorting out alternates most favorable to the population.

Understanding barriers in adoption of environment-friendly options.
Methodology

The study is designed with a primary component and a secondary component.

**A. Secondary study:** Data for the study was sourced from reports, research articles, websites, national/international regulations, and policy briefs, infographics along with news and magazine articles. These various sources were utilized to correspond and gain a better understanding surrounding the issue of menstrual waste and especially its disposal. The information taken from these sources have been marked against the text with references in footnotes.

**B. Primary study:** The primary study was conducted in two parts.

In Part 1, face-to-face interviews were conducted with waste pickers in the Delhi region.

In Part 2 of the primary study an online questionnaire survey was conducted among female consumers all throughout India. (Please refer to the annexure for the survey form.) The questionnaire was created using google forms and was circulated via Toxics Link's social media platform (Facebook, Instagram and Linkedin) along with sending out the survey form via email and WhatsApp in order to garner wide response. A total of 520 responses were received across different geographic regions in India.

Variables used for the study: the following variables were used for the study-

1. Place of residence
2. Age group
3. Menstrual cycle
4. Occupation
5. Income group
6. Menstrual product being used
7. Number of menstrual products used during one cycle
8. Methods of disposal
9. Awareness level regarding sanitary waste disposal

**Data analysis:** data analysis was done during single and multivariate cross tables using Microsoft Excel.

A total of 520 responses were collected using Google forms.
Limitations

The responses were collected via online mode through Google Forms, thus in-depth questions could not be asked regarding usage, awareness and practice.

Since survey was conducted through electronic media, females who did not have access to such means could not be made part of the study.

Due to the prevailing COVID-19 situation, the face-to-face interviews with waste pickers and rag pickers could only be conducted in the city of Delhi.
WHAT WOMEN THINK
A total of 520 responses were collected for the consumer survey using Google forms. The survey forms were circulated using emails, WhatsApp and uploaded on Toxics Link’s website and social media accounts (Facebook, Twitter and Instagram). A total of 32 responses had to be removed as the study was meant for Indian nationals (20 responses removed) and for women who are in the menstruation age bracket but do not experience menstruation (13 responses removed). Thus, the data set used for analysis was 520-(20+13) = 487.

Menstrual waste disposal practices vary according to the surroundings, socio-economic status, residence, cultural beliefs and taboos.
Respondents’ profile

GEOGRAPHIC DISTRIBUTION

The responses were received from different parts of the country. Highest number of responses were gathered from Delhi (97), then Maharashtra (72) followed by Uttar Pradesh (66) and Tamil Nadu (63). Remaining states had varying number of responses which are depicted in the figure above. Thus, it is safe to say, that the responses collected give a clear picture of disposal of sanitary products, awareness and perception regarding different types of menstrual products available from nearly all the regions of the country.

Figure 9: Survey responses

AGE DISTRIBUTION

The survey questionnaire had listed 5 age groups for the respondents to choose from. This was marked as a mandatory question so as to help in assessing if knowledge, perception and disposal practices concerning sanitary waste had any relation with age. The five age brackets given were
out of the total 487 responses, that were used for the analysis for this report, 57.1% of all the 487 responses recorded were from females between the ages of 21-30 years of age. 29.8% responses were recorded from females aged between 31-40 years of age. 8.2% responses were recorded from females falling under the age range of 41-50 years while 4.2% responses were from females in the age group between 10-20 years. Only 0.4% females were between 51-60 years, which was expected as in India the average age of menopause is around 46 years, as compared to 51 years in the western world.

Figure 10: Age group of the respondents

![Age Range of Respondents](image)

**OCCUPATIONAL STATUS & INCOME GROUP**

54.62% of our respondents comprised of paid workers (services, business, self-employed, medical professionals etc.), while 15.4% were unpaid workers (homemakers, job aspirants, volunteers etc.) and remaining 30% were students (schools, colleges, PhD scholars etc.)

Figure 11: Occupational status of the respondents

![Occupational status of the respondents](image)
Types of products used & consumption rate

As per the data collected, 80% respondents use inorganic disposable sanitary products. The remaining 20% share is divided among menstrual cups (6%), organic disposable pads (8%), while the usage of period pants, tampons and reusable pads came out to be around 2% each. 9 respondents used other products apart from the ones listed in the survey questionnaire. The results clearly indicated huge usage of disposable sanitary napkins- 88% in total, including both organic and inorganic ones among the respondents.

Our secondary research on data collected from the Internet, research papers, articles etc. also reiterated that inorganic sanitary products hold the major Indian market share of commercially available sanitary products.

Figure 12: Menstrual product usage- Overall

There was slight variation observed, based on the age group. Menstrual cups and tampons, which had an overall usage share of around 6% and 2% respectively, were not used by the youngest age group (10-20) and the oldest age group (51-60). Tampons, the other disposable product besides disposable pads and period pants, were most popular in the 41-50 age group, though there was a very small percentage of women in the two other age groups (21-30 and 31-40) using it as well. The maximum usage of menstrual cups and reusable pads was observed in women between 31-50 years (two age groups combined).
The number of disposable pads used during each cycle varied quite a bit for women across all age groups. Though the majority (53%) of respondents used between 5-10 pads in each cycle, a sizable population (28%) was using between 11-15 pads on an average. These responses were for all disposable menstrual pads, including both organic and inorganic pads. Females in the age group between 41-60 years were found to have high usage, with lot of them putting the number between 11-15 pads. Though tampons are also disposable products, none of the respondents who used tampons specified the number and hence these have not been included in the graph below (Figure 8).
Disposal methods

Among the menstruation products used by the respondents, inorganic and organic sanitary pads and tampons were the most prominent disposable products. When asked for the methods used to dispose of these products post usage, 54.76% females said they throw the sanitary waste in a separate bin using wrapping (wrap the waste in packaging/paper before disposal), while 38.9% females threw the waste in the common household bins after wrapping it. The positive part was that most women disposed it of after wrapping it. A small percentage of women respondents (just above 3%) admitted to burning/ pit burying as a means of disposal of sanitary waste. The number is low but surprising as most of these responses are from urban areas. This practice is expected to be much more prevalent in rural areas, where there are little means to dispose it. On seperately analayzing these responses or burning/burying in detail, it was found that 71% of these respondents were of the age group between 21-30 years of age and 93% of them were either college students or working professionals. Majority of these responses were recieved from the states of Kerala and Goa.

Figure 15: Disposal mechanisms used by respondents

Looking at age wise disposal patterns, there was not much variation. But usage of decentralised sanitary waste incinerator was seen predominantly in the youngest age group- this is probably because a large number of these equipments have been installed in schools and colleges. Among the oldest age group, 100% respondents threw it in separate bins with wrapping.
Figure 16: Disposal - age wise

- **Burn it**
- **Bury it in a pit**
- **Flush it**
- **Throw in a separate bin WITH wrapping**
- **Throw in a separate bin WITHOUT wrapping**
- **Throw in common household bin WITH wrapping**
- **Throw in common household bin WITHOUT wrapping**
- **Using a sanitary waste incinerator**
Awareness regarding menstrual waste

It was important to also understand the awareness regarding menstrual waste and its impact on the environment. The respondents were asked whether they are aware of what happens with the used sanitary product on disposal. Not surprisingly, a large majority, 57.5% of the females said that they did not know the fate of disposed menstrual waste. Since no detailed response was asked on what happens, it is not clear whether the 42.5% respondents, who answered in the affirmative, are also aware of the real fate. The awareness levels also varied among age groups. It was observed to be very low among the 10-20 and 41-50 age group with around 32% and 37.5%.

The respondents were also asked if they considered menstrual waste as a concern and if yes, what kind of issues they associated it with. An overwhelming majority (89% approximately) considered it as a matter of concern, while 10% were not sure about it. This was true across the age groups.
The respondents were of mixed opinion regarding the kind of issues related with menstrual waste. Most of them recognized it as a multiple concern. Since the respondents were allowed to choose more than one option, around 42% believed that menstrual waste was a concern for all three—environment, health and hygiene. Looking at them separately, an overwhelming majority—around 92% recognized it as an environmental issue, whereas 59% saw this as a hygiene issue. 48% Of them termed it as a health issue. A small percentage of respondents also recognized this as an occupational hazard for the waste workers.
Environment-friendly options

There are environment-friendly menstrual product options available in the market today, but it is important to assess if the consumers are willing to adopt it. The response was positive as 88% of the survey respondents were willing to use environment-friendly alternatives. Around 11% were unsure and a very minor number said that they were not willing to shift. The unwillingness to shift came from the age groups between 21-30 years and 31-40 years.

**Figure 20: Willingness to adopt environment-friendly products**

Since, currently available commercial environment-friendly sanitary products are more expensive we also asked the respondents on whether they will be willing to pay extra money for using eco-friendly sanitary products. 51% of the respondents were willing to pay extra for it, while 40% of them were not sure of it. Only 9% of them said they were unwilling to pay any extra amount for the eco-friendly products. This is certainly a positive feedback and indicates that there could be huge shift if the pricing was looked into. Looking at it from an age perspective, the unwillingness was highest among the youngest age group, i.e. if we correlate the willingness to shift and the willingness to pay additional amounts for environment-friendly products, we get to understand the barrier in terms of cost. Around 9% of the respondents, who shared that they are willing or may shift to alternatives, were not willing to pay the additional costs. A large section was unsure about the additional costs, as evident from the ‘maybe’ answers, especially in the ‘shift may be’ section of the population.

**Figure 21: Willingness to pay extra for environment friendly products**
Choice of alternatives

Respondents, who showed willingness to shift to an alternate sanitary product from the ones they were already using (mostly inorganic disposable products) to more environment-friendly options, were asked about their preferred choice of alternatives. A large majority (68%) chose organic disposable pads as their preferred alternative, while 18% females chose menstrual cups. 7% women preferred shifting to reusable pads, while 4% women chose organic cotton tampons as their alternative product. The choices across the groups was similar, though the 31-40 age group was more open to menstrual cups.

Figure 23: Preferred alternatives for shifting from current product
Barriers in using environment-friendly products

This segment of the study included respondents who were using inorganic products and also included females who had already made a shift to more eco-friendly products. 400 of our respondents were using inorganic disposable products in the form of either sanitary pads or tampons. On being asked about their concerns in shifting towards a more environmentally sound product, 31% shared that their prime concern was that the environment-friendly products weren’t easily available in the market, as compared to readily available inorganic disposable pads. 19% Of the respondents identified another big barrier in the form of cost as environment-friendly options were more expensive in comparison to inorganic disposable products. 17% of them believed that the alternate products were difficult to use as well as to dispose. Two important concerns shared by respondents related to alternatives were that organic products had less absorption capacity and they weren’t as hygienic when compared to the inorganic sanitary products available in the market. A small percentage of women (4%) had zero or little knowledge about the existence of such products, or they knew too little to be confident enough to swap them for the products that they were already using.

Figure 24: Barriers in shifting to Environment Friendly products

- Hygiene Issues: 31%
- Low absorption capacity: 14%
- Difficulty in usage and disposal: 19%
- Expensive: 14%
- Ease of Availability: 17%
- Discomfort: 4%
- Lack of Knowledge: 1%

1%
The same question was put to respondents who had already made the shift to eco-friendly alternatives like organic disposable pads, period pants, reusable pads and menstrual cups, so as to gauge the issues they faced while making the change. The barriers pointed by them were similar, as accessibility remained the biggest concern among them as well. The current users of alternates also identified difficulty in use and disposal as a big concern. Some of the other significant reasons mentioned are given in the graph below.

Figure 25: Barriers faced while shifting to Environment Friendly Products

Additionally

Majority of the respondents believed that there is very little awareness among Indian females regarding the harmful effects of commercially available inorganic disposable sanitary products and most of them have very little or no knowledge about environment-friendly sanitary products.
KEY FINDINGS

88% of respondents using disposable products

80% respondents use inorganic disposable sanitary products

48.5% females said they throw the sanitary waste in a separate bin using wrapping (wrap the waste in packaging/paper before disposal),

34.1% females threw the waste in the common household bins after wrapping it.

89% of respondents recognized menstrual waste as a major concern- most of them identifying it as an environmental problem.
50% of respondents were willing to pay additional cost for the environment-friendly products, but a large percentage was not willing to pay the additional price.

**Majority of women** are willing to shift to alternatives

**Organic disposable pads and menstrual cups** Organic disposable pads and menstrual cups are the most preferred alternative

**Availability of alternate products** is one of the biggest barriers in the shift

**Lack of awareness** regarding harmful effects of commercially available inorganic disposable sanitary products
ARE WASTE WORKERS AFFECTED?
A survey was conducted among waste workers to understand their handling of menstrual waste and the perceptions around it. Due to the limitations of the study, this part of the study was limited to Delhi only. Various districts of Delhi were covered to get a total of 55 responses, including both municipal workers and private players. Responses were obtained via one-on-one questions and the responses were collected via KoBo Toolbox. The data from the app was later converted into an excel sheet to be used for analysis.

In many countries, informal waste pickers contribute significantly to waste management and resource efficiency by collecting, sorting, trading and sometimes even processing waste materials.
**WASTE WORKER PROFILE**

**Gender and age**

Out of the 55 waste pickers who were part of the survey, 93% were males while 7% were females. Majority of the waste workers interviewed were of the age group between 18-40 years (71%), While 25% were above 40 years, 4% waste workers were less than 18 years of age, which is a serious concern. All the women waste pickers who were interviewed were under the 18-40 years age bracket.

*Figure 26: Waste workers- Profile*

![Gender and Age Chart]

**Nature of employment and source of waste**

Among all the interviews done, it was seen that 87% of the respondents were private players, while 4% were government players and 10% responded in the other category. The responses from the other category included those who were employed privately under the TPS infrastructure, private companies or for other people. 75% Females were employed as private players while 25% belonged to any other category.

The waste workers included workers working at different levels. 18% people were door-to-door waste collectors while 28% classified themselves as waste pickers i.e. people picking up waste from dhalaos & waste transfer stations. 18% of the respondents were rag pickers i.e. they picked up/ sorted waste from dumpsites, landfills etc. 36% mentioned that they do both door-to-door collection of waste and also collected waste from waste transferring stations and dhalaos. All the female respondents worked as door-to-door collectors as well as waste pickers.
The waste pickers were also asked about the source of waste i.e. the kind of institutions from where they are collecting waste. Around 45% of the waste workers interviewed were collecting directly from households and around 13% were collecting from dhalaoos. 22% obtain their waste from multiple institutions like offices, commercial buildings, and hospitals. In this few of the responses also mentioned Gurudwaras and roadside heaps of the waste collected by MCD workers. 20% of the respondents were collecting from roadside heaps, nallahs, dumping site, and empty plots.

**Menstrual waste occurrence**

Household waste is mandated to be segregated in India, as per the solid waste management rules. The rules also specify that the sanitary waste should be wrapped before being discarded. It is important to understand if any of these are actually being followed.

As a response to the question on whether they find used/soiled pads in general/household waste, 83.6% of the waste workers answered in the affirmative. They were further probed to know whether the soiled/used pads were packed or thrown as it is. 61% said that they found soiled pads wrapped in newspapers as well as disposed without any covering, while 15% of the waste workers said they always received used sanitary pads wrapped in newspapers. Nearly all the responses in this category barring one said, that the waste was handed over wrapped either in polythene bags or wrapped in newspaper and then polythene bags.
The door-to-door waste collectors were also asked if the soiled/used sanitary napkins are handed to them separately. 70% of the people revealed that the soiled napkins are always mixed with the household waste and they have never received such waste separately from any of the households. 26.7% said they have been handed over used sanitary pads separately from some of the households. Only 3.33% shared that they receive used/soiled pads separately. All the female respondents said that they have never been handed over such waste separately by any of the households.

Segregation of menstrual waste

From the section above, it is clear that most waste workers receive menstrual waste, packed or unpacked. Hence, it is important to assess fate of this waste stream from this point onwards. Not surprisingly, 100% of the respondents clearly stated that they do not segregate this waste. Irrespective of source or whether they are handed over this waste separately, they do not separate and collect it. This clearly is indicative that almost all of this waste ends up in landfills. This raises a lot of concern as it is clear from the sections above that most women are using disposable sanitary pads which have a lot of plastic content.
Concerns in handling menstrual waste

There can be various reasons on why the waste workers do not deal with menstrual waste and one of them could be their perception of this waste stream. Question was asked to them about understanding the same, regardless of whether the waste pickers handled it or not. 54.5% workers replied that they feel bad about dealing with sanitary waste or about finding them in daily waste while 45.5% of the respondents said they had no problems. 64.3% of people in the age group of above 40 years felt bad about dealing with sanitary waste, 100% of waste pickers under 18 years of age resonated the same feelings. The responses among female waste pickers was equally divided. While 50% of them felt bad in handling used pads, the other 50% had no issues in handling such waste.

Another question was asked during the waste workers’ survey about whether they believe that dealing with soiled/used sanitary pads has a harmful effect on their health. 67.3% said that they
have no idea/knowledge about it and they don’t know whether coming in contact with these soiled/used pads had any negative impact on their health. 23.6% people believed that it did not have any harmful effect on their health while only 9.1% responders said that they think that dealing with soiled/used pads can be harmful to health.

**Figure 32: Harmful effects on Menstrual Waste on Health**

![MW-Harmful to Health](chart1.png)

**Usage of personal protection equipment**

Use of protective equipments can be very effective in preventing risk of infection as well as to maintain hygiene and therefore it was important to understand if the waste workers, dealing with menstrual waste, are using PPEs during handling of this waste stream. During the survey, it was found that 29% do not use any PPE while collecting/handling waste. Only 11% of all the interviewed workers used masks, shoes and gloves. 35% used masks & shoes as a means of personal protection, whereas 13% workers used only masks. Another 13% only used shoes as a mean of personal protection.

**Figure 33: Usage of PPE while handling Menstrual Waste**

![Usage of PPE while handling Menstrual Waste](chart2.png)
On further analysis it was seen that 68.7% workers who did not use any sort of PPEs during menstrual waste handling belonged to the 18-40 age group, while 25% workers were above 40. 75% of women interviewed did not use any personal protection equipment while handling sanitary waste.

**Disposal-Expected ways**

The waste workers were also asked about what they think is the right way of handing over sanitary waste by the public to waste collectors, or what would be a preferable way they would like the sanitary waste being handed over to them. 69% people said that they want the sanitary waste to be covered and marked before being given to them. 12.7% of the people said they wanted sanitary waste to be covered in newspaper when being handed over to them. Only 3.64% respondents said that they are ok with the sanitary waste being handed over to them as it is while 14.5% said “any other”. This section gauged a varying set of responses. While 37.5% responses required the sanitary waste to be properly packed in either newspapers or polythene or both, in addition to that, they also required the people to inform them while handling the sanitary waste about its content. 62.5% people did not have any opinion in the matter, they either said they did not know, or they did not respond to the question.

**Figure 34: Preferred ways of receiving Menstrual Waste**

64.2% respondents in the age group of above 40 years wanted that the sanitary waste handed over to them should be properly wrapped and marked. The percentage was even higher in the age group of 18-40 years where 74.3% wanted the same. Roughly 13% of the 18-40 age group of waste pickers wanted to be informed that the waste they are being handed over contains used/soiled pads. 14% of waste pickers from the above 40 age bracket also felt the same.
**KEY FINDINGS**

- **83.6%** Responses found sanitary waste in the waste they collected.
- **67.3%** had no idea about the health implications of dealing with menstrual waste.
- **11%** people in the survey used the PPE (All three-masks, gloves and shoes).
- **75%** of women who were interviewed did not use any PPE while handling such waste.
- **69%** of sanitary waste handlers expect that sanitary waste which is handed over to them should be covered and marked beforehand.
- **55%** people feel bad about dealing with finding soiled/used pads in general household waste.
- **100%** of the respondents do not segregate menstrual waste from general waste.
- **70%** of the waste collectors never received soiled/used sanitary waste separately, it is generally always mixed with household waste.
- **11%** had no idea about the health implications of dealing with menstrual waste.
Conclusion & recommendations

This study, through its various approaches, has tried to explore the issue of menstrual waste in India. Even though, a lot of discussion has happened on accessibility of sanitary products to females all across the country there has been little focus on menstrual waste being generated in the country and how it is being managed at each level. There seems to be no concrete estimation regarding the percentage of menstruating population who use sanitary products, especially disposal products. Different studies suggest varying figures and hence it is difficult to get an annual waste estimation resulting from menstruation.

Availability of different types of products in the market has given the consumers a wide variety of options to choose from. But in real sense there is little choice as, not surprisingly, most manufacturers do not disclose the contents of sanitary products anywhere in their fancy packaging. Many of these products are teeming with toxic chemicals like vocs, phthalates etc. Along with a significant portion of plastics as pointed out via various research studies all over the world. Irrespective of whether the products are the size of your palm (e.g. a sanitary napkin) or the size of your finger (e.g. a tampon), all of them have varying degrees of plastics and harmful chemicals both in the core product as well as their packaging materials. These products are not only creating plastic pollution which will persist in the landfills for next 800-900 years, but also creating health risk to the users due to the presence of these chemicals, which are many a times added to the products to make them more appealing.

As the majority of the population who use sanitary products prefer one-time use disposable sanitary pads (used by around 80% of female respondents in our study), the concerns raised regarding the disposal mechanism warrant critical focus. With the penetration of disposable products on the rise, these would reach semi-rural and rural areas soon, where though it will help in improving menstrual hygiene it will also create waste issues at each level. While discussing methods of menstrual waste disposal, various studies report that a wide variety of practices are adopted, which are mainly guided by various socio-cultural practices. Our primary survey, conducted among women all across India, also showed varied disposal practices. Though a large majority of women now pack their used/soiled pads in newspaper/polythene and then throw it away, a large number of users are still throwing it as it is, as reported by the waste pickers. Our primary survey with the consumers as well as waste workers also confirmed that menstrual waste is almost always mixed...
with the general household waste—certainly leading to unhygienic mechanisms. With practices like open burning, pit burial still in practice, even in Tier 2 cities, pollution of natural resources like air and water via menstrual waste adds to the already degraded environment. Many females, as confirmed by our study, do not know about the impact of wrongly disposed sanitary products on the environment. They simply had no idea of what happens to the waste stream once it leaves their house. Though, a large number of females do understand that somehow, these one-time used sanitary products are injurious to both their health and environment, most of them are not aware of the complete picture.

A large majority of females, taking into consideration the threat that menstrual products pose to both the environment and human health, are willing to shift to environment-friendly options, but if we look at the larger picture, the will to shift is also towards organic disposable sanitary products rather than the more environmentally sound options like menstrual cups or reusable pads. Even if we welcome the move, that a large number of females are determined to take the leap and do away with plastic containing and chemically-laden sanitary products, the lack of accessibility becomes the biggest hurdle coupled with high pricing. The newly available organic pads and tampons do not find their way beyond metropolitan areas, let alone small villages. The high cost of these “organic” products makes for an additional out-of-the-pocket expenditure for a population, where millions of people already find it difficult to make ends meet even for basic amenities. Thus, for a vast number of females residing in small towns or rural areas, a plastic-free period is still a far-fetched dream. Another major contributor in this hesitancy to shift is the gaps in knowledge regarding alternate products. Many females, admitted to the fact that they find the other alternatives, difficult to use and dispose of. One of the reasons behind this could be the lack of marketing of products like menstrual cups, or reusable pads, where bigger players of the market dominate both the print and electronic media, thus making women believe that the best option available to manage their menstruation is the one that is heavily promoted and thus is popular. Though organic products are now being promoted via social media, testing for environment-friendly claims is also the need of the hour, before leading women to believe that the “organic” option is the perfect solution.

Hesitation in managing menstruation in the right way has put in thousands of sanitation workers all across the country in grave danger. The hushed nature of managing menstrual hygiene also echoes in how this waste is disposed of. Pads are mostly disposed of, wrongly wrapped thus, posing risk of infectious disease among waste workers. Sadly, majority of the waste pickers are not informed of the contents of the packet. The bigger matter of concern is that a vast majority of them are not equipped with adequate PPE thus exposing them to major health hazards. Most of them are unaware about the impacts of handling such waste on their health. While most of the waste workers do not like handling menstrual waste, the prevailing practices leave them with little choice.

During the study, we also did not find any recycling of this waste and hence the waste workers are not collecting the menstrual waste. In the current scenario, menstrual waste is almost never segregated (The Delhi study showed 100% non-segregation of menstrual waste from household waste), thus majority of it ends up in landfills, where it will stay for centuries to come. This waste
stream, with such large parts of plastic in its composition, is adding to the existing plastic waste pollution crisis and increasing the plastic load. No recycling and landfilling of these also means that over the years these will break down into smaller plastic fragments and eventually add to the microplastic pollution.

From the regulation perspective, it is clear that disposal guidelines are not very clear. Menstrual waste is mentioned in SWM but not implementable. It is not considered as bio-medical waste and hence BMW rules are not really applicable.

Thus, it is essential to understand that even though India as a country, has its struggles in providing females of menstruating age, a stress-free period in the form of adequate sanitary products, it is vital to take into consideration, awareness regarding correct methods of waste disposal, available alternatives, viable pricing and dignity of the sanitation workers. It is only then, if we handle the menstrual waste correctly, will complete menstruation hygiene management be achieved.

**Suggested recommendations**

Menstrual waste finds mention in the solid waste rules but it has not been able to change things on ground. Appropriate policy and legal framework are necessary for the management of menstrual wastes and should be developed. The framework should prioritize waste reduction by focusing on reusable products.

Segregation of menstrual waste from general waste is needed to be done at source. Separate bins should be designated at both household and public places, so that the waste does not mix with general waste.

Implementing EPR and making the brands responsible for the waste at end-of-use will be required if this humungous amount of waste is to be dealt with effectively. This will require clear instructions for the manufacturers to set up reverse logistics and definite targets and penalties.

There have been some initiatives in cities like Bengaluru and Pune, which needs to be looked at carefully and assessed if these can be replicated in other places. Movements like Red Dot campaign can be adopted.

Action should be taken to create an ideal waste flow pattern. This should be designed keeping in mind the privacy and dignity of women. Appropriate and safe disposal and treatment value chain is needed for urban and rural settings, communities and institutions.

Once menstrual waste is segregated at source, the problem will not be completely solved, until the collected waste is properly disposed of and does not end up in landfills. And hence there is a need to identify proper technology.
Manufacturing companies should be mandated to disclose the information on the menstrual products regarding the chemical composition of the pads so that consumers can make informed choices and appropriate technologies could be used for their disposal and treatment.

Small scale incinerators or decentralized incinerators have emerged as a favoured disposal technology and are being installed in various establishments. Issues of inappropriate placement, ventilation and operation of units have been reported rampantly. Small scale incinerators should undergo testing for emission standards and load capacity before being installed in public places, where it can cause huge damage to human health & environment if remained unchecked.

Scientific research should be encouraged for the most suitable techniques of disposal of sanitary pads or other menstrual products.

Menstrual hygiene management programs should incorporate effects of disposal and treatment for the complete range of menstrual hygiene products (reusable, compostable and non-compostable disposable products) on users and on the environment. There is a need to educate and make women aware about the environmental pollution and health hazards associated with them.

Awareness sessions when conducted in schools, colleges among students should also have detailed descriptions on the correct ways of using the products and disposing them.

There is a need for promoting effective menstrual materials which needs less and cost-effective management. Though organic disposable sanitary pads are the first choice of many as a viable alternative, rigorous testing must be performed to test claims like complete biodegradability, zero plastic content, and chemical-free before they develop a large consumer base.

Huge cost difference between the organic options and non-organic options is a major hindrance. Tax rebates, subsidies must be issued if a tested organic product releases in the market in order to obtain a significant customer shift.

Awareness regarding handling of menstrual waste among sanitation workers needs to be created, as the majority of them are operating without adequate PPE and negligible knowledge about the health implications of such waste. Gloves and proper safety tools should be provided to the cleaners so that they are not exposed to pathogenic organisms and harmful gases.