



MENSTRUAL WASTE DISPOSAL IN INDIA

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A study by TQH Consulting for the NFSSM Alliance

This study was commissioned by the National Faecal Sludge and Septage Management (NFSSM) Alliance. The alliance currently comprises of 24 organisations and works on all aspects from city sanitation plans to regulatory and institutional frameworks across the sanitation value chain in India.

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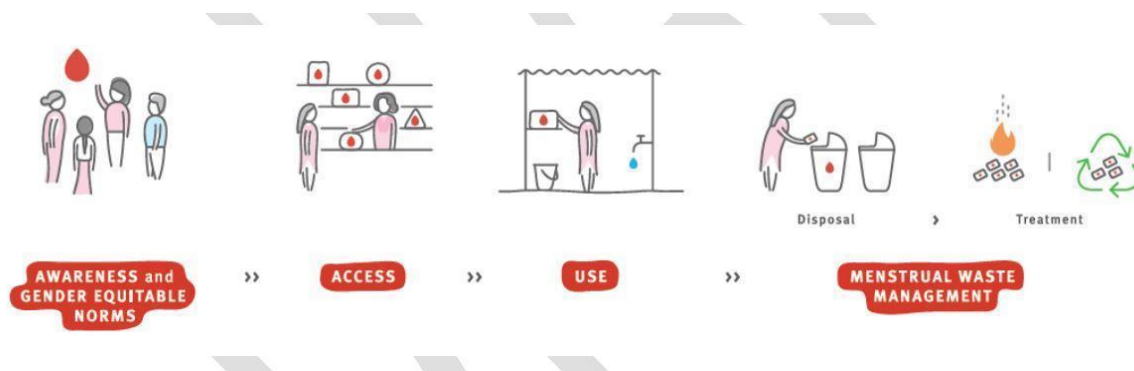
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Background and Overview

Menstrual hygiene management (MHM) refers to the creation of an ecosystem that allows women and girls to experience menstruation in a safe and dignified manner. This begins with easy and affordable access to feminine hygiene products to absorb or collect menstrual blood, and ends with access to facilities for disposing the used products in a safe, hygienic and sustainable manner. In India, menstruation continues to be a problem shrouded in taboo and stigma, despite being a reality for almost 336 million girls and women of reproductive age.¹

Figure 1: MHM Value Chain prepared by Menstrual Health Alliance India (MHAI)



Within the policy landscape in India, MHM has assumed particular significance over the last two decades and various steps have been considered to improve the status of each prong of the MHM ecosystem. The primary focus of the first MHM policies has been on improving access and affordability of products for better menstrual hygiene. This, coupled with rising incomes and awareness, has ensured that commercially available disposable sanitary napkins have witnessed large-scale adoption. To meet the potential demand, manufacturers have also consistently come up with innovations to reduce prices and reach previously untapped markets.

Governmental agencies on their part have also continued to drive policy initiatives towards the same objective. States like Gujarat, Tamil Nadu, Kerala and Telangana have rolled out schemes for large-scale distribution of sanitary napkins to girls in schools, while some other state governments have ensured that their MHM programs include a component of sanitary pad distribution.² The impetus provided by both the government and private players has led to a change in mindsets around menstruation and has increased the use of sanitary napkins among women. According to the NHFS-4, approx. 41.8% of women within the age of 15 to 24 years use sanitary napkins and another 16.4% within the same age group use locally-prepared napkins.³ This number is expected to grow as the market further matures.

One of the by-products of this focus on increasing access to sanitary napkins has been the expanding quantum of waste that is generated on account of menstruation every day. It has been estimated that around 1 billion used pads are discarded per month in India, thus adding to a tremendous quantum of waste generated due to the use of disposable sanitary absorbents.⁴ Various studies have suggested that a single disposable sanitary napkin contains plastic which takes up to 500 to 800 years to naturally decompose, making these napkins a serious environmental hazard.⁵ In addition, these products contain blood and bodily fluids, which if not sanitized to destroy pathogens,

¹ Sushmita Malaviya, 'The mammoth task of managing menstrual waste in India', DownToEarth on 26th February 2019 (<https://www.downtoearth.org.in/blog/health/the-mammoth-task-of-managing-menstrual-waste-in-india-63376>)

² Information provided through stakeholder conversation with Menstrual Health Alliance India.

³ Ministry of Health and Family Welfare, Government of India, 'National Family Health Survey (NHFS-4) 2015-16' Pg. 98 on December 2017 (<http://rchiips.org/nfhs/NFHS-4Reports/India.pdf>)

⁴ Ministry of Drinking Water and Sanitation, Government of India, 'Menstrual Waste Management: A Simple Guide' Pg. 1 (https://jalshakti-ddws.gov.in/sites/default/files/MGISC_Menstrual_Waste_Management_WASH_Network.pdf)

⁵ Anisha Bhatia, 'An Urgent Challenge: Why India needs to tackle its menstrual waste' NDTV on 28th February 2018 (<https://swachhindia.ndtv.com/urgent-challenge-india-needs-tackle-menstrual-waste-6665/>)

can spread dangerous infections to those coming in contact with such waste. All these aspects make the proper disposal and treatment of menstrual waste an extremely vital aspect of the value chain.⁶

Acknowledging the need to reduce the quantum of waste, over the past 5 years, alternatives to disposable sanitary absorbents such as menstrual cups, compostable pads, recyclable pads, cloth pads, etc. have been introduced and are being actively encouraged by some states such as Sikkim, Assam, and Arunachal Pradesh.⁷ In a first attempt, the gram panchayat of Muhamma, a census town in Kerala, has also recently announced that in order to reduce the quantum of menstrual waste it will distribute cloth pads and menstrual cups to the women in the area at a nominal fee.⁸

Despite these examples of alternate products, sanitary napkins continue to be one of the most preferred menstrual hygiene products in India. Accordingly, the disposal and treatment of menstrual waste have also been gaining traction as part of the larger sanitation value chain. Laws such as the Solid Waste Management Rules, 2016 (SWM Rules) and Bio-medical Waste Management Rules, 2016 (Bio-medical Rules) issued by the Ministry of Environment, Forest and Climate Change (MoEF&CC) for the treatment of solid waste and bio-medical waste respectively, deal with issues of sanitary waste and waste containing blood and other bodily fluids. Furthermore, disposal of menstrual waste is also addressed under the MHM Guidelines issued by the erstwhile Ministry of Drinking Water and Sanitation (presently the Jalshakti Ministry) in 2015 in conjunction with UNICEF India.

While the SWM Rules provide for a process of segregation of waste at source into various categories and identifies a disposal method for each category of waste, the Bio-medical Rules identify and categorise bio-medical waste including waste which has blood and body fluids, and prescribes incineration or autoclaving to destroy pathogens in such waste. The MHM Guidelines on the other hand discusses incineration, composting, deep burial as some of the ways in which such waste can be treated and disposed of.

As steps are taken to strengthen the MHM value chain as a whole, it has been observed that there is simultaneous need for a more specific and considered focus on the disposal and treatment leg. This is true for a variety of reasons, including: (a) interconnections between the MHM value chain and the sanitation value chain, (b) the multiplicity of laws, (c) lack of coordination between various governmental agencies, (d) the vast difference in MHM practices across the country, and (e) finally, the myths and taboos attached to menstruation. In the absence of a clear direction, surveys conducted by various organizations such as the World Health Organisation, MHAI, etc. working in the MHM sector have shown that most menstrual waste today finds its way to landfills, open burial pits, water bodies and down toilet drains.⁹

In view of the above concerns and the rising quantum of waste, generated as a result of the increasing use of sanitary napkins, the appropriate disposal and treatment of menstrual waste needs to be discussed both from the perspectives of MHM and sanitation. Without a discernible solution to this issue, the progress made on the MHM front is likely to stagnate and if environmentally sustainable ways of disposal are not identified and implemented, there is likely to be a long-term impact on health and hygiene of the women going through menstruation and the society at large, in addition to the direct adverse impact on the environment.

⁶ Sushmita Malaviya, 'The mammoth task of managing menstrual waste in India', DownToEarth on 26th February 2019 (<https://www.downtoearth.org.in/blog/health/the-mammoth-task-of-managing-menstrual-waste-in-india-63376>)

⁷ Information provided through stakeholder conversation with Menstrual Health Alliance India.

⁸ The Wire Staff, 'Kerala Gram Panchayat Set to Become First to Be Free of Synthetic Sanitary Pads', Wire.in on 30th December 2019 (<https://thewire.in/health/kerala-gram-panchayat-set-to-become-first-to-be-free-of-synthetic-sanitary-pads>)

⁹ Information provided through stakeholder conversation with Biomass Controls.

Objective and Methodology

The current discourse around MHM practices in India is primarily focused on generating awareness and creating access to menstrual absorbents for women and girls in the urban and rural contexts. Building on this foundation, the objective of this research is to assess the efficacy of menstrual waste disposal systems in India, with a specific focus on the use of incineration technology. In addition to examining the overall treatment of menstrual waste, this report studies the existing market size and operational possibilities of large-scale adoption of incinerators as a method of disposal of menstrual waste.

Through in-depth secondary research, this report has drawn up a blueprint of the menstrual waste disposal ecosystem. It traces the menstrual waste value chain, the different methods of menstrual waste disposal and their viability in different contexts. For the purpose of this research, we looked at the legal framework for menstrual waste disposal by analysing the Menstrual Hygiene Management National Guidelines (2015) and the Solid Waste Management Rules (2016), research available on ongoing practices, efforts, and the impact of menstrual waste management, and research articles documenting international examples of menstrual waste management methods. We have also used examples from countries with socio-economic backgrounds that are similar to India, as similar contexts will allow for better assessment of the impact of certain interventions.

To further understand ground realities, we spoke to various stakeholders in the MHM sector, ranging from beneficiaries, incinerator manufacturers, environmental and WASH think tanks, researchers in the field, policy makers and implementers. A complete list of stakeholders consulted is included in *Annexure 2*. The report is structured in the following manner - the first section presents the existing legal frameworks around menstrual waste management, followed by an understanding of menstrual waste management in practice, i.e. the prevalent practices of menstrual waste management in India currently, in contrast with the legal framework. Consecutively, the next section discusses menstrual hygiene and waste disposal practices from other countries. Post that, the report analyses different types of incinerators, their viability, and market size. The report then goes on to identify issues associated with the use of incinerators and analyses the differences between community level or centralised incinerators and decentralised small-scale incinerators and their viability in varying contexts. The last section of the report makes recommendations for policymakers at the centre, state, and local levels based on the above-mentioned research and analysis.

Menstrual waste disposal: Legal framework

At present, there are three primary policies that address disposal of menstrual waste both in urban and rural areas. Set out below are the key provisions of these government interventions. Some of the most significant issues with the existing legal framework around the disposal and treatment of menstrual waste is the multiplicity of laws, that causes ambiguity in the actual process to be adopted, the lack of coordination between different government bodies along with the difference in capacities that makes it difficult to resolve inconsistencies between the laws, and finally, the alignment of incentives of various players in the ecosystem.

1. Solid Waste Management Rules, 2016

The Ministry of Environment, Forest and Climate Change issued the Solid Waste Management Rules, 2016¹⁰ (SWM Rules) in the exercise of its powers under the Environment (Protection) Act, 1986 (EPA). The objective of the rules is to prescribe the processes for the management of solid waste in urban areas in India. SWM Rules also clarify that there are separate rules under the EPA on the treatment of other kinds of waste such as industrial waste, bio-medical waste and e-waste, and these SWM Rules will not apply to any of these categories of waste.

¹⁰ Solid Waste Management Rules, 2016 (<http://bbmp.gov.in/documents/10180/1920333/SWM-Rules-2016.pdf/27c6b5e4-5265-4ace-bff6-451f28202cc8>)

The SWM Rules define solid waste and includes solid or semi-solid sanitary waste within its meaning.¹¹ Sanitary waste is defined as “*wastes comprising of used diapers, sanitary towels or napkins, tampons, condoms, incontinence sheets and any other similar waste*”.¹² Sanitary napkins are also included within the definition of ‘dry waste’ in the SWM Rules.¹³

Every ‘waste generator’ (being any person that generates solid waste) is required to collect and segregate all waste into 3 categories - biodegradable, non-biodegradable and domestic hazardous waste. In case of sanitary waste, the waste generator must wrap the used product into pouches that are provided by the manufacturer or any other suitable wrapping material as instructed by the local authorities and collect it with other non-biodegradable waste.¹⁴ This sanitary waste along with other non-biodegradable waste is taken to the respective processing facility, the secondary storage facility or a material recovery facility.

Additionally, manufacturers of non-biodegradable products including sanitary napkins are required to explore the use of recyclable materials in their products or provide covers/wrappers or pouches for disposal of these products after use. They are also required to create public awareness around the appropriate collection and disposal of such used products.¹⁵ The urban local bodies and nagar panchayats are required to create awareness around the various provisions of the SWM Rules including the manner of disposal of sanitary waste through information, education and communication (IEC) programs.¹⁶ Finally, the SWM Rules also state that the provisions in respect of segregation of waste will become enforceable within 2 years from the date of notification of the rules.¹⁷

2. Guidelines for the management of sanitary waste by Central Pollution Control Board

Pursuant to the powers under the SWM Rules, the Central Pollution Control Board (CPCB) is also allowed to create guidelines on the management of different types of waste. The CPCB issued guidelines for the management of sanitary waste in May 2018¹⁸ (CPCB Guidelines on Sanitary Waste). These guidelines identify various sanitary waste disposal options and provide the kind of waste each option can be used for, where they can be installed and used, and the technical specifications or pollution control norms that could potentially apply to their manufacture and use, such as: (i) low cost, locally made incinerators, (ii) electric incinerators, (iii) high temperature incinerators for bio-medical waste, (iv) deep burial, (v) composting, and (vi) pit burning. Further, the CPCB Guidelines on Sanitary Waste also address the role of different stakeholders in the process, in line with the mandate under the SWM Rules.

According to the guidelines, at **the user level**, all sanitary waste must be placed in the wrapper/pouch provided by the manufacturer or in case no such material is provided, then in an old newspaper and placed along with other non-biodegradable waste.

A **producer or manufacturer of sanitary products** is required to provide packaging material that can be used for disposal, coordinate with local agencies to achieve segregated collection and disposal of sanitary waste. The manufacturers are also required to increase awareness around proper handling and segregation of sanitary napkins and explore the possibility of using recyclable materials for the manufacture of their sanitary products.

In relation to the disposal of sanitary waste, **waste pickers** that are authorised under the SWM Rules may provide services such as incineration on a commercial basis. In case a centralised bio-medical waste treatment facility in the area has sufficient capacity, these waste pickers may also aggregate sanitary waste collection and dispose of it in such treatment facilities.

The **state pollution control boards (SPCBs)** may permit the sale of mini or modular incinerators in cases where common incinerators are not available. Any modular incinerator that is manufactured and marketed will need to comply with any emission standards that are prescribed under law or by the SPCBs at the time. The SPCBs shall also coordinate with various ministries and other government bodies for awareness campaigns, identify district level

¹¹ Rule 3(46), SWM Rules

¹² Rule 3(41), SWM Rules

¹³ Rule 3(19), SWM Rules

¹⁴ Rule 4, SWM Rules

¹⁵ Rule 17, SWM Rules

¹⁶ Rule 15, SWM Rules

¹⁷ Rule 22, SWM Rules

¹⁸ Guidelines for Management of sanitary waste as per Solid Waste Management Rules, 2016 issued in May 2018 (<https://kspcb.gov.in/Sanitary%20Waste%2006082018.pdf>)

resources for implementation and organise the orientation workshops for different officers and other personnel across departments and ministries.

The **urban local bodies (ULBs)** are required to collaborate with the producers towards safe collection and disposal. All collected waste will need to either be disposed of through the waste disposal options, incinerated in treatment, storage and disposal facilities or centralised bio-medical waste treatment facilities or fed into a waste-to-energy treatment plants. ULBs may also set up common incinerators in their locality. ULBs may obtain support from women in the design and structure of MHM infrastructure, and also from private bodies and commercial/ industrial groups for better design of products, more eco-friendly use and disposal practices etc. Finally, ULBs should ensure compliance with the guidelines issued in relation to MHM and also conduct training sessions in schools and communities as per the MHM Guidelines. In rural areas/ villages and at the Panchayat levels, sanitary products that are home-made and biodegradable, can be disposed in a burial pits that are at least 50 cm deep and in case of commercially manufactured sanitary products, low cost incinerators such as matka incinerators can be used.

In addition to the policies set out above, there are other existing governmental interventions that provide a thrust to the menstrual waste disposal apparatus, primarily the use of incinerators. Below is an indicative list of such laws and their relevant provisions that provide guidance on menstrual waste disposal.

3. Menstrual Hygiene Management National Guidelines, 2015

The Menstrual Hygiene Management National Guidelines, 2015¹⁹ (MHM Guidelines) are an integral part of the Swachh Bharat Mission - Guidelines. The MHM Guidelines were issued by the Ministry of Drinking Water and Sanitation in collaboration with UNICEF India in 2015 and are divided into 3 sub-categories. The first sub-category focuses on the main guidelines that address the specific MHM framework and the ambit of this framework in the SBM Guidelines. It discusses in some detail the ways in which MHM choices can be provided to adolescent girls and women and finally describes MHM infrastructure in schools and means of safe disposal of menstrual waste. The second part of the guidelines is a set of Action Guides for different governance bodies and other actors in the ecosystem and finally the third part is a technical guide discussing the various disposal methods such as incinerators, deep burning/burial pits etc.

Aimed at school-going girls, the MHM Guidelines state that MHM awareness needs to be cultivated at 3 separate levels - state level, district level, and school level. **State governments** must enable districts to design, budget, plan, implement and monitor interventions that will sustainably support improved MHM. At the **district level**, relevant local players can be identified and capacity building endeavours can be put in place, as they positively influence general attitudes towards adolescent girls and the importance of considering MHM within the context of sanitation, education, and adolescent health and well-being. Finally, at the **school level**, the focus must be on orienting teachers with the right information and sufficient confidence to break the silence so adolescent girls can readily overcome the stigma and shame associated with menstruation. A supportive community at school will help girls deal with issues around menstruation more confidently for the rest of their lives.


Specifically, on the subject of disposal and treatment of menstrual waste, the MHM Guidelines state that for collection of menstrual waste, there should be discrete bins, with a specific schedule around emptying and appropriate transportation of such waste. Furthermore, the MHM Guidelines state that the chosen method of disposal and treatment must ensure that it involves limited human interaction and no adverse impact on the environment. Offsite disposal can be explored through the solid waste collection and management system. In case there is a hospital with a treatment unit for hazardous waste nearby it can be worked into the process. Options for on-site disposal include deep burial, composting, pit burning and incineration.²⁰ The MHM Guidelines further acknowledge that choosing the right disposal option for menstrual waste for a given area will be dependent on key factors such as amount and type of materials, the available budget (investment and O&M costs) and environmental considerations. Also, socio-cultural perceptions might play a role in the choice and use of the solution.²¹

¹⁹ Ministry of Drinking Water and Sanitation, Government of India, 'Menstrual Waste Management: National Guidelines, 2015' (http://www.ccras.nic.in/sites/default/files/Notices/16042018_Menstrual_Hygiene_Management.pdf)

²⁰MHM Guidelines Pg. 19

²¹MHM Guidelines Pg. 19

Figure 2: Common disposal practices and their safety under the MHM Guidelines, under Swachh Bharat Mission

<div>Unsafe</div>  <div>Safe</div>	Common practices
	Throw them unwrapped into fields, rooftops, etc.
	Wrap them in paper/ plastic bag and throwing them outside
	Drying, wrap in paper/ plastic bag and throw in dustbins (mostly non-rural)
	Bury them for de-composting
	Throw them in latrine/ toilets
	Burn it (rural areas and peri-urban areas)
	Use small scale incinerators (community or school levels)
	Municipal waste management/ burning in health clinics (more urban)

The budgetary requirements for all such MHM activities under the MHM Guidelines can be taken from the Swachh Bharat Mission budget, where any IEC programs related to MHM can be rolled out through the IEC campaigns budget of the SBM, and under the Solid Liquid Waste Management component, incinerators may be purchased to be placed in schools.²²

4. Swachh Bharat Mission

4.1 Menstrual waste disposal under SBM-Urban and SBM-Gramin guidelines

The Swachh Bharat Mission (SBM) as an initiative was introduced in 2014 in order to ensure that India becomes an open defecation free (ODF) country with strong solid waste management systems at the municipal level. Under SBM, there are separate guidelines for rural and urban areas. Under the SBM-Urban (SBM-U) guidelines, the norms and specifications for construction of public/community toilets has provisions for installing incinerators in each toilet block.²³ Similarly, for rural areas the SBM-Gramin (SBM-G) guidelines discuss implementation of sufficient facilities for ensuring MHM and requires that safe disposal of menstrual waste be a priority and states that this can be achieved through the use of incinerators.²⁴ In addition, the guidelines have also discussed the disposal of menstrual waste in the context of solid and liquid waste management, specifying that while segregation and collection of waste is a focus, for safe disposal of menstrual waste incinerators are the preferred mode of disposal.

4.2 ODF Protocols and Swachh Survekshan

Under the objectives of SBM and in order to promote the ideal of cities that are 100% open defecation free, the SBM has brought together a set of principles that work as an advisory guide towards achieving the status of an 'Open Defecation Free' city. The strength of the community led sanitation programs run under the SBM banner in a city determines the category that the city falls under on the ODF scale. The protocols that underpin such categorization include provisions for distinct community/public toilet facilities for men and women. As part of the assessment, any city that wishes to achieve the ODF+ status needs to ensure that at least 10% of its public and community toilets have sanitary napkin vending machines and an appropriate disposal mechanism for such sanitary waste. Similarly, for a city to achieve an ODF++ status, it needs to establish the same for at least 25% of its public and community toilets.²⁵

²²MHM Guidelines Pg. 2

²³ Ministry of Housing and Urban Affairs, Government of India, 'Guidelines for Swachh Bharat Mission - Urban' dated 5th October 2017 (http://swachhbharaturban.gov.in/writereaddata/SBM_GUIDELINE.pdf)

²⁴ Ministry of Drinking Water and Sanitation, Government of India, 'Guidelines for Swachh Bharat Mission (Gramin)' dated October 2017 (<http://swachhbharatmission.gov.in/sbmcms/writereaddata/images/pdf/Guidelines/Complete-set-guidelines.pdf>)

²⁵ Ministry of Housing and Urban Affairs, Government of India, 'Declaring your City/ Town as SBMODF+ and SBMODF++: Toolkit for Urban Local Bodies' (<https://www.pcmcindia.gov.in/marathi/swm2019/ODFPlus.pdf>)

5. Sarva Shiksha Abhiyaan

Under Samagra Shiksha, a scheme introduced by the government under the banner of Sarva Shiksha Abhiyaan, the Department of School Education and Literacy under the Ministry of Human Resource Development (HRD Ministry) has issued a set of guidelines called the 'Draft Framework for implementation of the Samagra Shiksha - an Integrated Scheme for School Education'. One of the components of the framework is making separate toilet facilities available for girls in schools. The framework also requires that all such toilets have an environmentally safe incinerator.²⁶ Introduced as a measure to reduce absenteeism among girls during menstruation, the focus is on providing sufficient, safe and discrete facilities to girls during menstruation, including the use of environmentally sustainable disposal systems. This is as a step towards improving disposal under the MHM value chain in schools.

Based on the above, the following observations can be made:

First, other than the SWM Rules, the other policy interventions exist either as guidelines or advisories issued by various governmental agencies. This means that they are not compulsory but at best, persuasive in nature.

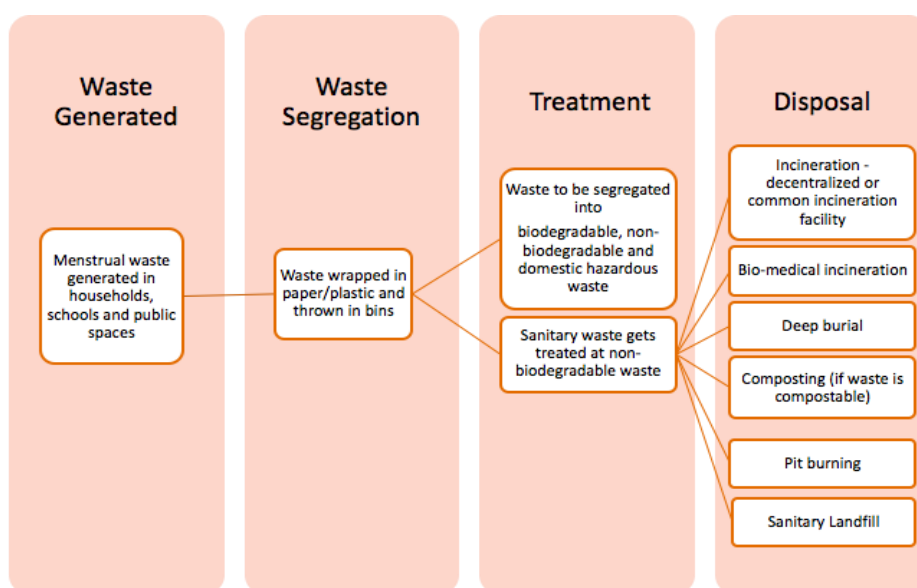
Second, the treatment and disposal of menstrual waste under each of these policies is different, leading to issues in its implementation processes.

Third, despite the inconsistency in treatment of such waste, there has been an increasing thrust towards using incinerators as a mode of disposal in absence of other scalable alternatives. Existing policy interventions either suggest the use of incinerators explicitly or in cases where the law states that an appropriate method will be utilized, we have been informed by stakeholders that in most occasions, incinerators have been installed for disposal. Finally, in addition to the central schemes that we have set out above, state governments have also been undertaking small-scale schemes to introduce incinerators as a disposal method of choice. We have discussed some of these examples in details in the following sections of the report.

Menstrual waste disposal: In practice

Menstrual waste management includes all activities from the time waste is generated, to segregation, its treatment and disposal. The diagram below summarises the disposal mechanism for menstrual waste, which falls under the definition of sanitary waste in the Solid Waste Management Rules 2016, and the CPCB Guidelines on Sanitary Waste as discussed above.

Figure 3: Flowchart showing the menstrual waste disposal value chain in India, according to the SWM Rules 2016



²⁶ Ministry of Human Resource Development, Government of India, 'Samagra Shiksha, An Integrated Scheme for School Education: A Framework for Implementation' (http://samagra.mhrd.gov.in/docs/Framework_IISE%20_F.pdf)

The figure above suggests that proper disposal of menstrual waste requires segregation at the waste generation level. Our research and interviews with multiple stakeholders, however, show that menstrual waste is mostly not segregated from normal household waste or public waste when being disposed of and collected by municipalities across most of the country. Due to this, in practice, menstrual waste gets mixed with other household waste that may end up in a landfill or disposed of in an inefficient manner. Moreover, since solid waste management comes under local governance and is carried out by municipalities, the practices vary across cities and regions. In this section, we have tried to capture the numerous observations made by us through stakeholder consultations and secondary research using available literature.

The different methods of menstrual waste disposal being practiced by different types of users has been elaborated below:

- **Household users** - The menstrual waste in households is most often not segregated from other household waste, with the exception of a few cities and municipalities such as Panaji and Pune where segregation mechanisms have been implemented.²⁷ Additionally, the disposal mechanisms vary across the rural and urban contexts. In rural areas, where waste collection is not as popular, women may collect and bury their menstrual waste near their house, or practice open burning as a way of getting rid of the waste.²⁸ Contrary to that, urban areas have waste collection systems that can collect household waste and place them in a landfill (burial) or if segregated, incinerate the waste using centralised incinerators.
- **Schools and office spaces** - In most cities, waste from schools and office spaces also find its way to landfills. Lately, however, given the increased traction on MHM in India, there is a small but growing number of schools and offices that have installed decentralised incinerators in their buildings where menstrual waste can be disposed of on-site. At least 19 states including Tamil Nadu,²⁹ Maharashtra,³⁰ Goa,³¹ Karnataka³² and Telangana³³ have reported institutionalized programs for installation of incinerators. Given that schools and offices often have private waste collection and segregation staff, the system for menstrual waste disposal can be refined to dispose of the waste in a sustainable manner, which may not always be the case in practice.
- **Community users/Public toilets** – In the case of community users and public washrooms, depending on the management the menstrual waste may be segregated. If segregated, the waste can be incinerated, following solid waste management rules, or buried in a landfill.
- **Hospitals/Dispensaries** - All body fluids and blood-related waste is segregated and put into yellow coded bags for disposal. The yellow bags are transported to a biomedical waste incineration facility and disposed of according to the Biomedical Waste Management Guidelines.

Given the above-mentioned practices for disposal of menstrual waste, the practices in rural and semi-rural areas vary to a great extent. There is a lack of awareness, access to toilets and absence of organised disposal infrastructure. In view of this, the disposal methods in rural areas involve burning in open spaces, shallow burial near water bodies and some other forms of burning and burial to dispose of menstrual waste, which leads to hazardous consequences such as polluted water bodies and air, and the introduction of toxins into the soil. The socio-cultural norms, including myths and superstitions often aggravate the situation. Community-specific beliefs play an important role in the determination of appropriate disposal methods. For instance, in some communities in Gujarat, there is a belief that that burning menstrual waste can cause harm to family members and therefore any disposal method that

²⁷Is green menstruation possible?, Swati Singh Sambyal, Sonia Henam, Fiola Tariang, 29 May 2019, <https://www.downtoearth.org.in/blog/waste/is-green-menstruation-possible--64796>

²⁸ Stakeholder conversations

²⁹ Tamil Nadu to Set up over 4000 Sanitary Napkin Incinerators in Govt. Schools!, Raymond Engineer, 21 Marh 2018, <https://www.thebetterindia.com/135175/tamil-nadu-sanitary-napkin-incinerators-government-schools-promoting-menstrual-hygiene/>

³⁰ On World Menstrual Hygiene Day, Maharashtra Announces 400 Toilets Equipped With Sanitary Napkin Facilities On Highways, Gopi Karelia, NDTV, 29 May 2018, <https://swachhindia.ndtv.com/world-menstrual-hygiene-day-maharashtra-toilets-equipped-sanitary-napkin-facilities-20493/>

³¹ Colleges equipped with sanitary pad machines, Times of India, 24 June 2019, <https://timesofindia.indiatimes.com/city/goa/colleges-equipped-with-sanitary-pad-machines/articleshow/69919731.cms>

³² Karnataka Takes A Step Towards Menstrual Hygiene Management, May Soon Introduce Pink Toilets, Gopi Karelia, NDTV, 24 January, 2018, <https://swachhindia.ndtv.com/karnataka-takes-step-towards-menstrual-hygiene-management-may-soon-introduce-pink-toilets-16912/>

³³ A Bengaluru woman's machine may solve the issue of sanitary waste disposal in India, Geetika Mantri, The News Minute, May 04, 2019, <https://www.thenewsminute.com/article/bengaluru-woman-s-machine-may-solve-issue-sanitary-waste-disposal-india-101203>

involves burning is not likely to see uptake. There are similar hurdles in menstrual waste management that can be seen around the world in developing countries. However, with increase in awareness and access, there has been some evolution in the menstrual waste paradigm.

Menstrual waste management practices in other countries

Given the accelerating discourse around menstrual waste disposal and incinerators, this report looks into international practices as well as different technologies being used around the world to dispose of menstrual waste. However, considering menstrual hygiene management is in its nascent stages in the developing world, there is limited data available on menstrual waste disposal methods in those areas. A literature review on Menstrual Hygiene Management and Waste Disposal in Low- and Middle-Income Countries³⁴ says that urban areas of LMICs have reported using sanitary pads, cloth and tissue paper as the most used menstrual hygiene products.

Studies from African countries such as Ghana,³⁵ Nigeria³⁶ and Egypt³⁷ indicated that girls in secondary schools mainly used sanitary pads.³⁸ School girls from Malawi and Ethiopia primarily rely on cloth or homemade pads, whereas Asian countries showed greater use of cloth or clothes during menstruation.³⁹ Some studies also show that tampons are the absorbent of choice for a few users in India,⁴⁰ Uganda,⁴¹ South Africa⁴² and Nigeria,⁴³ along with pilot studies that point to usage of menstrual cups in Zimbabwe and South Africa, which received positive feedback. These, however, are neither a common practice nor a scalable solution due to the social and cultural norms surrounding insertable products and beliefs around virginity in these regions.⁴⁴

To understand the disposal mechanisms of menstrual waste, it is important to gauge the context of sanitation systems, paying specific attention to the various interaction points across the sanitation value chain from the toilet, waste collection, conveyance, and treatment and disposal of sanitary waste. For example, in low-income regions of Bangladesh, some women disposed of their used cloth in drains and ditches, but others who were uncomfortable with disposing of menstrual cloth in the open, disposed them in toilets due to the perception that it was a discrete disposal option.⁴⁵

³⁴ Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature, Myles F. Elledge, Arundati Muralidharan, Alison Parker, Kristin T. Ravndal, Mariam Siddiqui, Anju P. Toolaram and Katherine P. Woodward, <https://www.mdpi.com/1660-4601/15/11/2562/htm>

³⁵ Menstrual hygiene management in Ghana: understanding the socio-cultural, economic, political factors, challenges and opportunities, S.A. Asimah, P.Y. Diabene & S.N.L. Wellington (Ghana), 2017, <https://wedc-knowledge.lboro.ac.uk/resources/conference/40/Asimah-2775.pdf>

³⁶ Knowledge and menstrual hygiene practices among adolescents in senior secondary schools in Ile Ife, south-western Nigeria, O. Olufemi Aluko, O. Modupe Oluya, O. Ayomide Olaleye, A. Adebola Olajuyin, T. Funmilola Olabintan and O. Iriyise Oloruntoba-Oju, Journal of Water, Sanitation and Hygiene for Development, 2014, <https://pdfs.semanticscholar.org/52b2/ef8756d92fa1cdfaf7a09c314be3bee053c9.pdf>
Menstrual health: the unmet needs of adolescent girls' in Sokoto, Nigeria, Oche M Oche, January 2012, https://www.researchgate.net/profile/Oche_M_Oche/publication/259571441_Menstrual_health_the_unmet_needs_of_adolescent_girls_in_Sokoto_Nigeria/links/02e7e52c9e544102f1000000.pdf

³⁷ Menstrual Hygiene among Adolescent Schoolgirls in Mansoura, Egypt, Abdel-Hady El-Gilany, Karima Badawi & Sanaa El-Fedawy, 2005, [https://www.tandfonline.com/doi/pdf/10.1016/S0968-8080\(05\)26191-8](https://www.tandfonline.com/doi/pdf/10.1016/S0968-8080(05)26191-8)

³⁸ Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature, Myles F. Elledge, Arundati Muralidharan, Alison Parker, Kristin T. Ravndal, Mariam Siddiqui, Anju P. Toolaram and Katherine P. Woodward, <https://www.mdpi.com/1660-4601/15/11/2562/htm>

³⁹ Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature, Myles F. Elledge, Arundati Muralidharan, Alison Parker, Kristin T. Ravndal, Mariam Siddiqui, Anju P. Toolaram and Katherine P. Woodward, <https://www.mdpi.com/1660-4601/15/11/2562/htm#app1-ijerph-15-02562>

⁴⁰ Menstrual hygiene management among adolescent girls in India: a systematic review and meta-analysis, van Eijk AM, Sivakami M, Thakkar MB, et al, 5 February, 2016, <https://bmjopen.bmj.com/content/bmjopen/6/3/e010290.full.pdf>

⁴¹ Menstrual hygiene in Ugandan schools: an investigation of low-cost sanitary pads, Journal of Water, Sanitation and Hygiene for Development (2012), Tracey Crofts ; Julie Fisher, <https://iwaponline.com/washdev/article-abstract/2/1/50/28811>

⁴² Acceptability and Performance of the Menstrual Cup in South Africa: A Randomized Crossover Trial Comparing the Menstrual Cup to Tampons or Sanitary Pads, Mags E. Beksinska, Jenni Smit, Ross Greener, Catherine S. Todd, Mei-ling Ting Lee, Virginia Maphumulo, and Vivian Hoffmann, 15 Feb 2015, <https://www.liebertpub.com/doi/abs/10.1089/jwh.2014.5021>

⁴³ Knowledge and menstrual hygiene practices among adolescents in senior secondary schools in Ile Ife, south-western Nigeria, O. Olufemi Aluko, O. Modupe Oluya, O. Ayomide Olaleye, A. Adebola Olajuyin, T. Funmilola Olabintan and O. Iriyise Oloruntoba-Oju, Journal of Water, Sanitation and Hygiene for Development, 2014, <https://iwaponline.com/washdev/article-abstract/4/2/248/30369>

⁴⁴ Sanitation in developing countries: a review through a gender lens. Journal of Water, Sanitation and Hygiene for Development, Tilley, E., Bieri, S. and Kohler, P., 2013. <https://iwaponline.com/washdev/article-abstract/3/3/298/30302>

⁴⁵ Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature, Myles F. Elledge, Arundati Muralidharan, Alison Parker, Kristin T. Ravndal, Mariam Siddiqui, Anju P. Toolaram and Katherine P. Woodward, <https://www.mdpi.com/1660-4601/15/11/2562/htm#B7-ijerph-15-02562>

Moreover, the use of dustbins varies across regions in LMICs. Many women do not prefer using dustbins because they fear that it will bring shame to women as waste collectors will think poorly of them if they see the used pads. A study in Durban (South Africa) reports that none of the studied communal Ablution Blocks had bins within the toilets for disposal.⁴⁶ Additionally, in South Africa, women reported that they do not throw used pads in the municipal dustbins as they feared that dogs will dig out the used pads, and someone will see them.⁴⁷ Therefore, they prefer to bury the waste under an old tin box or a heavy stone. The perception of shame associated with menses often forces girls to stay out of school during menstruation. Schools often lack proper water and sanitation facilities and hence do not allow women to dispose of their sanitary waste in a proper and discreet manner.

While incinerators are considered convenient and facilitate onsite disposal, there also are reports of unusable, broken school incinerators, problems with smoke and smell from simple incinerators in schools, and concerns voiced about emissions released from incinerators.⁴⁸

Given the above examples and research studies, we see that most pilots and research around menstrual waste are being conducted in LMICs in absence of less developed solid waste management systems at the level of cities and towns.

Menstrual waste disposal: Use of incinerators

Incineration is a waste disposal mechanism through which waste is burnt at a very high temperature and converted to ash. In the context of menstrual waste, incineration has gained much traction as a preferred method of destruction of harmful pathogens in sanitary waste, this kind of waste as discussed above taking a very long time to decompose and therefore being harmful to the environment. The increasing use of incineration as a mode of disposal and treatment of menstrual waste has been catalysed in India by its reference in the SWM Rules, the Bio-Medical Waste Management Rules, 2016, the CPCB Guidelines on Sanitary Waste and the MHM Guidelines. Taking direction from these rules, flagship schemes such as the Sarva Shiksha Abhiyaan⁴⁹ and even the ODF + and ODF ++ protocols⁵⁰ under the Swachh Bharat Mission have been actively promoting the use of incinerators. While bio-medical waste treatment facilities have routinely relied on incineration for the disposal of certain kinds of waste including waste that has blood or other body fluids, the use of small and medium scale incinerators placed at source have also seen an increase in their uptake recently, with as many as 19 states in India having reported scheme/pilots for the installation and use of such small scale or medium scale incinerators.⁵¹

The following section tries to highlight the different kinds of incinerators available in the market and also addresses the various issues around the use of incinerators for menstrual waste. For the purpose of our study we have categorised incinerators into two broad categories - decentralised incinerators and centralised incinerators, and decentralised incinerators are further categorised into small scale and medium scale incinerators. A small-scale incinerator is one that has a capacity of up to approx. 200/300 pads a day and a medium scale has a capacity of up to approx. 800/900 pads a day. Both of these are considered to be decentralised options. A large-scale incinerator is

⁴⁶Menstrual management in communal sanitation facilities: recommendations to eThekweni municipality, C. Truysens, R. Wilmouth, C. Buckley, W. Turnberg & W. Daniell, USA, Kenya, 2013, <https://pdfs.semanticscholar.org/08a7/221b04fcb23ac866d587e43775e8525784e4.pdf>

⁴⁷ "Bitten By Shyness": Menstrual Hygiene Management, Sanitation, and the Quest for Privacy in South Africa, Fiona Scorgie, Jennifer Foster, Jonathan Stadle, Medical Anthropology Cross-Cultural Studies in Health and Illness, 24 November 2015, https://www.researchgate.net/profile/Fiona_Scorgie3/publication/282760011_Bitten_By_Shyness_Menstrual_Hygiene_Management_Sanitation_and_the_Quest_for_Privacy_in_South_Africa/links/56fe642708ace995dde72d2a.pdf

⁴⁸ Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature, Myles F. Elledge, Arundati Muralidharan, Alison Parker, Kristin T. Ravndal, Mariam Siddiqui, Anju P. Toolaram and Katherine P. Woodward <https://www.mdpi.com/1660-4601/15/11/2562/htm#B7-ijerph-15-02562>

⁴⁹Ministry of Human Resource Development, Government of India, 'Samagra Shiksha, An Integrated Scheme for School Education: A Framework for Implementation' (http://samagra.mhrd.gov.in/docs/Framework_IISE%20_F.pdf)

⁵⁰Ministry of Housing and Urban Affairs, Government of India, 'Declaring your City/ Town as SBMODF+ and SBMODF++: Toolkit for Urban Local Bodies' (<https://www.pcmindia.gov.in/marathi/swm2019/ODFPlus.pdf>) along with stakeholder discussions

⁵¹ Information sourced from stakeholder discussion.

one which has a capacity of more than 1400 pads/day and would include incinerators placed at bio-medical waste treatment facilities, waste to energy plants, etc.

Figure 4: Types of Incinerators



Centralised incinerators

In India, the large-scale incineration technology has existed for many years and has seen mixed reactions. Its presence was challenged in the Supreme Court of India through a public interest litigation, which concluded with the apex court permitting the use of bio-medical incinerators for various hospitals.⁵² However, large-scale incinerators are largely present in most urban and peri-urban areas and used for treatment of bio-medical waste or for a combination of bio-medical waste and other solid waste that is incinerable. In view of their continued use, standards have been prescribed under the Bio-Medical Waste Management Rules, 2016 and regulations and guidelines framed under it.

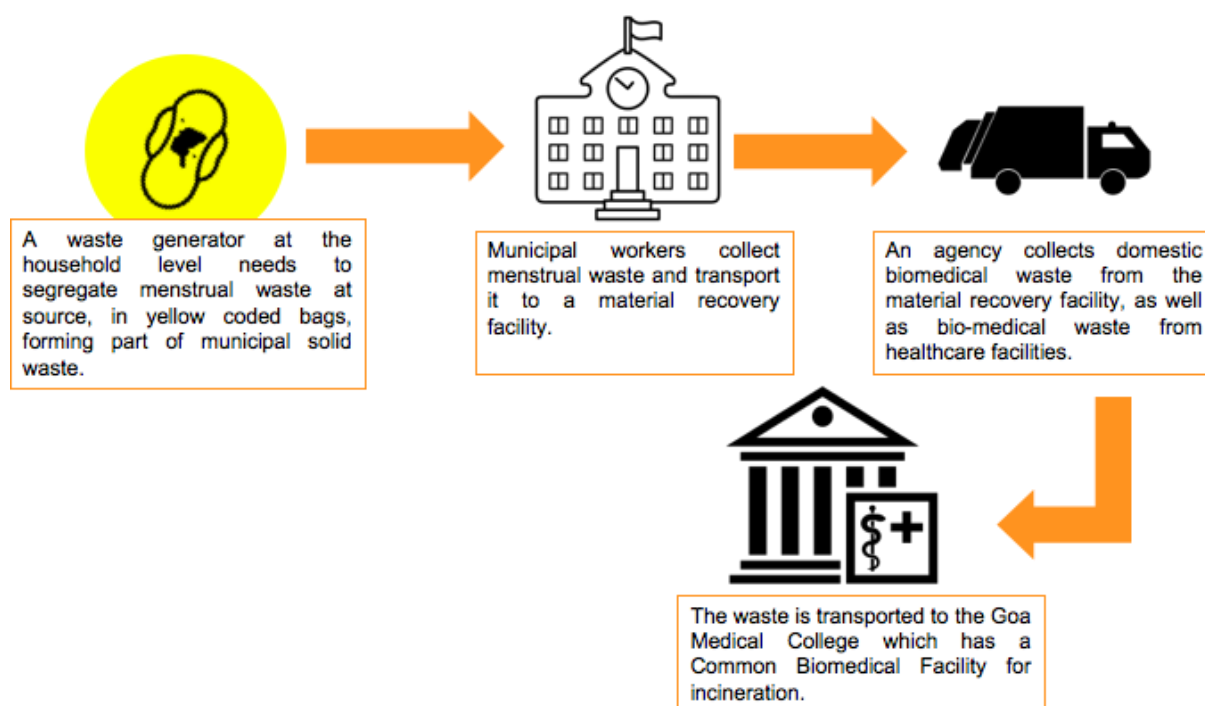
One of the most important prerequisites for the use of any centralised incinerator is the need for developed infrastructure and processes around segregation of waste. The focus on segregation in case of any centralised incinerator has been reiterated by multiple stakeholders working with ULBs in different parts of India. Segregation as a process has also been proposed under the SWM Rules, which provide a period of 2 years from the date of notification of the rules (in 2016) for the implementation of this provision. Large-scale segregation efforts are underway in many cities around India, with cities like Indore (as per the Swachh Sarvekshan 2019), doing well on this front. Other cities such as Pune and Panaji have also attempted to address the issue of segregation at the ULB level in earnest over the past decade through efforts of the municipal local body (in case of Panaji) and through civil society initiatives (in case of Pune). However, most municipalities segregate waste into dry and wet waste. Sanitary waste is not identified separately and finds its way to landfills.

⁵²*Dr. B. L. Wadebra v. Union of India* 1996 SCC (2) 594

Case Study - Panaji Municipal Corporation

In 2002, the Panaji Municipal Corporation started an initiative to segregate sanitary waste from general household waste and dispose of it using a biomedical incinerator in the Goa Medical College. Menstrual waste is segregated at the household level into yellow coded bags. Once the waste is segregated at source, the municipal workers collect the waste and transport it to a material recovery facility. At the facility, a third-party agency collects the domestic biomedical waste, along with biomedical waste from healthcare facilities, and transports it to the Goa Medical College's common biomedical waste facility for incineration.

While this example is often cited as a best practice in the Indian context, Panaji has been facing challenges in sustaining this model for menstrual waste disposal. Media reports and stakeholder interactions indicate that the many households and commercial establishments have discontinued segregation at their end due to lack of regular inspections and lax enforcement. Furthermore, the city corporation has also found it hard to keep up with the growing quantum of waste. The biomedical waste incinerator can only dispose of 40 kgs of waste at a time, which poses as a capacity constraint for the disposal of menstrual waste.² It has been reported that a large amount of sanitary waste is left at the Material Recovery Facility because the bio-medical incinerator does not have the capacity to incinerate the waste.³ Both these factors have resulted in the failure of Panaji's menstrual waste disposal ecosystem as their facilities have been stretched beyond capacity, and the quantum of waste continues to increase.



¹ Is green menstruation possible?, Swati Singh Sambyal, Sonia Henam, FiolaTariang, 29 May 2019, <https://www.downtoearth.org.in/blog/waste/is-green-menstruation-possible--64796>

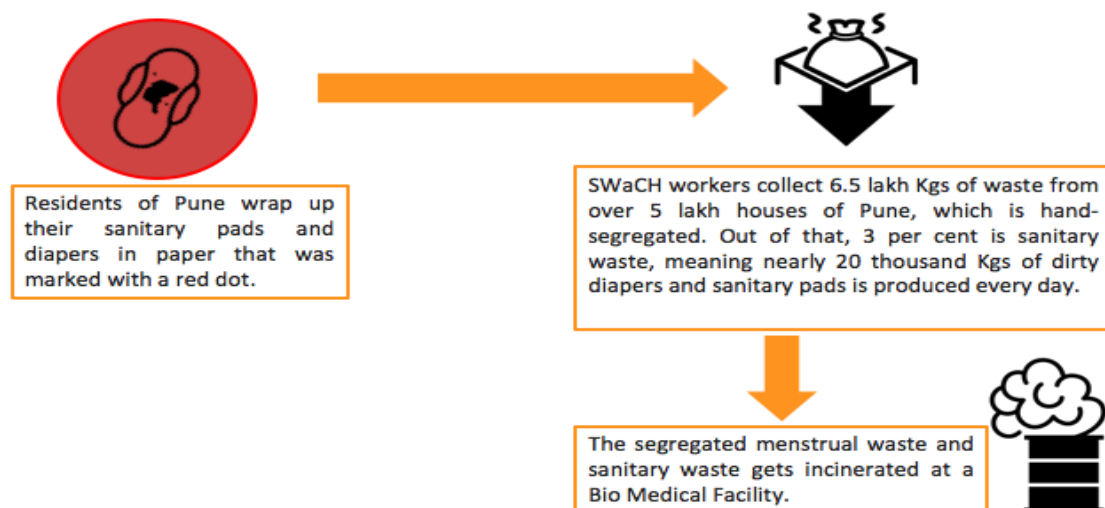
² Basis stakeholder conversations

³ Why Panaji should not give up on decentralized waste management, Richa Agarwal, 03 August 2017, <https://www.downtoearth.org.in/news/waste/back-to-bins-58380>

Case Study: Pune – Red Dot Program

In 2018, Pune formally adopted a waste segregation system that aids better disposal of sanitary waste, and named the campaign the Red Dot Campaign.¹ The process was started by a non-governmental organisation and has been a community-led movement for more efficient waste disposal in Pune. The residents of Pune wrap their menstrual waste and diapers in a bag and code it by pasting a red sticker on the waste. The waste is then collected by SWaCH workers who collect approximately 6.5 lakh kgs of waste from all households, out of which 20,000 kgs. are sanitary waste.² This sanitary waste is then taken to a Biomedical Facility where it is incinerated in the correct manner.

Pune, like Panaji, has faced hurdles in sustaining this model of menstrual waste disposal, as segregation of waste is dependent on user behaviour, which is hard to control at the household level across 5 lakh houses in Pune. Conversations with stakeholders reveal that even with awareness efforts, a small percentage of households segregate their waste in the prescribed manner. The Pune Municipal Corporation (PMC) and P&G have entered into a joint venture and are coming up with a recycling facility for sanitary waste, which will be piloted in Aundh. The recycling facility will segregate the sanitary waste into three to four components that can be used as compost and will have technology that can turn 100% of the waste into valuable materials like plastic cellulose and absorbent material. Each tonne of sanitary waste will produce 50 kgs of cellulose, 75kgs of mixed plastics and 5kgs of absorbent material.³



¹ A Simple Red Dot On Your Menstrual Waste Can Change A Sanitation Worker's Life, Gopi Karelia, 28 February 2018, <https://swachhindia.ndtv.com/simple-red-dot-menstrual-waste-can-change-sanitation-workers-life-2-5840/>

² A first-of-a-kind campaign in Pune creates awareness about sanitary waste segregation, Richa Agarwal, 13 February 2017, <https://www.downtoearth.org.in/news/waste/a-first-of-a-kind-campaign-in-pune-creates-awareness-about-sanitary-waste-segregation-57033>

³P&G, SWaCH to recycle sanitary napkin waste generated in city, Neha Basudkar, 8 October 2018, <https://www.sakaltimes.com/pune/pg-swach-recycle-sanitary-napkin-waste-generated-city-26060>

Challenges in the adoption of centralised incinerators

1. Need for segregation at source and at collection points

One of the most significant barriers to a more focused use of large-scale incinerators is the fact that there is a level of segregation at source and during transportation that is required for such disposal and treatment to be effective. Segregation processes at all levels have seen limited success and a result of that the last mile treatment of waste is adversely impacted. As of 9th December 2019, following the records of the Ministry of Housing and Urban Affairs, segregation in ULBs continues to happen under the heads of dry waste and wet waste. The MoHUA has confirmed that there is no such category as sanitary waste/menstrual waste under the banner of Swachh Bharat Mission-Urban, despite it being a requirement under the SWM Rules.⁵³

The issue of segregation therefore needs to be discussed in two distinct contexts i.e. urban and rural.

Urban areas

Under the SWM Rules, an urban local body that collects waste from households/community and public toilets or schools are responsible for ensuring that the 'waste generators' provide them with segregated waste. For this process to function smoothly, the following actions need to be completed:

- Every waste generator must collect waste at source in a segregated manner as prescribed by the municipal corporation.
- A sanitation worker/waste picker (responsible for collecting waste from source) must carry the segregated waste to the material recovery facilities.
- Once sorting takes place at these facilities, the different kinds of waste is then separately transported to their final treatment stations.

Given this process, two key factors need to be highlighted - first is the incumbent infrastructure required for segregation which includes separate bins for storage at source, collection vans and trucks which have the relevant compartmentalisation, a material recovery facility that utilises the right technology for the separation of waste that has to be treated differently, and finally the treatment facilities such as large scale incinerators, composting pits, landfills etc.

The second factor is the level of dependency on human interaction. In most circumstances, there is human interaction necessary for the collection at source, transportation of the waste and in most cases even during the final segregation since manual segregation is the most effective form of segregation available to the country. It is therefore necessary that at each of these stages, the sanitation workers are made aware of their responsibility for segregation and the consequence of segregation not being done appropriately. Furthermore, the most important step in the process is also the fact that waste generators at the household level need to segregate and keep separate all waste including sanitary waste till it is collected.

On the basis of interaction with stakeholders, we understand that these processes for segregation that have been initiated under the SWM Rules and otherwise by specific urban local bodies have not seen much success and to that end, unless these are strengthened, large-scale incinerator use is likely to be limited. Under the Swachh Survekshan 2019, which is the world's largest cleanliness survey, as of 31st January 2019 only 436 ULBs out of approximately 4000 cities surveyed have initiated source segregation of waste in at least 40% of the wards.⁵⁴

This problem is aggravated for sanitary waste due to the hazardous nature of the waste, which if left exposed or mixed with other waste is likely to have adverse health consequences. Moreover, due to the long-standing taboo around menstruation, women in urban areas do not feel comfortable identifying their menstrual waste and pack it up discreetly, making it harder for waste pickers to avoid contact with such waste. Finally, what needs to be

⁵³ Information sourced from an RTI response received from the Ministry of Housing and Urban Affairs dated 12th December 2019 bearing registration no. MOURB/R/2019/51981/1

⁵⁴ Ministry of Housing and Urban Affairs, Government of India, Swachh Survekshan Report 2019 at Pg. 5
<https://swachhsurvekshan2019.org/Images/SS2019%20Report.pdf>

acknowledged in this regard is that under the law, each ULB is required to prepare and implement its own solid waste management plan and the treatment of any waste can vary substantially across states.

Also, as can be seen above with the two case studies of Panaji and Pune, even in smaller municipal areas, it is hard to sustain segregation by households, given it takes a massive behavioural change effort and enforcement through fines, etc.

Rural areas

In rural areas, the quantum of waste is limited and accordingly, there is no systematic collection of waste. There are certain localised processes followed for waste disposal but in general most of such waste finds its way into water bodies and open landfills which is burnt periodically. Furthermore, there is limited knowledge and awareness among households on the impact of this kind of unsegregated waste. The stigma around menstruation, coupled with the myths prevalent in certain communities make it difficult to segregate and identify what can be done to treat and safely dispose the waste.

Stakeholders have informed us that large-scale incinerators which require some level of segregation are difficult to adopt due to the challenges of segregation infrastructure and behavioural change.

2. Cost of using centralised incinerators

The issue of segregation notwithstanding, the CPCB Guidelines on Sanitary Waste state that for the purpose of disposal of menstrual waste, waste pickers may rely on existing bio-medical facilities with an incinerator for disposal of menstrual waste. In fact, cities that are practicing or using some form of waste segregation and disposal plans (including Panaji and Pune) are using existing bio-medical incineration facilities. While this provision seems innocuous, there exist some systemic issues with its implementation. In our conversation with stakeholders, we were made aware that since the bio-medical facilities are often run by private organisations, there are large costs associated with their use. In fact, citing the example of a peri-urban town in Uttar Pradesh, the stakeholder informed us that the cost of using the bio-medical treatment facility for menstrual waste would cost the ULB approx. Rs. 24/kg.⁵⁵ This would be a large cost burden on a municipal body that is already struggling to implement sanitation systems due to resource crunch.

The other issue is that there are no incentives for these bio-medical treatment facilities (as private entities) to engage in the process of more effective menstrual waste disposal and this lack of incentive plays a huge role in mandating that ULBs have to pay commercial market rates for treatment of large quantum of waste, which may not be feasible.

Decentralised incinerators

Decentralised incineration in India for the purpose of disposal of menstrual waste arose from the need for segregation at source in cases of centralised incineration technologies. It was observed that there was a need for a disposal method that could ideally be placed at source and would not require much human interaction but could be used by the waste generator directly. The decentralised incineration approach therefore fit the bill in this regard. If burnt correctly, this incinerator ostensibly disposes of pads with limited smoke and ash residue. Finally, in addition, to being a discrete solution to the menstrual waste disposal problem, these incinerators also have come to be seen as a part of a complete MHM package, whereby sanitary napkin manufacturers provide an incinerator machine to be installed with their vending machine.

The CPCB Guidelines on Sanitary Waste that released after both the SWM Rules and the MHM Guidelines attempt to reconcile both these legal frameworks and describe some broad specifications that some of the small-scale incinerators may follow. The CPCB Guidelines on Sanitary Waste identify 2 types of small-scale incinerators - low cost, locally manufactured incinerator and second, the electric incinerator. It also discusses the technical aspects of a bio-medical waste incinerator which has been covered in detail in the Bio-medical Waste Management Rules, 2016. The relevant provisions from the CPCB Guidelines on Sanitary Waste have been extracted below for reference.

⁵⁵ Information has been sourced from a discussion with Centre for Science and Environment.

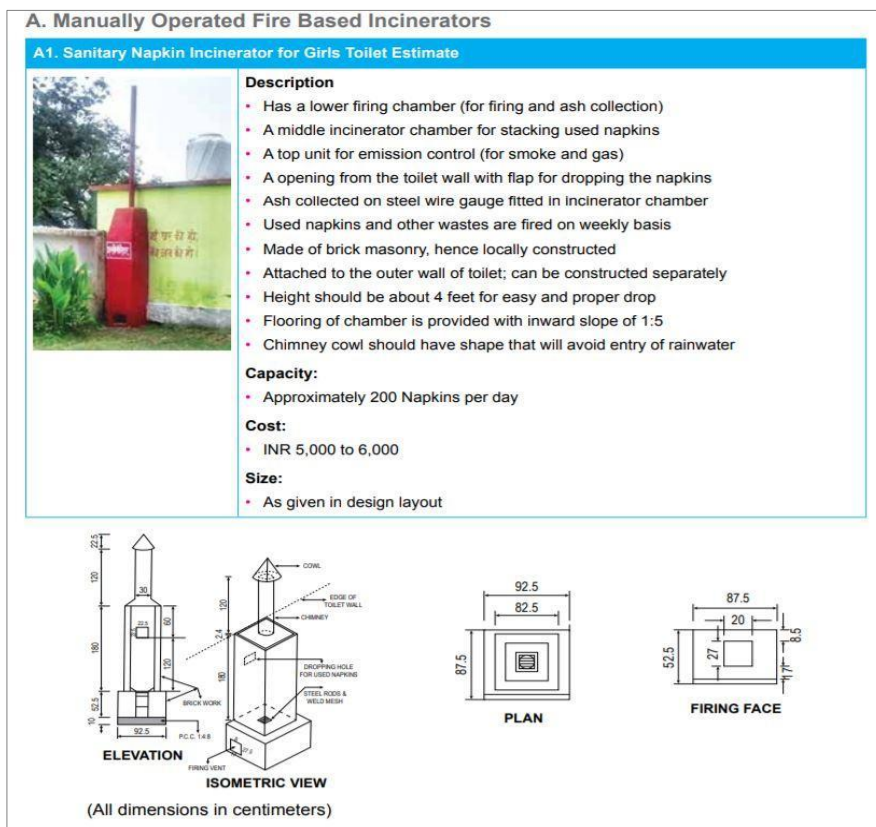
Table 1 : CPCB Guidelines on Sanitary Waste

Option	Type of Waste	Where to use	Specifications/ Pollution control norms
Low cost, locally made incinerator	Napkins and other wastes. Best suited for pads with high cellulose content, not those that have super absorbent polymers (SAP)	Rural Girls School, Colleges, Institutions, Hostels etc.	<ul style="list-style-type: none"> • Manually operated • Minimum Size: 3' x 3' x 3' • Design: As given in MHM Guidelines, Technical Guide 2 • Capacity should be —200 Napkins/Day • Comprises of two chambers (for firing and ash collection) • An emission control system along with a door for firing • Made of brick masonry • Opacity of the smoke shall not exceed 20%. • All the emissions to air other than steam or water vapor shall be odourless and free from mist, fume and droplets. • Operation temperature reaches up to 300°C • Assure 100% burning effectiveness. • The incineration chamber shall be designed to include an auxiliary gas or oil burner to be used as necessary to maintain the prescribed minimum combustion temperatures. • If diesel is used, low Sulphur diesel shall be used as fuel in the incinerator. • Compliance to General Emission Standards for air pollutants notified under E (P) Act, 1986 or as may be prescribed by SPCBs/PCCs.
Electric incinerators	Bulk amount of napkin wastes	Girls toilets, community toilets, complexes, Malls, society complex etc.	<ul style="list-style-type: none"> • Ensure complete burning of napkin. community • Ensure instant disposal in a scientific and hygienic toilet, way with fully automatic way and burn complexes, completely. • Burns 150 to 200 napkins/day, can be complex etc. programmed for cycles/day • Self-disposal by user by directly putting into the incinerator. • Ash generation should not exceed more than 5% per napkin • Ash should be collected in separate tray and ensure stack on that tray. • Auto power & thermal cut-off and automatic temperature maintenance should be there for safety of user. • Inside refractory lining should be excellent heat retention to avoid thermal loss. • 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 the General Emission Standards mentioned under Standard for incineration section in SWM Rules, 2016.
High temperature incinerators for bio-medical waste	Incinerate all types of pads (those with high cellulose content, high moisture content, and those with SAP) and all types of bio-medical waste	Waste burned at central/combined incinerator facility	<ul style="list-style-type: none"> • The incinerator shall be designed for capacity more than 50 kg/hr. • The double chamber incinerator shall preferably be designed on "controlled-air" incineration principle, as particulate matter emission is low in such incinerator. Minimum 100% excess air shall be used for overall design. • No incinerator shall be allowed to operate unless equipped with Air Pollution Control Device (APCD). • The incineration ash shall be stored in a closed sturdy container in a masonry room to avoid any pilferage. Finally, the ash shall be disposed in a secured landfill. • Emission control measures must be followed as per Schedule 11 of the Bio-medical Waste Management Rules, 2016, notified under the Environment (Protection) Act 1986. • The location, structural design etc. of the incinerator shall be as per the guidelines of Bio-medical Waste Rules, 2016, published by CPCB under Guidelines for Bio-medical Waste Incinerator, 2017. • A skilled person shall be designated to operate and maintain the incinerator.

MHM Guidelines - UNICEF Technical Guide⁵⁶

In contrast with CPCB guidelines, the MHM Guidelines includes a set of technical guides for incinerators and other disposal methods prepared by UNICEF India. While not going into many technical specifications per se, this guide includes information regarding various available models of incinerators. By way of example, the description of manually operated fire-based incinerators has been extracted below.

Fig 5: An extract of the UNICEF Technical guide



There are two interesting aspects of how decentralised incinerators have been treated in the context of the CPCB Guidelines on Sanitary Waste and the UNICEF MHM Guidelines. Firstly, the standards referred to in the Guidelines are prescriptive in nature and are not enforceable, a fact that has been conveyed to us by multiple stakeholders through our consultations. Secondly, even assuming that these standards were in fact enforceable, the categorisation and potential specifications of each such category varies across these two sets of guidelines. For instance, the manually operated fire-based incinerator is most similar to the low cost, locally manufactured incinerator under the CPCB Guidelines on Sanitary Waste, however the specifications for these incinerators under the policies are evidently inconsistent. Finally, the MHM Guidelines addresses electric incinerators, but instead of providing a set of technical aspects that would work best for small scale incinerators of this nature, it puts together a list of some products available in the market, their features, cost and areas of use.

Finally, the CPCB and SWM Rules prescribe a set of emission control standards that are applicable to any incineration done under the SWM Rules and by extension apply to the decentralised incinerators, through the CPCB Guidelines on Sanitary Waste. These standards are also extracted below. Non-compliance with these emission standards has an adverse impact not just on the health of those inhaling the smoke and fumes from such incineration, but also on the environment at large due to the release of harmful and poisonous gases.

⁵⁶MHM Guidelines: Technical Guide 2: Safe Disposal and Incinerators, http://unicef.in/CkEditor/ck_Uploaded_Images/img_1513.pdf

SWM Rules - Standards for incineration

The Emission from incinerators/therma technology in Solid Waste treatment/disposal facility should meet the following standards: -

Table 2 - Emission Control Standards under the SWM Rules

Parameters (1) Particulates	(2) 50 mg/ Nm³	Emission standard (3) Standards refer to half hourly average
HCl SO ₂ CO	50 mg/ Nm ³ 200 mg/ Nm ³ 100 mg/ Nm ³ 50 mg/ Nm ³	Standards refer to half hourly average Standards refer to half hourly average Standards refer to half hourly average Standards refer to half hourly average
Total organic Carbon HF NO _x (NO and NO ₂ expressed as NO ₂)	20mg/ Nm ³ 4 mg/ Nm ³ 400 mg/ Nm ³	Standards refer to half hourly average Standards refer to half hourly average Standards refer to half hourly average
Total dioxins and furans	0.1ng TEQ / Nm ³	Standard refers to 6-8 hours sampling. Please refer guidelines for 17 concerned congeners for toxic equivalence values to arrive at total toxic equivalence.
Cd + Th+ their compounds	0.05 mg/ Nm ³	Standard refers to sampling time anywhere between 30 minutes and 8 hours.
Hg and its compounds	0.05 mg/ Nm ³	Standard refers to sampling time anywhere between 30 minutes and 8 hours.
Sb+ As+ Pb+ Cr+ Co+ Cu+Mn+ Mi+V+ their compounds	0.5 mg/Nm ³	Standard refers to sampling time anywhere between 30 minutes and 8 hours.
Note: All values corrected to 11% oxygen on a dry basis.		

Note:

1. Suitably designed pollution control devices shall be installed or retrofitted with the incinerator to achieve the above emission limits.
2. Waste to be incinerated shall not be chemically treated with any chlorinated disinfectants.
3. Incineration of chlorinated plastics shall be phased out within two years.
4. If the concentration of toxic metals in incineration ash exceeds the limits specified in the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008, as amended from time to time, the ash shall be sent to the hazardous waste treatment, storage and disposal facility.
5. Only low sulphur fuel like LDO, LSHS, Diesel, biomass, coal, LNG, CNG, RDF and bio-gas shall be used as fuel in the incinerator.
6. The CO₂ concentration in tail gas shall not be more than 7%.
7. All the facilities in twin chamber incinerators shall be designed to achieve a minimum temperature of 950°C in secondary combustion chamber and with a gas residence time in secondary combustion chamber not less than 2 (two) seconds.

8. Incineration plants shall be operated (combustion chambers) with such temperature, retention time and turbulence, as to achieve total Organic Carbon (TOC) content in the slag and bottom ash less than 3%, or the loss on ignition is less than 5% of the dry weight.
9. Odour from sites shall be managed as per guidelines of CPCB issued from time to time

Given the above, incinerators currently in the market are a set of products that comply with one or more aspects of the above frameworks but without adhering to anything other than a set of standards that are at best derived from these laws but are often self-prescribed. Furthermore, unlike other consumer electronic products, the incinerators manufactured in India are not tested for any standards certification.

In order to better understand the nature of incineration/burning in an incinerator chamber that is most sustainable from a health and environment perspective, we consulted some stakeholders who had technical expertise on the subject, and the following three aspects came out to be the most significant features of the incineration process.

The first is that (i) the incinerator must burn waste at a temperature that is at least higher than 800 degrees Celsius,⁵⁷ in contrast, the CPCB Guidelines on Sanitary Waste prescribe a temperature of only 300 degree Celsius; (ii) the emission control guidelines under the SWM Rules need to be adhered to; and (iii) ash generated needs to be disposed of in such a way that it has limited contact with water bodies and soil.

Following our discussions with stakeholders, we understand that most of the models of small and medium scale incinerators available in the market today do not comply with these minimum requirements and have an adverse impact on the environment, in addition to negatively affecting women who repeatedly use these toilets. We have tried to map the available categories of incinerators in the form of a table below:

Table 3 - Viability of available incinerator models against standards

Sr. No.	Type of Incinerator	Advantages of use	> 800 degree Celsius	Ash disposal guideline	Emission control standards
1.	Clay pot (Matka) incinerator	<ul style="list-style-type: none"> Low cost Use locally available material for construction of burning chamber and locally available fuel sources 	No	No - Typically mixed with soil	Not compliant
2.	Low cost/locally made incinerator	<ul style="list-style-type: none"> Low cost Easy to use and maintain Use locally available fuel sources 	No	No - Typically mixed with other solid waste	Not compliant

⁵⁷Safe health-care waste management, Policy Paper, World Health Organization, Department of Protection of the Human Environment Water, Sanitation and Health, https://www.who.int/water_sanitation_health/medicalwaste/en/hcwmpolicye.pdf

3.	Electric incinerator	<ul style="list-style-type: none"> Some models have emission control features and quality standards Runs on electricity and can be installed in schools/ colleges and other institutional setups 	Yes	No - Typically mixed with other solid waste	There are some that are compliant - but we understand from various stakeholders that most models in the market today do not comply with these standards.
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Despite the fact that most decentralised incinerator models do not comply with these basic requirements for incineration, there are multiple state governments and other central government agencies that are procuring and distributing decentralised incinerators. Based on a response to a request filed under the Right to Information Act, the New Delhi Municipal Council (NDMC) has informed us that they have installed 35 incinerators at different public toilets in the NDMC area.⁵⁸ Additionally, states like Tamil Nadu have reported plans to install up to 4000 incinerators in schools, colleges and other public areas.⁵⁹ We were also informed by a stakeholder about a scheme issued by the Maharashtra state government that intends to provide a decentralised incinerator to every gram panchayat in the state.

The use of incinerators has also been piloted in not just India but other developing countries as well. A study carried out in Nepal with 200 adolescent girls who had attained menarche, analysed the impact of incinerators on school going girls.⁶⁰ The study included 140 girls from schools where pad incinerators were built and 60 girls from schools where pad incinerators were not built. The girls were aged between 12 to 18 years of age from four municipalities in Nepal - Bharatpur, Guleria, Tikapur and Butwal.⁶¹ The study reported that 46% of girls included in the study felt that incinerator use was easy, while 5% were uncomfortable using the incinerator, and 49% had not used the incinerator facilities.⁶² Among the girls who knew of the incinerators in the four municipalities, 31% from Bharatpur, 25% from Guleria 47% from Tikapur and 35% from Butwal reported that it is easier to change pads when an incinerator is available at school. Moreover, 29% from Bharatpur, 50% from Guleria, 43% from Tikapur and 47% from Butwal responded that sanitation of school has improved in their schools after the incinerators were installed.

In another study, schoolgirls from Malawi noted the need for sanitary pads (26%), water (17%), and incinerators (11.4%) in helping them manage their menses better. Findings from Nigeria suggested that socio-cultural norms do not discourage the burning of menstrual blood, and over half the girls interviewed claimed to burn their pads, as they believed this to be the only method that removed all traces of menstrual blood.

Apart from convenience, the usability of incinerators stems from the socio-cultural norms and taboos that surround menstruation and disposal of menstrual blood. Privacy has often been overlooked in the design and placement of incinerators and to ensure privacy, incinerators should have a chute directly from the toilet room to the incinerator; a design that has been tested in Tamil Nadu. For instance, women using a communal toilet in Tamil Nadu were

⁵⁸ Information sourced from an RTI response received from the New Delhi Municipal Corporation dated 12th December 2019 bearing registration no. D-20/PIO(H)/2019

⁵⁹ S. Poorvaja, 'Napkin incinerators in govt. girls' schools this year', The Hindu, 21st March 2018 (<https://www.thehindu.com/news/national/tamil-nadu/napkin-incinerators-in-govt-girls-schools-this-year/article23306499.ece>)

⁶⁰ A study of menstrual hygiene and impact of pad incinerator: A comparative study in Bharatpur, Guleria, Tikapur and Butwal, KC, Elawati, 2012, <http://library.nhrc.gov.np:8080/nhrc/handle/123456789/508>

⁶¹ A study of menstrual hygiene and impact of pad incinerator: A comparative study in Bharatpur, Guleria, Tikapur and Butwal, KC, Elawati, 2012, <http://library.nhrc.gov.np:8080/nhrc/handle/123456789/508>

⁶² A study of menstrual hygiene and impact of pad incinerator: A comparative study in Bharatpur, Guleria, Tikapur and Butwal, KC, Elawati, 2012, <http://library.nhrc.gov.np:8080/nhrc/handle/123456789/508>

reluctant to leave menstrual waste in communal bins as it was unclear when the waste would be burned.⁶³ The majority of participants were comfortable with incinerators, but the Tamil Nadu study found that incinerators installed in a communal toilet were not used due to a lack of signage.⁶⁴ In some communities, the burning of menstrual blood is also a taboo, drawing on the belief that such actions will compromise a woman's reproductive capacity.⁶⁵

We have presented below the existing market for decentralised incinerators, given the increased use.

Market for Decentralised Incinerators

Decentralised incinerators are typically small or medium scale incinerators which have been installed in schools/offices or similar areas which can be used by residents/employees/students, etc. of that area. In contrast, centralised incinerators are large-scale biomedical, or waste incineration/treatment facilities typically set up by local governmental bodies, used by the city or town, which require a certain level of collection at source and segregation of waste at large scale.

While incineration of waste has been a practice in relation to bio-medical waste for many years, there is an expansion in the size of the decentralised incinerator market in India over the past decade. The market demand at present is for over 1 million units per year and there are more than 50 manufacturers in the market. In addition, the procurement statistics indicate that the government is currently the biggest buyer for incinerators, but that market is likely to switch to the private sector as more and more organisations/building complexes start procuring incinerators as a pro-MHM measure by 2030.⁶⁶

As discussed earlier, at least 19 states have reported intentions to install decentralised incinerators in various places including schools, gram panchayats, government colleges, hostels, and so on. The procurement for such incinerators is done through the usual tendering process. In our review of various tender documents available in the public domain, we found that while most specify that the manufacturer must ensure that the machine being supplied complies with the requirements for emission control as set out by the CPCB, some others simply provide a set of specifications that are more generalised in nature. Another important observation is that the technical specifications of the materials used to manufacture the machines are inconsistent and do not comply with any particular standard. We have provided comparative details of some of the tenders that we have come across in our review in *Annexure 1*.

The budgetary allocation for decentralised incinerators when procured by the governmental bodies can fall within the following heads:

1. Swachh Bharat Mission

The Swachh Bharat Mission allows states to use funds allocated under Solid and Liquid Waste Management (SLWM) component to install incinerators in toilets for disposal of sanitary napkins. Additionally, the Swachh Vidyalay Praskar guidelines have included the installation and disposal of sanitary napkins in their scoring questionnaire, reiterating the importance of menstrual waste disposal in education institutions.⁶⁷

2. Sarva Shiksha Abhiyaan

Under the Sarva Shiksha Abhiyan, Framework for Implementation by the Ministry of Human Resource Development, Department of School Education & Literacy, schools can use the budget allocated for school infrastructure development to install incinerators in girls' toilets. This is done with the objective of

⁶³ATH. Menstrual Management and Sanitation Systems: Findings from Two Case Studies in South Africa and India; PATH: Seattle, WA, USA, 2013

⁶⁴ATH. Menstrual Management and Sanitation Systems: Findings from Two Case Studies in South Africa and India; PATH: Seattle, WA, USA, 2013

⁶⁵Cultural and social practices regarding menstruation among adolescent girls, Anant Kumar & Kamiya Srivastava, 20 September 2011, <https://www.tandfonline.com/doi/abs/10.1080/19371918.2010.525144>

⁶⁶Information sourced from stakeholder discussion.

⁶⁷Swachh Vidyalaya Puraskar, Ministry of Human Resource Development, Government of India, https://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/Swachh_Vidyalay_Puraskar_Guidelines.pdf

ensuring equal access to education for all children.⁶⁸

3. Urban Local Bodies (ULBs) budget

Urban local bodies have the freedom to allocate funds for infrastructure development under sanitation needs of cities, as well as for waste disposal. They have been given the discretion for fund allocations and numerous municipalities use funds to install incinerators for sanitary waste disposal in public washrooms. For instance, the Mumbai municipal corporation, the BMC made allocations for the technological upgradation of toilet blocks by installing Sanitary Napkin Vending Machine & Incinerators in Community toilet blocks in various slums with a budget estimate of Rs. 1.6 crore for 2018-19 and Rs.1.9 crore for 2019-2020.⁶⁹

Given the recent media focus on menstruation, we have also observed that many companies have been installing incinerators, especially in schools and other educational institutions as part of their CSR initiatives.⁷⁰ In view of increasing demand as well as the expanding market, we have identified the following barriers to the usage of incinerators, which when addressed may improve the viability of scaling these options.

Challenges in the adoption of decentralised incinerators

The use of incinerators in India, despite being on the rise has some significant barriers. In this section, we have identified a set of challenges that need to be addressed before the use of decentralised incinerators can be scaled up.

1. Standards for decentralised incinerators

As discussed earlier, we have been informed by various stakeholders that other than a set of technical guidelines provided by UNICEF as a part of the MHM Guidelines, at present there are no requirements under law to comply with any minimum standards for designing a decentralised incinerator. As regards the emission control protocols issued by the CPCB, while being enforceable, we have been informed that there is little to no consequence of not complying with the same. The situation gets further diluted when there is self-certification of compliance in contrast with the standard certification process in place for most electronic goods. As a result, there are multiple products currently available in the market that claim that they are environmentally sustainable and in the absence of a formal certification process to identify what the standards need to be for a machine to be so, it is difficult to challenge any misinformation regarding the same.

Further, in absence of these standards and certification, many state governments are inevitably procuring products that are likely to harm the environment and the health of women using them. We have been informed by certain stakeholders that the process of procurement relies on word-of-mouth and cost considerations, some of which take into account compliance with CPCB norms and some that do not. A quick look at the tenders for this purpose available in the public domain also highlights the same concern.

In addition, even the standards that exist need to address the concerns of the ash that is generated at the end of an incineration cycle. At present, other than stating that each incinerator must have an independent ash tray which is stacked, there are no prescribed mechanisms for disposal of ash. While some standards have been prescribed in case of large-scale bio-medical incinerators, the same are absent for the smaller decentralised models. In the first instance, this may seem accurate given that the quantum of ash that is generated in a bio-medical incinerator is much larger than in a small-scale incinerator. However, if this is coupled with the general issue of not ensuring burning at the right temperatures, we have been informed that the ash is likely to contain traces of chemicals which should not be mixed with soil and water, as they can have harmful consequences for the health of those that come

⁶⁸Sarva Shiksha Abhiyan, Framework for implementation, Page: 93, Ministry of Human Resource Development, Department of School Education & Literacy, March 2011, https://seshagun.gov.in/sites/default/files/2019-05/SSA-Frame-work_0.pdf Page: 93

⁶⁹Brihanmumbai Mahanagarपालिका, Gender Budgeting 2019-2020, Mumbai, [https://portal.mcgm.gov.in/iri/go/km/docs/documents/MCGM%20Department%20List/Chief%20Accountant%20\(Finance\)/Budget/Budget%20Estimate%202019-2020/7-%20Gender%20Budget/GENDER%20BUDGET.pdf](https://portal.mcgm.gov.in/iri/go/km/docs/documents/MCGM%20Department%20List/Chief%20Accountant%20(Finance)/Budget/Budget%20Estimate%202019-2020/7-%20Gender%20Budget/GENDER%20BUDGET.pdf)

⁷⁰ Examples can be found at - (<http://nirmanfoundation.org/category/activities/csr/>)

in contact with it.⁷¹ This is very prevalent in rural areas where earthen pots and matka incinerators have been installed. .

We have heard from stakeholders that most often in rural areas, this ash is disposed of by mixing it with the soil or throwing it into water bodies. In urban areas, schools that do have incinerators on premises, dispose the ash by mixing it with other solid waste. Both of these lead to some sort of interaction of the ash with soil, water, or other human beings including the waste pickers and sanitation workers. To that end, it is necessary to increase awareness on the impact that the ash residue can have and on the need for guidelines on how to dispose of the ash.

2. Costs associated with decentralised incinerators and inadequate budgetary allocation

As mentioned above, there are multiple models of the decentralised incinerators available in the market. These differ from each other in their size, capacity, energy source, technology used and emission standards. In addition, features such as maintenance contracts and extent of after sales support may also play a role in determining the cost of each incinerator. The range of prices for a small-scale incinerator is from Rs. 4000 to 25,000. Within this range, and due to the lack of standardised technical features, the determination of cost is at the behest of the manufacturer, the volume of demand and bargaining power of the procurer. One of the most basic aspects that impact the range in the pricing is the emission control standards that various manufacturers adhere to, with the ones that have higher emission standards placed at the higher rungs of the pricing ladder. It is, however, unclear how to establish a clear price range for incinerators. By way of an example, the 35 incinerators installed in the public toilets in the NDMC area were purchased at a staggering price of Rs. 1 40,432 each.⁷²

Given the staggered nature of the market, the manufacturers often do not compete in the same market and due to the lack of competition, the downward pressure on the price is not something that can be easily identified. There are some markets such as Maharashtra, Telangana and Tamil Nadu, which are more developed than others - due to the placement of these manufacturing units in these areas and as a result, the competition is restricted to sectors of the market that these companies service.

Finally, the procurement, especially by government bodies occurs through tendering processes that often have an inconsistent set of requirements and the deciding factor becomes the cost itself, leading to undesirable outcomes such as incinerators with poor emission controls. Currently, sanitary napkin incinerators are available on the Government E-Marketplace (GEM) portal as well. Of the approximately 2000 models available on the website, the size ranges from the capacity of up to 50 pads a day (for a starting price of approximately Rs. 9,000) to a capacity of 1000 to 1400 pads a day (for a price of approximately Rs. 2,00,000).

While we have discussed the need for standards that can be used at the time of procurement above, there is also a need to identify, whether the budgetary allocations currently existing are adequate to scale the operations of large-scale use of decentralised incinerators.

In our research, we have not come across incinerators as a specific line item under any specific budgetary allocation. While schemes such as SBM, SSA do prescribe the use of incinerators out of their general budget on waste management and sanitation, the procurement trends show that even though there exists no restrictions in the budget on the amount spent per incinerator, the environmentally sustainable models are generally more expensive and their procurement at scale may be contained due to the budget allotted to waste management and sanitation, of which incinerator purchase forms only a small part.

3. Maintenance associated with incinerators

Like most other electronic products, the decentralised incinerator includes a component of operation and maintenance. Most incinerator manufacturers that we have interacted with have informed us that the cost of the incinerator includes an annual maintenance contract which estimates one cycle of servicing and replacement of faulty parts. The cost associated with this has been built into the cost price of the incinerator.

⁷¹ Information sourced from a stakeholder discussion

⁷² Information sourced from an RTI response received from the New Delhi Municipal Corporation

However, we have repeatedly heard from stakeholders that the incinerators that have been installed in various parts of the country have fallen into disuse. On delving deeper into the reasons for the same, we note the following:

- **Voltage fluctuations** - Most parts of India suffer from regular and often unscheduled power shortages. Decentralised incinerators that use electricity often face irregular shifts in voltage because of which the incineration is not completed and causes fluctuations in the burning cycle, having an impact on the overall durability of the machine.
- **Overloading** - Each model of incinerator has an overall capacity and a run-time for each cycle of incineration. In addition, some models which have a higher capacity also have a feed-in rate, being the number of pads that can be deposited into the burning chamber over the frequency within the run-time. In case the feed rate is not strictly followed, the overloading can impact the quality of the burning process and in the long run impact the durability of the machine.
- **Lack of awareness among users** - In our discussion with some stakeholders, we have been notified of the limited understanding that most users have of these technical aspects of use. Users may hesitate to use the machine if they are unsure about correct usage.

4. Servicing of pan-India markets is both an administrative and financial burden

Due to the fact that decentralised incineration technology is in its nascent stages and the market for it is dispersed, we have seen that incinerator manufacturers generally service areas in and around their manufacturing units. The reasons for this range from wanting to continue monitoring and evaluation of the user experience before scaling up operations, to not having sufficient funding to scale up operations once they have started out. In view of this, other than HLL Lifecare which markets and supplies the Vendigo model for incinerators, most other manufacturers do not have enough scale to service their products across the country.

In addition to this, we have also noted that given the nature of technology and the users that it typically targets - such as school-going girls, there is some amount of training required before use and further, any maintenance services which typically form part of the product package, will be difficult to scale without presence in all parts of India. Each of these issues poses a significant barrier to scaling up operations for most manufacturers and has an impact on market development.

Alternative Products and their Disposal Methods

While awareness among users is the key to any steps initiated for improving the condition of menstrual waste disposal, as one of the longer-term goals, we need to aim towards moving to sanitary products that are environmentally sustainable and do not produce such a large quantum of waste.

The table below shows the alternative products and the amount of time it takes for them to decompose if disposed of in the correct manner. These alternate methods of menstrual protection are either reusable products that reduce the quantity of waste being produced, or they are compostable, which implies that they do not need to be treated or incinerated and can decompose into the soil, thereby reducing the quantity of waste generated. Reusable products like cloth pads and menstrual cups can be used multiple times and then disposed of, reducing the quantum of waste immediately. However, in the compostable type, the gap in practice of disposal arises when the compostable waste cannot be segregated from the general waste and ends up being mixed in a landfill.

*Table 4 - Alternate products for menstrual hygiene management.
Source: MHLAI*

Product	Type of use	Disposal method	Additional information
Sanitary Pads and Tampons	Disposable – Single use	High waste burden – incineration, burial or landfills	-Contains chemicals, Super Adsorbent Polymers (SAPs) and plastics.

			- Lower cost per purchase - non-biodegradable
Sanitary pads (Cloth pads, menstrual underwear, inter-labia pads)	Reusable – 1 to 2 years	Biodegradable low waste burden	-contains no chemicals -low life cycle cost
Menstrual Cups	Reusable – 5 to 10 years	Lower waste burden	-collects blood, does not absorb it. -lower life cycle cost
Compostable Sanitary pads	Disposable - Single use	Compostable low waste burden	-contains some plastic -low cost per purchase

1. Composting

Composting is a form of waste disposal whereby organic waste decomposes under naturally oxygen rich conditions.⁷³ In relation to menstrual waste, composting of waste has been considered a viable option, especially for products such as compostable pads and recyclable pads. Composting pits can be made in communities (both urban and rural) and schools, encouraging for community-based and community-led composting. Composting a feasible option only for compostable sanitary pads (e.g., made of natural fibres), not pads made of bleached cellulose, SAP, and plastic covering.⁷⁴ However, in order to ensure that composting is used accurately, the type of products and disposability of the same needs to be considered and the composting pits need to be constructed according to specifications to facilitate composting.

As per the technical guidelines provided by UNICEF, composting pits can be designed by ensuring that the used menstrual absorbent is mixed and covered with materials such as leaves, dried plants or other biodegradable material. Further, the pit should be properly moist, which might require watering during dry periods and finally once the pit is filled, it should be covered properly with soil so as to avoid foul odours, destruction by rodents, etc. The minimum specification for the pit should be 0.5 m x 0.5 m x 1.0 m, or even better 1.0 m x 1.0 m x 1.0 m (l x b x d).⁷⁵

2. Deep burial

Deep burial is a low-cost method of menstrual waste disposal that can be implemented in regions that have availability of free land space, such as in the rural areas of India.

As per the technical guidelines provided by UNICEF, deep burial pit can be designed by ensuring that once the used absorbent material is put inside the burial pit, it should be covered with soil or sand and that it should not be kept exposed to open air. The pit should be constructed at a distance of about 5 to 7 meters from any drinking water sources. For the purpose of the size, it can vary based on the number of users but the minimum specifications can be 0.5 m x 0.5 m x 1.0 m, or even better 1.0 m x 1.0 m x 1.0 m (l x b x d).⁷⁶

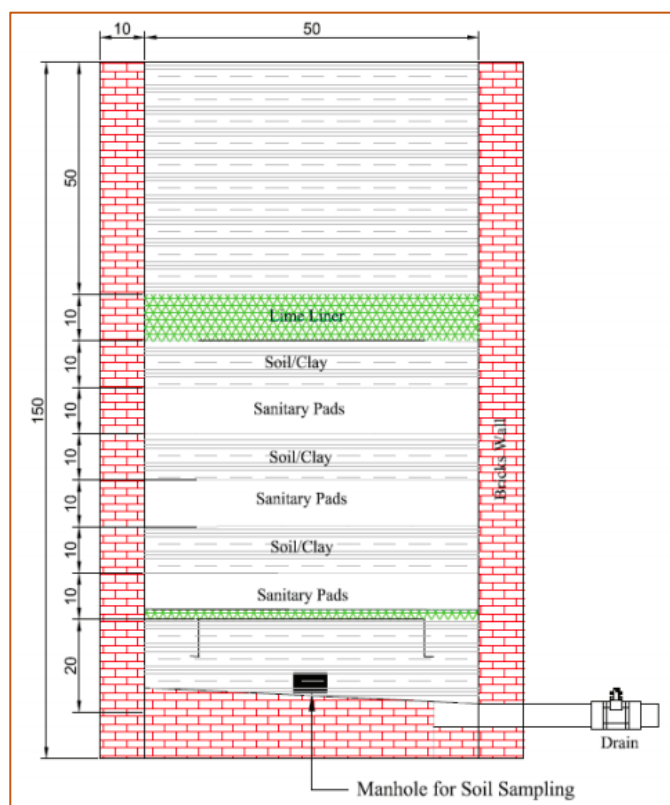
⁷³ Based on information received through a stakeholder discussion.

⁷⁴ Pushing the Boundaries on the MHM Dialogue in India, Disposal and Treatment, https://path.azureedge.net/media/documents/ID_mhm_mens_waste_man.pdf

⁷⁵ MHM Guidelines: Technical Guide 2: Safe Disposal and Incinerators, http://unicef.in/CkEditor/ck_Uploaded/Images/img_1513.pdf

⁷⁶ MHM Guidelines: Technical Guide 2: Safe Disposal and Incinerators, http://unicef.in/CkEditor/ck_Uploaded/Images/img_1513.pdf

Diagram: Illustrative Deep burial pit for menstrual waste products developed by NEERI, based on deep burial protocol in the Biomedical Waste Management Rules 2016⁷⁷



However, there are some disadvantages and limitations associated with deep burial. For instance, deep burial is not a viable option in regions that have a high-water table or heavy rainfall and flooding. Additionally, deep burial may have issues relating to shame and privacy concerns for women, along with the inconvenience to collect and take the waste to the burial site. Moreover, deep burial would be best suited for compostable pads and menstrual protection materials, that does not include pads that have plastic components.

3. Microwave Technology

In most urban areas as well as rural areas, segregation of menstrual waste is a challenge which leads to improper disposal of used menstrual protection products. Due to many reasons, varying from privacy concerns of women for discreet disposal to segregating different types of waste for appropriate disposal, menstrual waste in India can lead to toxins in the environment if not disposed of correctly. An innovative solution for this problem is the use of microwave technology, which can destroy pathogens in used sanitary products such as menstrual waste.⁷⁸ Although used sanitary pads fall under the Solid Waste Management Rules, they can also be considered biomedical waste due to the blood component present on pads, tampons and cups, etc. With the use of microwave technology, menstrual waste can be treated and sterilised, making it non-toxic and free to dispose of in a landfill or be incinerated without releasing toxins in the air or in its residual ash. Once treated by microwave technology, the waste can also be incinerated in cement incinerators, solving the problem of low capacities of biomedical incinerators and menstrual waste incinerators. However, a major hurdle in the adoption of microwave technology for developing countries is its high cost, which limits its adoption and large-scale implementation in India. Microwave Technology is being

⁷⁷ Menstrual Waste Management, WaterAid India, September, 2019 <https://www.wateraidindia.in/sites/g/files/jkxooof336/files/menstrual-waste-management.pdf>

⁷⁸ Menstrual Hygiene Management and Waste Disposal in Low and Middle Income Countries—A Review of the Literature, Myles F. Elledge, Arundati Muralidharan, Alison Parker, Kristin T. Ravndal, Mariam Siddiqui, Anju P. Toolaram, and Katherine P. Woodward, 15 November 2018, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6266558/>

adopted by many developing countries for treatment of sewage sludge and healthcare waste in countries like Thailand, China and Kenya, as well as being piloted in India (Agra) for sewage sludge disposal.⁷⁹

Recommendations

Concomitant to the above analysis, we have prepared a set of recommendations that can be implemented in a staggered manner in order to improve menstrual waste disposal and management. One of the most significant concerns around developing any recommendations on this issue is the requirement for coordination between various levels of governance and various departments at each level. This is relevant because setting of standards, issuing guidelines for segregation, etc. are necessarily within the purview of the central government, while the compliance with said standards at the time of procurement and manufacturing etc. would fall within the purview of the state governments. Finally, the implementation of any model of disposal of waste will fall within the jurisdiction of the municipal/local body. We have categorised our recommendations by level of governance for the ease of reader's consumption, however many of these steps need to take place in conjunction with one another.

Union Government

1. Incentivise ULBs and private players to meet their segregation targets and dispose of menstrual waste sustainably

Most ULBs in India continue to lag in segregation of waste due to lack of resources, political will and the effort required to inculcate large scale behavioural change towards segregation of waste at source itself. As discussed above, even those municipal wards where segregation is undertaken, the waste is segregated in two categories - wet and dry. Menstrual waste is not identified separately and disposed of along with other dry waste in landfills. For incineration to work at the community level, which is most environmentally safe and cost effective, ULBs need to institute mechanisms by which menstrual waste is segregated and incinerated in large scale incinerators. This will become even more imperative as more and more women adopt sanitary napkins for menstrual hygiene with rising incomes and awareness in the future. The central govt. should therefore incentivise ULBs by way of special grants, rankings, etc. to undertake such efforts under its existing urban governance related programs.

For example, at present, India is home to one of the largest cleanliness surveys, i.e. the Swachh Sarvekshan in the world which ranks ULBs on various aspects of their cleanliness. The manner in which the survey and ranking system functions is set out in the Swachh Sarvekshan Toolkit prepared every year prior to the survey. The toolkit reveals that while the survey looks at the sanitation value chain as a whole, at present it does not contain MHM as an individual component.⁸⁰ However, aspects such as access to discrete toilet facilities for women have been adopted in a piece-meal fashion.

Accordingly, we recommend that MHM be included within the evaluation criteria of the Swachh Sarvekshan and be used to incentivise ULBs to improve segregation and other concerns highlighted around disposal of menstrual waste. We therefore recommend that the Service Level Progress indicators in Swachh Sarvekshan's point system in the Toolkit should be amended and include the following:

- Under Sub-indicator 1.2: Source segregation into dry waste, wet waste and menstrual waste.
- Under Indicator 2: Additional sub-indicators for:
 - (i) whether the capacity of the disposal facility matches the amount of menstrual waste generated, and
 - (ii) the total percentage of menstrual waste generated that is processed either through decentralised or centralised incinerators.
- Under Indicator 4: Additional sub-indicators for IEC (Information, Education, Communication) on menstrual waste as is required under the Solid Waste Management Rules 2016.

⁷⁹ Microwave Technologies: An Emerging Tool for Inactivation of Biohazardous Material in Developing Countries, Klaus Zimmermann, 6 July 2018, <https://www.mdpi.com/2313-4321/3/3/34>

⁸⁰ Ministry of Housing and Urban Affairs, Government of India, 'Swachh Sarvekshan Toolkit 2020' (<http://sac.ap.gov.in/sac/UserInterface/Downloads/SS%202020%20Toolkit%20Final.pdf>)

- **Under Indicator 6:** Additional sub-indicator for innovation in menstrual waste management including interventions for behaviour change.

Another important aspect of the incentivisation process is the alignment of incentives for various players that are participating in the ecosystem. At present, a number of cities outsource their waste collection process to private third parties, including the use of treatment facilities. In order to ensure that the system functions effectively, each of these private players also needs to be incentivised to participate in the menstrual sanitation value chain. The central government can also build capacity of ULBs/facilitate cross sharing of best practices to drive adoption of such measures.

2. Issue standards for manufacture and procurement of decentralised incinerators and ensure compliance of such standards

In view of the increasing uptake of decentralised incinerators as a mode of disposal for menstrual waste and in the absence of other alternatives that may be scaled up for the same, any use of decentralised incinerators will require that such incinerators meet minimum standards. We understand that technical standards for the manufacture and procurement of decentralised incinerators are under consideration of the Bureau of Indian Standards. Once these standards are issued, there should be monitoring of compliances with the standards, and penalties around any non-compliance in line with the general functioning of standards certification and testing by the BIS for consumer good.⁸¹

Some of the primary features that the standards should address include: the materials to be used, the construction of the chambers for burning, the feed-in rate and capacity of a given model, emission control protocols, disposal process for the ash residue, and instructions for the use and maintenance of decentralised incinerators.

In addition, the standards prescribed should also be accompanied with a basic format of tender requirements as a measure to streamline procurement by government bodies at all levels. The primary aspects that should be included in the tender include the standards to be prescribed for manufacturing, compliance with CPCB guidelines through an accredited laboratory along with an annual maintenance contract, and basic training for use of the incinerator machine provided to the primary users.

3. Identify ways to implement extended producer responsibility (EPR)

In an attempt to create a circular economy around products that are typically non-biodegradable, countries around the world (most significantly) have attempted to implement waste management rules, whereby producers of such products are required to contribute towards recycling of such materials. Targets are assigned and implementation is staggered.⁸² At its core, this principle is called ‘extended producer responsibility’ on the basis of which, a producer is required to take accountability of its manufactured products even at the end of the consumption cycle. The SWM Rules acknowledge the role played by manufacturers of sanitary products by making it a requirement that they provide wrappers for disposal. The SWM Rules under the same clause require other manufacturers of non-biodegradable products to contribute towards building required disposal systems. The provision reflects the intention of the government to tap into the circular economy principles to hold manufacturers liable for the waste generated through their products. Based on our conversation with an expert on circular economy and waste, this could be a self-incentivizing system as an efficient disposal mechanism will allow the continued promulgation of disposal products. We have included in the box below the mechanism used by the European Union in creating a circular economy through extended producer responsibility for certain goods.⁸³

⁸¹ Bureau of Indian Standards, ‘BIS at a Glance’ <https://bis.gov.in/PDF/other/BStudents.pdf>

⁸² European Commission, ‘Press Release: New waste rules will make EU global front-runner in waste management and recycling’ dated 18th April 2018 https://ec.europa.eu/info/news/new-waste-rules-will-make-eu-global-front-runner-waste-management-and-recycling-2018-apr-18_en

⁸³ Kleoniki Pouikli, ‘Concretising the role of extended producer responsibility in European Union waste law and policy through the lens of the circular economy’, Academy of European Law, 10th February 2020, <https://link.springer.com/content/pdf/10.1007/s12027-020-00596-9.pdf>

Extended Producer Responsibility in the European Union:

- EPR measures were introduced in an attempt to promote the ideal of a circular economy.
- The economic rationale behind implementing sound EPR schemes is to have producers internalize treatment and disposal costs so that they have an incentive to design products that last longer and are more easily treated after use.
- In the EU, the Waste Framework Directive of 2008 allows member states to choose whether the producer pays for waste disposal in part or in full.
- In addition to this, the EPR is enshrined in four sectoral waste directives: Directive 94/62/EC on packaging and packaging waste; Directive 2000/53/EC on end-of-life vehicles; Directive 2012/19/EC on waste electrical and electronic equipment (WEEE) and Directive 2006/66 on batteries and accumulators.
- In general, there are two possible EPR options – financial EPR (where the municipalities organise the waste disposal, financial burden of which is handled by the producer and the second one where the operational burden of ensuring disposal along with the costs associated with it are both borne by the producer. The downside of EPR is that the cost is ultimately passed on to the consumers.

Therefore, we recommend that producers of disposal sanitary products need to be included within the ecosystem and their responsibility needs to be increased in order to ensure that disposal systems are most effective. These could include user nudges such as disposal instructions in regional languages for setting up and operating waste collection and treatment facilities for menstrual waste, such as the one that Procter & Gamble is currently exploring with Swachh near Pune. This of course will increase the burden on sanitary napkin manufacturers, however models in other countries can be explored to action this while maintaining a balance between the ease of doing business and enforcing extended producer responsibility.

State governments

4. Monitor and evaluate the current use of decentralised incinerators before their use is scaled up

As discussed above, many states have already begun/piloted distribution and installation of decentralised incinerators, both in schools and other public areas. Further, incinerators are routinely used in public/community toilets under the ODF protocols. However, stakeholders have repeatedly observed that despite a large number of incinerators being installed around the country, their use has been insufficient due to a variety of issues. In view of the same, there is a need to conduct a detailed evaluation of the currently installed incinerators and whether a significant percentage of these installed units are in use. The following steps can be considered for conducting the monitoring and evaluation:

- An agency be contracted for monitoring and evaluation of the use of incinerators that have already been installed under various schemes by central govt./state govts/ ULBs.
- Such monitoring and evaluation should be done for a period of at least 1 year from installation for the purpose of this study.
- Evaluation of the use of incinerators should be done among different types of demographic profiles-rural/urban, in schools/offices, etc. and the results should be evaluated around user experience, frequency of usage, ease of maintenance, initial and recurring expenditure incurred. This will help determine the scalability of decentralised incinerators as a solution towards menstrual waste disposal in the absence of centralised solutions that require segregation of waste.

In case there is insufficient use, the reasons behind the same need to be delved into before any programs/schemes that promote their use can be undertaken on a larger scale. In case it is observed that decentralized incinerators are not in fact the right mode of disposal at the end of the evaluation process, steps should be taken to amend the existing policy interventions to align with the findings of the evaluation.

5. Training and awareness among users

One of the most significant drawbacks to the current use of incinerators is the lack of awareness around appropriate use of the machines. In order to ensure that the uptake of incinerators is high, there is a need to ensure that

sufficient training is provided to users. This training should include information regarding the feed-in rate, the capacity of burning and the process itself, so as to ensure that the machines installed are durable. While this can begin with ensuring user instructions are placed prominently on the body of the machine to aid users, it also requires additional training sessions and more frequent involvement of the manufacturer in the education of end users, especially when the machines are being installed in places like schools and colleges.

6. Leverage SHGs under National Urban Livelihood Mission (NULM) for driving segregation at source and ensuring disposal of menstrual waste using centralised incinerators

One of the primary concerns around segregation has been lack of awareness/incentives among users and waste pickers around the need for segregation of menstrual waste. In order to involve the community in waste segregation, we recommend leveraging the self-help groups that have been set up under the NULM scheme to provide menstrual waste collection, disposal and treatment services. The following model can be considered while implementing this strategy:

- Under the NULM program, loans can be given to self-help groups (SHGs) to set up a business whereby they collect, transport and dispose of menstrual waste on behalf of ULBs. The ULBs can pay SHGs for such services rendered. This model can be piloted in one city and scaled up to other cities in case it is successful.
- The services include:
 - (i) awareness among households towards segregation,
 - (ii) provision of specific bags for segregation,
 - (iii) collection of waste, either through the network of members or through partnerships with existing waste pickers, and
 - (iv) transportation of such waste, to either the biomedical incinerator or other common treatment plant in the ULB.
- The roles and incentives for each player is as below:
 - (i) An SHG set up under the aegis of NULM shall be the entity responsible for the efficient and adequate delivery of services towards menstrual disposal discussed above against a remuneration provided by a ULB.
 - (ii) A ULB which is required under the Swachh Survekshan point system (as suggested above) to ensure effective and segregated menstrual waste disposal, can contract it out to the SHGs, without having to invest in the infrastructure and pay for it as a service instead.

7. Promoting informed choice among women and developing relevant disposal practices for alternative products

To address the increasing quantum of menstrual waste in India, it is important to not only have access to alternative products for menstrual protection, but also to develop their disposal mechanisms and include segregation of products in the system. Without that, the use of compostable and reusable products in practice becomes inconsequential to the larger problem of menstrual waste disposal. To that end, the discussion on menstrual waste disposal should include awareness and IEC programs around alternate products such as menstrual cups, compostable pads and cloth pads which are more environmentally friendly. Such information dissemination can be supported through mandated IEC programs at the local level, assigning a budget specifically for the purpose of information dissemination of sanitary products and finally, through partnerships with civil society organisations that have been working with women from different walks of life.

Urban Local Bodies

8. Strengthen compliance with SWM Rules

One of the primary requirements for effective implementation of the law is a set of unambiguous provisions that can be enforced. At present, the SWM Rules which primarily govern the activities of ULBs need to address both of these notions. Our interaction with a stakeholder working closely with MoEF&CC revealed that the SWM Rules were worded broadly to give ULBs the powers to determine their specific plans for treatment of waste in their areas. Fully cognizant of the need for this flexibility and given the diversity among cities on their specific waste disposal

mechanisms, the SWM Rules at present do not have much enforcement value, and based on conversation with ULB officials it is clear that there is no real consequence to not complying with the SWM Rules and the practices under it. To that end, it is necessary to have stronger enforcement mechanisms which can then form the cornerstone of effective implementation. Penalties levied on sanitation workers/households for not segregating waste at source can be considered for the same.

9. Build partnerships for MHM awareness with Civil Society Organisations and Private Players

One of the most significant contributions to MHM awareness has been through civil society initiatives. Even in the sanitation space, work done by organisations such as Swachh and Sachhi Saheli through partnerships with urban local bodies has contributed significantly to the IEC aspect of the MHM ecosystem. In our review, we have also come across various organisations that are making contributions to their wards/municipalities/cities by increasing awareness of different menstrual hygiene products, right disposal methods, and waste segregation. Further, be it in the context of CSR, EPR or otherwise, the role of producers and other private players within the ecosystem cannot be overlooked. Private companies that have a stake within any given ecosystem have historically made for great partners in bringing about positive outcomes for those sectors. Therefore, we recommend that urban local bodies should proactively identify organisations (both civil society and private) within their jurisdiction that are working on these issues, partner with them to use their IEC budgets, and contribute more effectively to the MHM dialogue and influence behavioural aspects (such as segregation) that affect the sanitation value chain at present, which they are unable to solve through the existing framework.

ANNEXURE 1: STANDARDS FOR PROCUREMENT OF INCINERATORS - EXAMPLES OF TENDERS

S.No.	TENDER DETAILS	NUMBER OF INCINERATORS AND LOCATION	PROCUREMENT STANDARDS
1.	Bid Document for Supply, Installation, Commissioning, Operation and Maintenance for 5 (five) years of automatic sanitary napkin vending machines & electric incinerators at various locations in Amritsar City under Amritsar Smart City Project. ⁸⁴	85 incinerators to be installed in Government Girls School, Railway Station and Bus Stand, Public Toilets, Hospitals, Factories or Industrial establishments, Offices, Government Offices in Amritsar City	<ul style="list-style-type: none"> • Ensure complete burning of napkin • Ensure instant disposal in a scientific and hygienic way with fully automatic way and burn completely • Burns 150 to 200 napkins/day, can be programmed for cycles/day • Self-disposal by user by directly putting into the incinerator • Ash generation should not exceed more than 5% per napkin • Ash should be collected in separate tray and ensure stack on that tray • Auto power & thermal cut-off and automatic temperature maintenance should be there for safety of user • Inside refractory lining should be excellent heat Guidelines on approval of Sanitary Waste retention to avoid thermal loss • 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. • The Incinerator should stop automatically if the door/ lid is open.
2.	E-Tender for Supply and Installation of 150 nos. approx. Sanitary Napkin Disposal Machine (Incinerators) ⁸⁵	150 incinerators to be installed at various places in Haryana.	<ul style="list-style-type: none"> • Type: Wall mounted/ floor mounted • Capacity: 200 pads/ day and 15 to 20 pads/ cycle with 12 cycles in a day. • Housing- External: CRCA Steel OF 1.2 MM Thickness • Housing Internal: Inside SS Covering For Maximum Lifetime 0.40MM Thickness. • Dimensions EXTERNAL (in mm): Width 350 mm (+/-) 10 % Depth 300 mm (+/-) 10% Height 750 mm (+/-) 10% Weight 25 Kgs (+/-) 10 % • Emission Outlet Yes On Top • Emission Outlet size 2 inch- FLEXIBLE PIPE • Residue Ash Less Than 1 GM Per Cycle Central PCB Control • Temperature Cut-off Yes With LED Display • Equipment ON indicator provided Yes/ No Yes Required • Door Design Type of insulation Thermal Ceramic Insulated • Door dimension L x D x H 150MM X 25 MMX 200MM (+/-) 10 %

⁸⁴<https://pmidc.punjab.gov.in/wp-content/uploads/2019/06/RFP-Sanitary-Napkin.pdf>

⁸⁵http://techeduhry.gov.in/sites/default/files/documents/Sanitary%20Napkin%20Incinerator_Tender%20document.pdf

			<ul style="list-style-type: none"> • Door Locking Type of door lock used Magnet Catcher with automatic door closer • Heater Type of Heater (ISI Marked) Ceramic Heater Wattage in watts 1200 WATT Cut OFF temperature in degree C 400 DEGREE C • Length of power chord used in meters 2.5 metres outside the equipment. MUST have ISI MARK flue gas pipe provided Yes/ No YES • Standard length provided with every equipment in meters 2 Metres (Flexible pipe) • Type of connection of pipe with flue gas outlet Clamp Type (2pcs) Temperature Indicator provided Yes/ No settable and range Yes, Settable, UPTO 850 Degree. • Safety MCB provided Yes/ No YES. If Yes, MCB rating in Amp 25 Amp 23 Loading Manual- Front Loading 24 Ashtray Dimension L x H 175mm x 50mm(+/-) 10 %
3.	Quotation Call Notice for Procurement of Incinerators ⁸⁶	13 incinerators for Ashram schools located at different location of Sukinda and Danagadi areas under District Mineral Foundation, Jajpur.	<ul style="list-style-type: none"> • Electronically operated & Micro Processor Controlled (Electronic PCB based temperature control) LCD Display Massage System • Inbuilt Thermostat & Timer o Must achieve min. temperature 9500C with gas resistance time of not less than 2 seconds. • Convenient Soiled Napkin Front Loading system • Inbuilt SVS (Safety Valve System) . Easy Single Switch Start • Operation Auto Power Cut Off System on completion of Burn • Equipped with High Quality Round Burner for faster heating • Double Insulation for extra protection & excellent thermal protection High Density Heatproof Ceramic Insulation • Compressed Glass wool Insulation • Removable Ash Tray for cleaning the Ash easily. • Wall & Floor Mountwith both options. • Completely burn the Soiled Napkin with very little ash residue • Inbuilt Hi Quality MCB switch for protection • Ash generation of 1 gm (maximum) per napkin • NABL certified for emission &ash . Smoke pipe of 2mtr. Length
4.	Supply and Installation of Sanitary Napkin Vending Machine and Sanitary Napkin Incinerator under Hubballi	3 incinerators to be installed in Chitiguppi hospital, lamington school and at City Corporation office in Hubballi.	<ol style="list-style-type: none"> 1. Type: Wall Mounted Auto Cut – Off Electrically Safe Ceramic Insulated 2. Capacity per cycle: 40 to 50 Napkins per Cycle 3. Capacity per day: 200 to 250 Napkins per Day 4. Cycle Time One Hour 5. Housing-External CRCA steel of 1.2 mm thickness (minimum)

⁸⁶<https://cdn.s3waas.gov.in/s3ad61ab143223efbc24c7d2583bc69251/uploads/2019/09/2019092627.pdf>

	Dharwad Smart City Limited ⁸⁷		6. Dimensions (WxDxH) mm Less than 700x400x1000 mm Variation are also applicable 7. Weight Less than 50 Kg 8. Insulation Thermal Ceramic Sheet with Glass wool of 4 – 5 mm thick 9. Wattage 1000 Watt 10. Power Saver Auto Cut-off Provided 11. Residue Ash Less than 1 gm per cycle per pad 12. Temperature Cut-off Yes, with LED Display 13. Heater Ceramic Heater 1000 Watt 14. Fuel gas pipe provided Yes, 2 meters flexible Clamp 15. Safety MCB provided Circuit breaker
5.	Selection of Project Implementation Agency to install sanitary napkin vending machine and incineration system ⁸⁸	Community toilet, public toilet, girls toilet at municipal school, government aided schools, college private schools, college toilets, ward offices and municipal offices, commercial market, railway station, bus depot in the Pune Municipal Corporation	1. Ceramic insulation for external thermal protection 2. Auto thermal cut off for safety of user. 3. Having an emission outlet the room for the fumes developed during the incineration. 4. Very compact and can be fixed on the wall with easy installation for the convenient use. 5. Capacity should of 100 napkins / day. 6. Made of Stainless steel body. 7. Load and ash tray. 8. Insulation of high density. 9. Power 230v+10% lkw 10. Power saver. 11. Emission outlet with residue ash not more than 1 gm / napkin. 12. Should have in built smoke filter and water scrubber unit 13. Both machines should fulfil MPCB, CPCB norms. 14. NIBL certification for both machines is compulsory.

OBSERVATIONS/ COMMENTS

Key observations from the review of the tenders is as below:

- Inconsistency in requirements, especially on the materials to be used. While it is common for there to be difference in capacity of the incinerators, the quality of a heating device requires that the standards be aligned.
- The CPCB requirements are not consistent either. While there is reference to compliance with CPCB, it is unclear how these are verified and in most cases it seems to be self-certification of the standards and compliance norms.
- We have also seen multiple tenders floated under the SMART City mission alluding to the fact that there is governmental thrust coming through from other existing sanitation programs to use decentralised incinerators as the disposal mechanism for menstrual waste.

⁸⁷https://smartnet.niua.org/sites/default/files/snm_hdscl_tender_doc_13.8.18.pdf

⁸⁸<https://www.pmc.gov.in/sites/default/files/eoi/Project%20Brief%20EOI%20SNDP.pdf>

ANNEXURE 2: LIST OF STAKEHOLDERS CONSULTED

Urban Local bodies/Government

Organisation
Panaji Municipal Corporation
Swachh - Project Red Dot
SarvaSikshaAbhiyaan
Swacch Bharat Mission (Madhya Pradesh)
Swachh Bharat Mission - IEC, Karnataka
Chandrapur Municipal Corporation
Pimpri Chinchwad Municipal Corporation
Goa Health Monitoring Services
Bureau of Indian Standards

Incinerator Manufacturers/Sanitary product manufacturers

Organisation
NEERI
Padcare Labs
Aakar Innovations
Green Earth Equipment
Shri Ram Inc
Zuci Fem Care Solutions
J&J
P&G
Biocon Biopharmaceutical company
Fulcrum Hygiene
HLL Lifecare
Vatsalya Organisation
SowbalAerothermics
The Biomass Controls PBC
Electra Koko Tawa Weld Pvt. Ltd.

Academia/Civil Society Organisations/NGOs

Organisation
WaterAid/ Menstrual Health Alliance of India (MHAI)
Development Solutions/MHAI
Water Supply and Sanitation Collaborative Council - WSSCC
Population Services International (PSI)
CSE India - Centre for Science and Environment (CSE)
Department of Botanical and Environmental Sciences, Guru Nanak Dev University,
Govt. Polytechnic College for Girls, Amritsar

Department of Botanical and Environmental Sciences, Guru Nanak Dev University,
UNICEF India
Chintan
ASCI
NIUA
NEERI
Centre for Advocacy and Research
Sacchi Saheli
Stone Soup Inc
Tata Trusts
Tata Trusts - Maharashtra
She for Change
Centre for Water And Sanitation (C-WAS), CEPT University
The Biomass Controls PBC
Toxics Link
Ecofemme
Boondh
Green the Red

