

Sanitary Waste Management – Glancing through Indian Scenario

Dr. Bharat Bhushan Nagar

Independent Consultant
E-mail: [b.nagar\[at\]outlook.com](mailto:b.nagar[at]outlook.com)

Abstract: *The present article discusses sanitary waste management, which is defined as part of domestic hazardous waste as per SWM Rules 2016. Sanitary waste management is discussed with a focus on used sanitary napkins in the present article. The article makes an attempt to define a methodology to estimate the generation of used sanitary waste for used pads. The legal aspect of sanitary waste management is also discussed, which reduces programs on waste segregation at the source due to the inclusion of used sanitary pads as part of recyclable waste streams, despite it being part of domestic hazardous waste.*

Keywords: Sanitary Waste, Waste Minimization, Recycling; Infectious

1. Introduction

Women and men have specific sanitation needs, preferences, access requirements, and utilization patterns and experiences [1]. Women also use toilet facilities to manage their menstruation. Good menstrual hygiene practices mean that women and adolescent girls are using a clean menstrual management material to absorb or collect menstrual blood, that can be changed in privacy as often necessary for the duration of a menstrual period, using soap and water for washing the body as required, and having access to safe and convenient facilities to dispose of used menstrual management materials [2].

Poor menstrual hygiene management (MHM) can negatively impact the health and psycho-social well-being of women and girls [3]. Menstrual hygiene management in the water and sanitation sector is not formally defined in the Sustainable Development Goals (SDGs). However, clear linkages are framed here to include: SDG3 (physical health and psycho-social well-being for women and girls), SDG4 (quality education for girls), SDG5 (gender empowerment and equality), SDG6 (water and sanitation), and SDG12 (responsible consumption and production for the environment).

There are 336 million menstruating women in India, of which 36 per cent use disposable sanitary napkins - those totals to 121 million women, estimates the Menstrual Hygiene Alliance of India (MHAI). The number of sanitary napkins used per menstrual cycle - at a conservative eight - and calculating that for the year - implies that India has 12.3 billion disposable sanitary napkins to take care of every year, majority of which are not biodegradable/compostable [4].

With not enough effort going into stripping used sanitary napkins so that the richness of the nutrients can be captured though composting, menstrual waste is disposed as part of routine waste ending up in landfills, thrown in open spaces and water bodies, burnt, buried (shallow burial) or flushed down toilets. Each poses a different type of risk to the environment. Burning releases carcinogenic fumes in the form of dioxins and furans.

2. Introduction to Menstrual Waste Management (MWM)

Issues and challenges related to menstrual hygiene management (MHM) in low and middle-income countries are gaining increased recognition in the water, sanitation, and hygiene (WASH) sector globally.

WHO and UNICEF (2014) have defined MHM as “Women and girls are using clean menstrual hygiene management material to absorb or collect blood, that can be changed in privacy as and when necessary for the duration of the menstrual period, using soap and water for washing the body as required and having access to facilities to dispose of used menstrual management materials by them [5].

Menstrual hygiene management (MHM) or menstrual health and hygiene (MHH) is about access to menstrual hygiene products to absorb or collect menstrual blood, privacy to change the materials, and access to facilities to dispose of used menstrual management materials. It can also include the "broader systemic factors that link menstruation with health, well-being, gender equality, education, equity, empowerment, and rights" [6].

As per Rule 3 (41) of SWM Rules 2016, “**sanitary waste**” means wastes comprising of used diapers, sanitary towels or napkins, tampons, condoms, incontinence sheets and any other similar waste. Household sanitary waste primarily comprises of disposed sanitary napkins and baby diapers [7].

Menstrual waste refers to blood and used and discarded menstrual absorbents, including cloth, disposable sanitary napkins, tampons, and other substances or materials that girls and women use to soak up or hold blood during menstruation. [8]

Globally, Sanitary waste and Menstrual waste are used very commonly, but Menstrual waste is used as a broad term and includes used sanitary pads and baby nappies prominently. Sanitary waste comprises baby nappies in addition to streams defined for Menstrual waste (Indian SWM Rules, 2016). But since this subject has its own limitation for open discussions and social limitations, people have refrained

from defining it clearly. This has further resulted in barriers for undertaking its management and planning.

3. Categorization of Menstrual Waste Streams

Baby nappies and menstrual products (tampons and pads) are included under the category of absorbent hygiene products (AHP), which are products designed to absorb excreted body fluids at various stages of a consumer’s life. Single-use AHP and wet wipes are examples of items that become waste after using them only once and, despite entailing serious environmental, economic and social impacts, their usage is expected to increase in the future unless technical or legal measures are implemented [9].

Overall, the MWM primarily comprise of, sanitary napkins, tampons and sanitary cups. These wastes are of single use type and have a significant impact on environment.

A. Menstrual Products

These products are divided into Tampons and Pads/Panty Liners.

- **Tampons**

Generally, tampons are mainly composed of absorbent materials (over 90% of the tampon), either rayon, cotton,

polyester, or a mixture of these fibres, which are usually bleached. Usually the absorbent-core is covered by a thin, smooth layer of non-woven or perforated film helping to reduce loss of fibres and making the tampon easy to insert and remove. The withdrawal cord used to remove the tampon is usually made out of cotton or can be made out of polypropylene or polyethylene fibres. The tampon is individually wrapped with a paper wrapper or a thin film (e. g., polymeric plastic material or cellophane) before being packed into cartons. Tampons may come with an applicator of coated paper or hard plastic (polyethylene (PE) or polypropylene (PP)) [10].

- **Pads/Panty Liners**

It has been calculated that most conventional single-use pads are made out of 90% plastic (11). Polyethylene is the most abundant plastic (polyolefins being part of its family, which also includes LDPE, LLDPE, HDPE and PP), with other materials also used, such as adhesives and various fragrances. Generally, conventional single-use menstrual pads and panty liners are composed of a series of raw materials which are distributed based on the different layers.

Table 1: Product Characterization of Sanitary Pads (Zero Waste Europe, 2019)

Pad components	Infinity	Radiant	Ultra	Maxi	Pure and Clean
Top Sheet A soft fabric that is designed to pull fluid away from skin	Polyolefins, like those commonly used in clothing; with petrolatum and zinc oxide (ingredients found in skin lotions) on Infinity and Radiant				Polyethylene/ Synthetic fibers similar to those used in garments clothing
Absorbent Core A layer that acquires and stores fluid, locking it away	Absorbent foam (Flex Foam)		Absorbent wood cellulose (the absorbent material used in pads since 1920s) with absorbent gel, rayon, or polyester		Absorbent wood cellulose and super absorbent gel pearls to keep fluid inside
Back Sheet A soft moisture proof layer to keep the fluid inside	Polyolefins, like those commonly used in clothing (printed on Radiant)				Polypropylene and polyethylene/Synthetic layer moisture proof to keep fluid inside
Adhesives	An FDA approved food additive adhesive similar to craft glue sticks				Glue to ensure the layers in the pad keep together and adheres to panty
Fragrance Provides a fresh scent	Fragrance ingredients. Only on versions labelled as scented				Not present
Wrapper Protects the adhesives before the pad is used	Printed polyolefin like that used in clothing, and paper (Maxi only)				Printed polyethylene/ film to keep pad protected and convenient to carry
Wing paper Protects the wings adhesive before the pad is used	Printed paper				Paper to protect wing adhesive before pad is used

Some menstrual products also include fragrances/scents, which can interfere with the balance between good and bad

bacteria. Synthetic fragrances can be made from a cocktail of up to 3, 900 chemicals (styrene, chloromethane,

chloroethane, chloroform, acetone, among others). Some of them are identified as carcinogens, neurotoxins, irritants, hormone disruptors and reproductive toxicants. The chemicals in these products can also modify the pH balance of the individual. However, most of the time these chemicals are not disclosed on the product by the manufacturer.

4. Present National Scenario in MWM

This section discusses about the current situation of MWM at various levels at National and state level activities for managing of Menstrual Waste management.

4.1 National Scenario – Menstrual Waste Management

Amount of Sanitary Waste Generated Despite the under usage of proper sanitary products in India, menstrual waste is increasing day-by-day owing to the ever-increasing

population [12]. An average woman throws away around 150 kg of non-biodegradable waste every year [13]. With changing demographics and preferences, the amount of non-biodegradable sanitary napkins used in India is growing. As women are becoming more aware about the importance of using hygienic sanitary products, the number of sanitary napkins used per month is going to increase rapidly. Different eco-friendly products like biodegradable napkins and menstrual cups have recently started gaining importance; how-ever it will be years before the usage of non-biodegradable sanitary napkins scales down. If an estimated 121 million women and adolescent girls are currently using an average of 8 disposable napkins every month, the waste load generated in India is estimated to be 0.11 million tons [4]. The generation cycle is shown in diagram below:

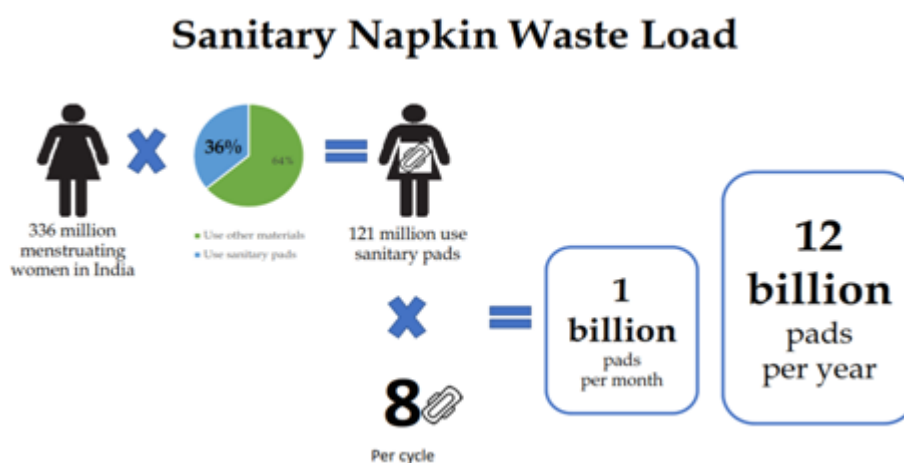


Figure 1: Pictorial Estimation of Sanitary Waste in India (Source: Water Aid India, 2018)

Products used during menstruation and its disposal techniques vary from whether the woman stays in rural area or urban and even whether there are adequate disposal facilities available for her [15]. Most of the women dispose of their sanitary pads or other menstrual products into garbage bins that ultimately become a part of municipal

solid waste [16]. In urban areas, where modern disposable menstrual products are used, they dispose of them by flushing in toilets and throwing in dustbins [17]. In rural areas, women use reusable and non-commercial sanitary materials like reusable pads or cloths.

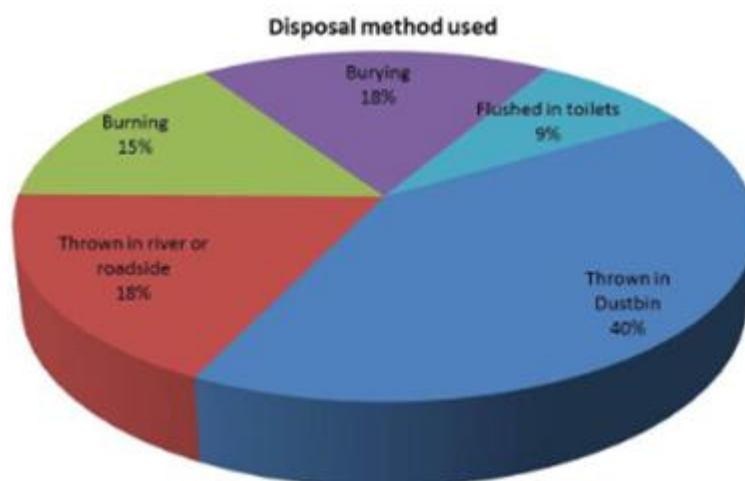


Figure 2: Segmentation of Prevailing Menstrual Waste Disposal Methods in India (Source: Water Aid India, 2018)

Thus, generating lesser amount of sanitary waste as compared to those using disposal and one time used pads in big cities. Rural areas provide many more options for disposing menstrual waste such as by burying, burning, and throwing in garbage or in pit latrines [18].

According to a report prepared by Action Aid India, the disposal methods vary according to below shown pictograph:

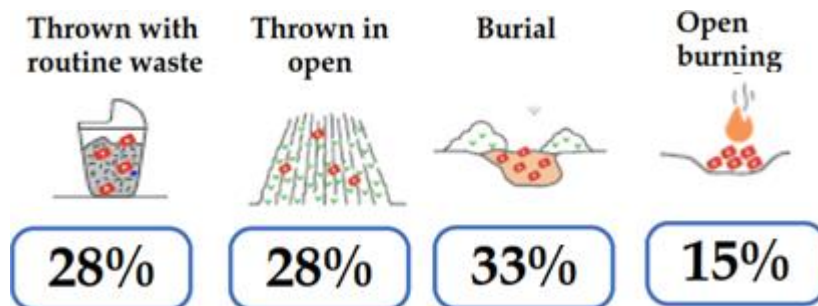


Figure 3: Segmentation of Prevailing Menstrual Waste Disposal Methods in India
(Source: ActionAid India, 2018)

The disposal method of a menstrual product largely depends even on the cultural beliefs and location or time of disposal, since menstruation is still considered as something to be kept private and secretive, women prefer to dispose their products or wash them in private and bury or burn only at night or when no person, especially men are around [8]. At some locations, incinerators are used for disposing menstrual waste material but due to shyness or fear of being seen by others they refrained from using it. Toilet facilities in India lack bins for the disposal of sanitary pads and hand washing facilities for menstruating women to handle menstrual hygiene. The situation is even worse when it comes to public toilets either at a rural or urban location [19-22].

The toilet doors usually have broken lock, lack of water tap, bucket, and poor water supply are some to the common issues observed at a public washroom. Thus, women are forced to flush the pads in the toilets or wrap and throw them in the dustbins [23-24]. Where dustbins are not placed, they leave the soiled pads wrapped or unwrapped in the toilet corners. (Kaur R. et al, 2018) This makes the toilets dirty, breeding place for flies and mosquitoes, and also unhygienic for other toilet users and cleaners. All these above unhygienic practices create a lot of health issues and infection for whoever is exposed to them or have to clean the areas [25-27].

Women using a communal toilet in Tamil Nadu were reluctant to leave menstrual waste in communal bins as it was unclear when the waste would be burned [28]. The majority of participants were comfortable with communal incinerators, but the Tamil Nadu study found that incinerators installed in a communal toilet were not in use due to a lack of signage [29].

Current solid waste management laws in India require the waste generator to securely wrap sanitary waste prior to disposal and require the product manufacturer to provide a wrapper for disposal. To address these requirements, manufacturers have started providing plastic wrappers for product disposal, but an unintended consequence of this is the increased burden on the environment and waste management systems from the additional menstrual waste wrapping [21]. The Government of India is promoting

incineration of menstrual waste as a disposal method, which would help to reduce environmental burden of menstrual waste if incinerators meet design and emission standards. However, the lack of standards for small-scale appliances, the lack of oversight or enforcement of emission regulations on incinerators, the potential risks resulting from inadequate emission control measures or poor thermal treatment performance are concerning [12].

4.2 State Scenario

The state scenarios for details on MWM has been poorly captured as none of the states have taken initiatives to set up study projects related to generation of MW. Govt. of Bihar in 2017 has issued MWM guidelines, which provide a driving framework for implementation of MWM program through better provision of pads distribution based hygienic approach and financial support extension to the rural health centres for eased distribution and access to menstruate ladies only [12-14]. The guidelines do provide the ways and methods of disposing the used pads in a hygienic manner, but does not touch any aspect of maintaining quantity of waste pads generated across the state and exploring its linkage and impact upon Urban and Rural waste management systems [15-18; 23].

Many databases exist, which can furnish information related to total Urban SWM systems prevalent across the cities, but MW has not been considered as part of study parameters [45]. Though it may be worth noting that this waste stream was added only in SWM Rules 2016, but even after passage of 4 years, not much have been studied and documented, as far as MW quantification is concerned.

4.3 MWM Estimation Methodologies & Database

Across the world, very few geographical regions have been able to develop database related to generation, handling and disposal of MW, which includes all categories as defined in section. EU has been at the forefront to conduct extensive studies for establishing real-time quantities of various streams of MW, generated as part of MSW [29]. Estimating the number of menstrual products consumed across Europe it is not an easy task if we take into account that its usage by

global consumers varies significantly by country, ethnicity, age, menstrual cycles and changing frequencies. It should therefore also be noted that there is a percentage of menstruators that uses reusable products on a regular basis instead of single-use ones.

4.4 Estimation of Sanitary Pads Waste Generation

In order to simplify the calculations, it has been considered that on average a menstruating woman consumes 32 single-use menstrual products (pads or tampons) per period and 416 products annually (if you assume 13 periods per year) [30]. That would mean that each menstruating woman uses about 14, 000 menstrual products in their lifetime. When translating this consumption into waste generation, it is estimated that the weight of a period is 384gm (considering each product after use, on average, weighs 12gm), meaning that “if a woman has 1 period per year and menstruates for 36 years, more than 180 kg of single-use tampons and pads will be thrown away in a single lifetime for one menstruating woman” [30].

Based on these considerations, the total waste generation of Menstrual waste in India has been estimated in below table.

Table 2: Estimation of Used Sanitary Pad Waste in India in 2020

Number of women of reproductive age (Million)	Menstrual items consumption (units)	Annual Menstrual Waste generation (tons)
1.71	23940, 000, 000	85680

- Converting this into monthly generation = 6590 tons /Month
- Daily Generation = $6590/30 = 220$ Tons/Day

This is as same as reported at website of Saral Napkins, which report that approximately 200 Tons/day of Sanitary Napkins are generated on daily basis in India [55]. It is worth noting that this amount excludes baby nappies and wet wipes, whose estimated methods are not included in this study.

As per IANS, the quantum of sanitary pads is estimated to be 113, 000 tons annually [31].

5. Legal Guidelines Review

Despite the massive waste generated in the country, India does not have separate laws governing the disposal of sanitary waste. Only two cities – Bengaluru and Pune – have laws on segregation of sanitary waste wherein the sanitary waste must be separately handed over along with the dry and wet waste of the household.

According to the *Solid Waste Management Rules, 2016*, menstrual waste is classified as “sanitary waste” under the ambit of solid waste. The method for disposing sanitary waste is incineration and the state has pushed for low-cost incinerators in various schools and women’s complexes. The guidelines for menstrual waste disposal also further elucidate the responsibilities of the authorities and the manufacturers in ensuring proper disposal. Needless to say, these are not always followed.

5.1 Present Solid Waste Management 2016 Requirements

As per sub-rule Rule 3 (19) of SWM Rules 2016, “dry waste” means waste and includes recyclable and non-recyclable waste, combustible waste and sanitary napkin and diapers, etc [12]. Rule (4) (b) of SWM Rules, 2016, states that wrap securely the used sanitary waste like diapers, sanitary pads etc., in the pouches provided by the manufacturers or brand owners and place in bin meant for dry waste.

Interestingly, In UK, The Water Industries Act 1991 stipulates that no sanitary waste is to be flushed away as it can damage sewers and drains. Coupled with The Environmental Protection Act 1990, which imposes a Duty of Care on organisations that produce controlled waste including sanitary waste, it becomes clear that dealing with this waste requires proper facilities.

But this inter linkage in Indian legislation is clearly absent, which deters proper planning and institutionalization of agencies dealing with waste with same characteristics, but being handled under different system.

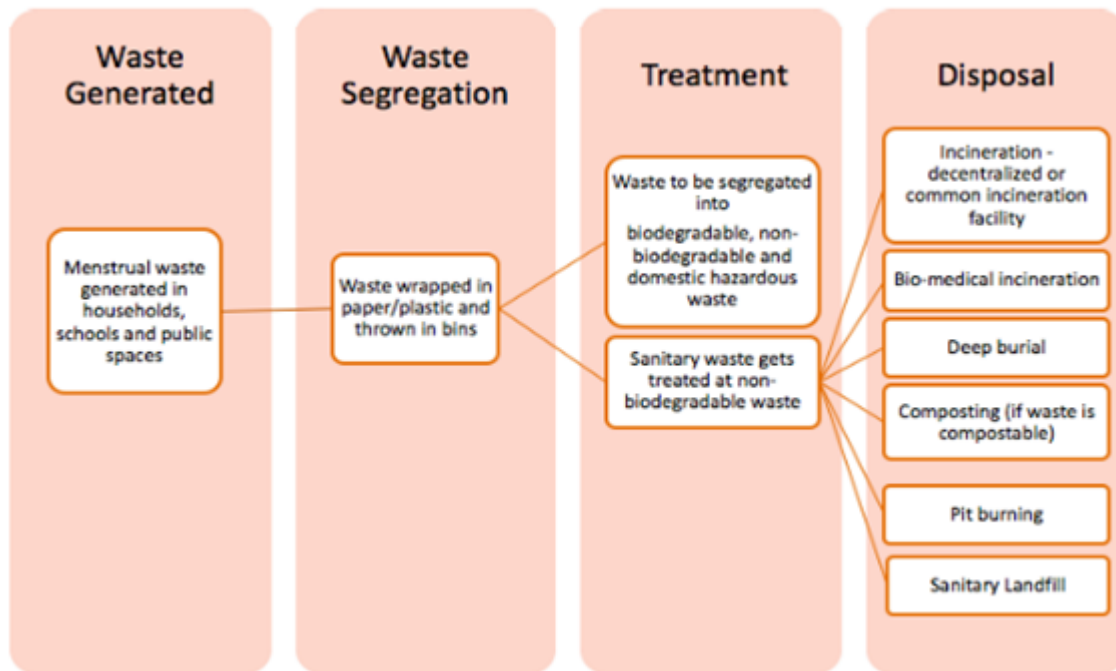


Figure 4: Sanitary Waste Management as per Indian SWM Rules 2016 (Source: CPCB, 2017)

It's worth noting that practically, it's not desirable to mix sanitary waste with dry waste.

5.2 Bio Medical Waste Perspective in MWM

Household sanitary waste stream is very similar to biomedical waste category No 6 referring to the Discarded linen/clothing/, mattresses and beddings contaminated with blood or body fluid and have, which include similar items with particular focus upon Menstrual Waste, which is part of Household sanitary waste as defined in SWM Rules, 2016. One interesting observation worth mentioning is that the menstrual waste generated in hospital is categorized as per No.6 and are kept with defined waste streams and disposed with defined procedure as per BMW Rules 2016. It is being debated whether this waste must be brought under Biomedical Waste Management & Handling (BMW) Rules, 2016 or not [12]. The Workplace (Health, Safety & Welfare) Regulation 1992 in UK recommends that businesses provide all female toilets with a suitable method for disposing of sanitary waste.

5.3 EPR Requirement Perspective under sub-rule 17 of SWM Rules 2016

As per sub-rule 17 of SWM Rules 2016, it is the duty of manufacturer or brand owners responsible for sale and introduction of disposable sanitary products like sanitary napkins and pads and diapers to provide disposal bags along with the product for its safe packaging after its usage for safe handling and to avoid cross-contamination of other waste, which as per law is dry waste streams, This statement also mandates implementation of Extended Producer Responsibility (EPR) for all companies engaged in Diapers and Sanitary Pads under Plastic Waste Management and Handling Rules, 2018 [21]. While the guidelines suggest that the manufacturers not only provide a pouch for safe disposal of the pad but also assist the local authorities in creating awareness and handling disposal of their products, this is seldom done.

6. Conclusions

A comparative account of sanitary waste management with focus upon sanitary pads at global and Indian National scenario has been captured in this paper. The comparison focuses on definition of Single use plastic-which is being used in EU market for achieving reduction in sanitary waste generation and minimization. In USA, the disposal practices adopted are very similar to Indian conditions, relying upon incineration. There is an urgent need to redefine the end of waste usage definition, as per EU, which would not only encourage non-conventional types of sanitary products such as tampons, but also replacing them with a series of biological origin material with repeated usage aspects.

References

- [1] Academics – CPS Home available at <https://www.cps.iitb.ac.in/academics> (Accessed on Dec 14 2020)
- [2] Fast-facts-nine-things-you-didn't-know-about-menstruation Available at: <https://www.unicef.org/press-releases> (Accessed 12 Dec 2020)
- [3] Over 40% of Young Indian Women Use Unhygienic Menstrual Protection Available at <https://www.thewire.in> (Accessed on 14 Dec 2020)
- [4] Unlearning Menstruation: Sanitary Waste in India – Eco-Femme Available at: <https://www.ecofemme.org> (Accessed on 14 Dec 2020).
- [5] Water, Land & Livelihoods-Towards building resilient communities and ecosystems Available at: <https://www.wordpress.com> (Accessed on Dec 16 2020)
- [6] WaterAid_Arundati-Muralidharan. pdf Available at: <https://www.menstrualhygieneday.org> (Accessed on Dec 17 2020)
- [7] Menstrual hygiene management in schools in South Asia, Published by ActionAid, 2018. Available at <https://washmatters.wateraid.org/sites/g/files/jkxooof256/files/> (Accessed on Dec 14 2020)

- [8] Menstrual Disposal, Waste Management & Laundering in Emergencies-A Compendium, published by USAID, Feb 2020. Available at <https://www.publichealth.columbia.edu/sites/default/files/mhm> (Accessed on Dec 17 2020)
- [9] SBM-Urban Guidelines, Published by Union Ministry of Housing & Urban Affairs (MoHUA), Govt. of India, 2017 Available at <https://sbmurban.org/policy-guideline> (Accessed on Dec 15 2020)
- [10] SBM-Rural Guidelines, Published by: Union Ministry of Drinking Water & Sanitation, Govt. of India, 2017 Available at: <https://swachhbharatmission.gov.in/sbmcms/index.htm> (Accessed on Dec 16 2020)
- [11] National Menstrual Hygiene Mgt. guidelines, Published by: Union Ministry of Drinking Water & Sanitation, Govt. of India, 2017 Available at: <https://swachhbharatmission.gov.in/sbmcms/index.htm> (Accessed on Dec 19 2020) (Accessed on Dec 14 2020)
- [12] Guidelines on Sanitary Waste Management, Central Pollution Control Board, 2018 Govt. of India. Available at: https://cpcb.nic.in/uploads/plasticwaste/Final_Sanitary_Waste (Accessed on Dec 15 2020)
- [13] Bihar MHM Guidelines, Published by Govt. of Bihar State, India, 2019 Available at: <https://www.wssc.org/media/resources/bihar-state-menstrual> (Accessed on Dec 14 2020)
- [14] MENSTRUAL WASTE DISPOSAL IN INDIA-A study by TQH Consulting for the NFSSM Alliance March 2020. Available at: <https://thequantumhub.com/menstrual-waste-disposal-in-india> (Accessed on Dec 18 2020)
- [15] Explaining the outcomes of the 'Clean India' campaign: institutional behaviour and sanitation transformation in India, Curtis V. *BMJ Global Health* 2019; 4: e001892. doi: 10.1136/bmjgh-2019-001892. Available at: <https://gh.bmj.com/content/bmjgh/4/5/e001892.full.pdf> (Accessed on Dec 14 2020)
- [16] THE ENVIRONMENTAL & ECONOMIC COSTS OF SINGLE-USE MENSTRUAL PRODUCTS, BABY NAPPIES & WET WIPES-Investigating the impact of these single-use items across Europe, Published by Zero Waste Europe, 2019. Available at: <https://www.breakfreefromplastic.org/wp-content/uploads/2019> (Accessed on Dec 18 2020)
- [17] Menstrual Health in India-Landscape Analysis May 2016 Available at <https://menstrualhygieneday.org/wp-content/uploads/2016/04> (Accessed on Dec 16 2020).
- [18] BASELINE SURVEY REPORT ON MENSTRUAL HYGIENE MANAGEMENT-Baseline survey report on School Girls' Menstrual Hygiene Management issues, 2014 Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5541609> (Accessed on Dec 19 2020)
- [19] MENSTRUAL WASTE MANAGEMENT in India-van Dijk et al (2016). Menstrual Hygiene management among adolescent girls in India: a systematic review and meta-analysis. Published by: Union Ministry of Drinking Water & Sanitation, Govt. of India, 2017 Available at: <https://pubmed.ncbi.nlm.nih.gov/26936906> (Accessed on Dec 20 2020)
- [20] "Menstrual Hygiene, Management, and Waste Disposal: Practices and Challenges Faced by Girls/Women of Developing Countries"; Rajanbir Kaur et. al; *Journal of Environmental and Public Health* Volume 2018, Article ID 1730964, 9 pages. Available at: <https://doi.org/10.1155/2018/1730964> 2017 (Accessed on Dec 14 2020)
- [21] Menstrual Hygiene Management Operational Guidelines, published by: Save the Children, 2018. Available at: <https://www.savethechildren.org/content/dam/global> (Accessed on Dec 19 2020)
- [22] An Impact Assessment of Shelter Associates' 'One Home One Toilet' Program Conducted by GOKHALE INSTITUTE FOR POLITICS AND ECONOMICS PUNE, 2018 Available at: <https://www.shelter-associates.org/downloads/Sanitation/IMPACT> (Accessed on Dec 21 2020)
- [23] Menstrual Disposal, Waste Management & Laundering in Emergencies: A Compendium, Published by: Columbia University, IRC 27 Aug 2020. Available at: <https://reliefweb.int/report/world/menstrual-disposal>. (Accessed on Dec 18 2020)
- [24] IJERPH | Free Full-Text | Menstrual Hygiene Management and Waste Disposal in Low-and Middle-Income Countries-A Review of the Literature (mdpi.com) . Available at: https://res.mdpi.com/d_attachment/ijerph/ijerph-17-04140 (Accessed on Dec 17 2020)
- [25] Roxburgh H, Hampshire K, Kaliwo T, Tilley EA, Oliver DM, Quilliam RS (2020) Power, danger, and secrecy-A socio-cultural examination of menstrual waste management in urban Malawi. *PLoS ONE* 15 (6): e0235339; <https://doi.org/10.1371/journal.pone.0235339>. (Accessed on Dec 16 2020)
- [26] Guidelines for Handling, Treatment and Disposal of Waste Generated during Treatment/Diagnosis/Quarantine of COVID-19 Patients. Published by: CPCB, 2019. Available at: <https://swachhindia.ndtv.com/guidelines-issued> (Accessed on Dec 15 2020)
- [27] PRACTICAL IDEAS AND EXPERIENCES FOR SWACHH BHARAT MISSION (GRAMIN) CAMPAIGNS-A LIVING SOURCEBOOK available at www.communityledtotalsanitation.org (Accessed on Dec 14 2020)
- [28] The mammoth task of managing menstrual waste in India (downtoearth.org.in) available at www.downtoearth.org.in (Accessed on Dec 17 2020)
- [29] A TOOLKIT FOR INTEGRATING MENSTRUAL HYGIENE MANAGEMENT (MHM) INTO HUMANITARIAN RESPONSE THE FULL GUIDE Published by: Columbia University, 2019. Available at <https://reliefweb.int/sites/reliefweb.int/files/resources> (Accessed on Dec 16 2020)
- [30] Guideline on Promotion of Menstruation Health and Hygiene for Trainers and Supervisors, UNICEF, Sept 2010. Available at: <https://menstrualhygieneday.org/wp-content/uploads/2016> (Accessed on Dec 14 2020)
- [31] Guidance on Menstrual Health and Hygiene, UNICEF, 2016 available at <https://www.UNICEF-Guidance->

menstrual-health-hygiene-2019. pdf (Accessed on Dec 22, 2020)

- [32] <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/nondurable-goods-product-specific-data#DisposableDiapers> (Accessed on Dec 22, 2020)
- [33] (<https://saraldesigns.in/sanitary-napkins-and-its-environmental-impact-part-1/>) (Accessed on 19 Dec 2020)
- [34] (<https://www.thenewsminute.com/article/billions-sanitary-pads-pollute-our-environment-india-needs-focus-managing-menstrual-waste.html>) (Accessed on 18 Dec 2020)
- [35] Guidance Manual on Menstrual Health and Hygiene UNICEF, May 2019. Available at: <https://www.unicef.org/wash/files/UNICEF-Guidance-menstrual> (Accessed on 19 Dec 2020) (<https://pushingforpeacepune.weebly.com/red-dot-campaign.html>). (Accessed on 18 Dec 2020)