



## Incinerator Awareness for Personal Hygiene Absorbent Products: A Study on Indian women

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**Abstract:** Personal hygiene management (PHM) has gained attention in the recent days as it is an important and essential step towards a healthy life. Physical and mental fitness is the first requisite of happiness. Women's personal hygiene is of main concern as her contribution towards home and society is immense. Personal hygiene absorbent products are more convenient and preferred by the mothers and the caretakers than cloth diapers which were used few centuries ago. Personal hygiene absorbent products contain traces of dioxin, an extremely toxic by-product of the paper-bleaching process and a carcinogenic chemical, the most toxic of all cancer-linked chemicals. Hence the disposal of these diapers is a main concern not just for the safety of the individual but also for the environment. The environmental pollution caused by the disposal methods of the personal hygiene absorbent products poses a lot of challenges as these create a lot of waste. This paper aims at understanding the awareness of the female population on the proper disposal and environmental effects of used personal hygiene absorbent products on our environment.

**Keywords:** Personal Hygiene, Absorbents products, Disposable diapers, disposal

### I. INTRODUCTION:

Hygiene is a concept of preservation and well-being of the individual which is vital for the daily routine life. It is a practice to prevent oneself from spreading the diseases and to lead a healthy lifestyle. Hygiene is always associated with the health of the individual. The happiness of an individual and the family depends on the good health of all.

Women are the backbone of the house and their well-being is of importance to the family. Hygiene on their personal part is essential as they do a lot of activities in and outside the house. Maintaining appropriate feminine hygiene for intimate area is one of the important factors as it plays a vital role in every aspect of female reproductive health, sexual health and quality of life. It is very important especially to girls, who have reproductive age and menstrual cycle require more sanitization.

Waste generation and waste management have become an environmental concern. The incessant growth in the amount of waste generation has turned out to be one of the main environmental harms that the modern societies have to face in recent years. The ever-increasing rise in society's environmental awareness, along with an increasing difficulty to locate waste facilities such as waste incinerators and landfills (Alçada-Almeida, 2009), has showed the way Public Administrators to search for alternative waste management solutions, such as composting or recycling. In particular, in Europe, the recent Directive 2008/98/EC of 19 November 2008 on Waste establishes the following waste hierarchy "a) prevention; b) preparing for reuse; c) recycling; d) other recovery, e.g. energy recovery; and e) disposal" (art. 4). Additionally, Directive 1999/31/EC of 31 April on the landfill of waste sets up significant restrictions on the disposal of biodegradable materials in landfills.

### II. THEORETICAL BACKGROUND

☑ Women are always involved in household activities like cooking the food, cleansing of the house and caring for children and other family members. This means that women health is of immense importance not just to her but to her family as well. This has to be understood by the Women folk and necessary steps have to be taken to gain knowledge and get involved in the practices of personal hygiene.

☑ Personal hygiene is also important from health point of view, wherein paying attention on the personal hygiene and cleanliness can keep oneself away from disease, such as skin diseases, respiratory diseases or gastro intestinal diseases.

☑ Personal hygiene is also vital at social level. It is necessary especially during sweating, menstruation (periods) and vaginal discharge to prevent body odor and to be healthy. It is especially important at the places where proper etiquettes are required like work, school or in social activities.

## **TYPES OF PERSONAL HYGIENE PRODUCTS**

The quality of the menstrual hygiene product is judged by factors like leak protection, absorbency capacity, dryness, product comfort and size, thinness, allergies and biodegradability. Some authors defined menstrual hygiene products either as hygienic (e.g., sanitary pads) or as unhygienic absorbents (e.g., cloth, tissue papers and cotton wool) based on whether their use may cause infections. A woman menstruates between puberty (age 11–24) and menopause (age 45–55) for an estimated 459 cycles during her lifetime. With rapid urbanization, rising incomes, expanded product availability and distribution, and increased mobility, the use of disposable sanitary napkins is increasing rapidly.

Disposable diapers: A diaper is a type of underwear that allows the wearer to defecate or urinate without the use of a toilet, by absorbing or containing waste products to prevent soiling of outer clothing or the external environment. Disposable diapers are clothed or synthetic disposable materials which contain absorbent chemicals that allows discreet defecation or urination.

Reusable pads: Cloth pads mimic what women used historically. They're made up of cotton layers and encased in waterproof fabric so you don't have to worry about leaks. They also have wings that help keep them in place, just like regular disposable pads. They're comfortable, environmentally friendly and healthier option. Some have a foldable shape that does not resemble a pad when drying. Lifecycle costs are significantly lower than disposable pads and they are easier to manage when compared to traditional cloth, although hygienic use still requires commitment to washing and drying.

Period pants: These are absorbent underwear worn like normal knickers. These are made from multiple layers that hold the menstrual blood and vary in absorbency. These can be washed after use.

Menstrual cups: These are flexible bell-shaped receptacles that collect blood (rather than absorb) and need insertion like tampons. It's a silicone or rubber cup that can be inserted into vagina. It can be rinsed and reused, making them economical, eco-friendly and gentler on your body.

## **DIFFICULTIES OF DISPOSABLE DIAPERS**

Diapers are used for infants, children, adults with incontinence or in certain circumstances. These can include those of advanced age, patients' bed-bound in a hospital, individuals with certain types of physical or mental disability, and people working in extreme conditions, such as astronauts.

Disposable diapers have become indispensable in the list of our day to day baby care products. Approximately 90% and 95% of diapers used in the developed world are disposable diapers. A baby uses an average of 4 to 5 disposable diapers a day, which shows they are generally used in many parts of developed and developing world as a replacement for cloth (reusable) diapers. The advent of disposable diapers somehow resulted in the death of the napkin culture. There are a lot of disposable diaper in the market now with different Brand names and sizes e.g. pampers, huggies, bamboo etc. In order to help mask the smell of a soiled diaper, or to protect the skin, the marketers include fragrance or essential oils to their disposable diapers

Disposable diapers have become highly commoditized and a necessity rather than a luxury in fast paced lives. Disposable diapers represent about 4% of solid waste and are third largest single consumer item in landfills which are discarded after a single use. The disposal of these absorbent leads to a great burden on landfill sites and environment. Even if the used personal hygiene absorbent products are burnt, buried in the ground or thrown dumped in illegal dumpsites by people, it results in the spread of communicable diseases. The personal hygiene absorbent product's disposal methods in several countries are inadequate and it is a common sight to find them unguardedly along road sides. These negligent disposals of soiled disposable diapers carry bacteria, viruses, and when in the environment can be transmitted directly or indirectly. Some waste pickers use bare hands to salvage materials disposed of at the landfills.

Diaper wastes have a significant proportion of organic materials in their composition, but their final destination in most of the countries is landfill or incineration. In municipalities where high levels of separate waste collection are reached, disposable diapers account for a significant part of the refuse fraction and constitute one of the main difficulties to increase the recycling levels. As first objective and based on a literature review, this paper describes the main impacts of disposable diapers (section 2) and possible

alternative treatments (section 3). Then, as second objective, it experimentally analyses the compostability of disposable 4 diapers mixed with the Organic Fraction of Municipal Solid Waste (OFMSW), as a possible alternative treatment to landfill or incineration.

Better Menstrual hygiene management (MHM) is important for sanitation access, sustained facility use, and for gender equity. Improved access to culturally acceptable MHM in sanitation facilities enables women and girls to fully engage in education and at the workforce. Toilet facilities designed to accommodate menstrual hygiene practices, provide access to absorbents, and encourage safe handling and disposal of used absorbents are important measures supporting women's health and dignity. In the design of communal toilets, disposal of menstrual waste has often been overlooked, leading to improper waste disposal. To improve this situation in the future, knowledge of the variety of current menstrual materials is required. For example, if thermal treatment technologies are considered, these will need to be optimized for different materials. Disposing of menstrual blood can have particular cultural considerations, and the breadth of these needs to be fully understood before designing a technology. This paper aims to inform water, sanitation, and hygiene (WASH) programming on better facility user designs and waste management practices to support the menstrual hygiene needs of women and girls, and the environment. This paper addresses topics of menstrual absorbent use, and brings a unique focus on disposal practices, waste treatment strategies such as incineration. The focus on Indian women population is prioritized given the higher public and environmental risks associated with poor waste management in heavily used shared spaces in densely populated areas.

### III. LITERATURE REVIEW

At present, diapers are generally not collected separately and are disposed of as solid municipal waste for further treatment, the majority of them ends up in landfills or incinerators (**Mirabella et al., 2013**)

The report by **Ministry of land, infrastructure, transport and tourism** discusses that the paper diapers are considered to cover 6%–7% of the total volume of household combustible waste, and the high moisture content due to excreta included in used paper diapers leads to a low calorific value, inhibiting heat recovery efficiency during combustion.

**Japan Hygiene Products Industry Association** in their report gave the findings that used paper diapers from business operators such as nursing care facilities and hospitals are not collected by local governments in principle but instead are entrusted to special disposal companies who collect and incinerate them as general waste from business activities or specially controlled waste.

**Meseldzija et al.** had also reported that once in the landfill, soiled diapers are very toxic as they are prone to leach chemicals, pathogens, and other contaminants which may eventually contaminate underground water leading to various health disorders in the long run.

Diapers tend to absorb water and expand but they do not breakdown. This reduces the sewer diameter, and in some cases once the diapers have absorbed water they cover up the whole sewer diameter (**Chinyama and Toma, 2013**).

Menstrual hygiene friendly infrastructure includes “clear mechanisms for collecting and disposing of menstrual waste,” but does not elucidate what these mechanisms could be. (**Hartmann et al, 2015**)

Incorporating MHM considerations to include waste management into WASH sector planning will advance goals to ensure safety, dignity, and deliver demand-generated designs for women and girls by responding comprehensively to their biological needs. (**Sommer, M.; Chandraratna, S.; Cavill, S.; Mahon, T.; Phillips-Howard, 2016**)

According to the **WHO reports of 2018** for bio-medical health waste, the WHO recommends that small-scale incinerators reach a temperature of at least 850 °C according to EU and South African standards or 1000 °C based on Indian and Thai standards.

The products are naturally broken down over time by saprophytes and other inorganic organisms like fungi and bacteria and can then be absorbed by living organism, completing the cycle. Materials that are no longer in use should be termed as residue. Residues are materials that our economy has not yet learnt to use efficiently (**Enger and Smith, 2007**).

**Sommer et al. and Kjellen et al.** provide a framework for understanding the disposal of menstrual waste in the context of sanitation systems, calling attention to the various interaction points across the sanitation value chain from the toilet, to waste collection, conveyance, treatment and disposal of excreta.

The main impacts of waste incineration are emissions of pollutants to the atmosphere, generation of contaminated wastewater and generation of contaminated ashes (**Hester & Harrison, 1994**).

The main gases produced due to incineration of diapers are greenhouse gases. However, considering that their composition includes several polymers and organic compounds, their incineration may generate other more pollutant substances, such as Cl and CO (**Riber, 2007**).

A report on Waste Incineration Directive by the **European Union** discusses that the European Waste Incineration Directive recommends incinerators reach a temperature of at least 850 °C for at least two seconds to ensure full breakdown of toxic substances.

#### IV. RESEARCH METHODOLOGY

This research is based on mixed research methodology involves both quantitative and qualitative research methodology. Both interview method and survey method was employed.

##### Study and Target Population

The population of the study was women users of sanitary napkins and users of diapers in and around Bangalore.

##### Sampling Method and Procedure

The research employed cluster sampling techniques in which various clusters like students of schools and colleges, home makers and working women from various sectors like IT, education, banking, industries etc. Further purposive sampling was used to identify the users, The purposive sampling was used to identify household, where indicative cases that offered in-depth information were selected.

##### Sample size:

The sampling size of the study was 158 respondents and from various clusters. The cluster wise sample size was given in the table 1.

Table 1. Sample Distribution

Cluster	No of Respondents	Percent
Students of schools and colleges	54	34.18%
Working women	51	32.28%
Home makers	53	33.54%

##### Data Collection Instrument:

A structured questionnaire were developed to collect the research data from the respondents and used in the study. Questionnaire consists of closed ended questions with respect to demographic information of the respondents such as age, income level, occupation, No of years usage, no of napkins used per day. The second part of the questionnaire gathered the information regarding method of disposal, awareness about the disposal method, impact of the disposal method and disposal incinerator. The following table explains the demographic details of the respondents.

Demographic Details	No of Respondents	Percent
Age		
17 years to 20 years	43	27.22
21 years to 24 years	42	26.58
25 years to 28 years	10	6.33
29 years to 35 years	11	6.96
Above 35 years	52	32.91
Education		

No formal Education	9	7.74
Primary Education	18	15.48
Secondary Education	58	49.88
Degree level and above	73	62.78
Income		
2,00,000 to 4,00,000	86	54.43
4,00,001 to 6,00,000	35	22.15
6,00,001 to 8,00,000	14	8.86
Above 8,00,000	23	14.56
Usage of personal hygiene absorbent product		
Diapers	44	27.85
Disposable napkins	72	45.57
Both	42	26.58
No of personal hygiene absorbent product used		
<b>Napkins usage: (per month)</b>		
0-5	44	27.85
6-10	72	45.57
11-15	24	15.19
above 15	17	10.76
<b>Diapers Usage: (per day)</b>		
less than 3	25	21.5
3 - 5	38	32.68
5 - 8	20	17.2
above 8	7	6.02

The study inferred that most of the respondents are above 35 years, in terms of education very less respondents are not having formal education and most of them are in degree level and above. Most of the respondents are falling in the income level of less than two lakhs. With respect usage of personal hygiene absorbent products, 45% of them are disposable napkin users and others are both diapers and napkins users. On an average most of them are using 6 to 10 disposable napkins per month and 3 to 5 diapers are used by the users per day.

The model of disposal method: The present research attempted to find out the various methods adopted by the users to dispose used personal hygiene absorbent products. The following table shows the statistics regarding the same.

<b>Disposal Method</b>	<b>No of Respondents</b>	<b>%</b>
With other garbage in Dustbins	63	39.87
Separate dustbins maintained for pads	74	46.84
Burn it	19	12.03
Bury it	1	0.63
Flush it	1	0.63

It was found that around 46% of them are disposing in to separate bins maintained for these kinds of products and around 40% of them are throwing along with household garbage. And they are not aware /know about what happens to that waste. Very less people are burying or burning or flush it. And most of them are properly wrapping waste before they dispose it.

### **Case Processing Summary**

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
VAR00002 * VAR00001	90	100.0%	0	0.0%	90	100.0%

#### VAR00002 \* VAR00001 Cross tabulation

Count

		VAR00001					Total
		1.00	2.00	3.00	4.00	5.00	
VAR00002	17-20	9	12	4	0	0	25
	21-24	7	13	2	1	1	24
	25-28	3	2	0	0	0	5
	29-32	3	3	0	0	0	6
	Above 32	14	12	4	0	0	30
Total		36	42	10	1	1	90

#### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.994 <sup>a</sup>	16	.867
Likelihood Ratio	10.930	16	.814
N of Valid Cases	90		

a. 19 cells (76.0%) have expected count less than 5. The minimum expected count is .06.

#### ANOVA

VAR00001

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.733	4	.683	1.131	.348
Within Groups	51.367	85	.604		
Total	54.100	89			

#### Descriptives

VAR00001

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	25	1.8000	.70711	.14142	1.5081	2.0919	1.00	3.00
2.00	24	2.0000	.97802	.19964	1.5870	2.4130	1.00	5.00
3.00	5	1.4000	.54772	.24495	.7199	2.0801	1.00	2.00
4.00	6	1.5000	.54772	.22361	.9252	2.0748	1.00	2.00
5.00	30	1.6667	.71116	.12984	1.4011	1.9322	1.00	3.00
Total	90	1.7667	.77966	.08218	1.6034	1.9300	1.00	5.00

#### V. CONCLUSION AND SUGGESTIONS

In this research we can conclude that the personal hygiene absorbent products are an essential part of women, kids or adults in a family. The women are looking forward to alternatives for disposable personal hygiene products as they find it very difficult to dispose away this silent menace along with the other waste from their households. The awareness campaigns should be carried out by women cells and committees in educational institutions by providing discussions on puberty, sex education and menstruation. The NGOs can organize these awareness events in self help groups at local levels. The incinerators provide scientific method and proves to be environment friendly compared to the disposable products which take thousands

of years to get degraded. The state government should ensure that an incinerator is installed in most of the public places. The establishment of performance and quality standards for personal hygiene products is critical and has important implications for disposal and waste management. The housing societies can also contribute by purchasing incinerators that can burn down 200-300 absorbent products in a day in collaboration with their waste collection people. As this is available in small sizes at low prices, women should be encouraged to purchase for personal usages as well. The marketers can take initiatives for development and promotion of affordable compostable pads.

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