
BASE University Working Paper Series: 06/2021

# Menstrual Hygiene Management in Poor Adolescent Girls: A Comparative Cross-Sectional Case Study in The Slums of Chennai and Delhi

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April 2021

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## Abstract

Many women, especially in Low and Middle Income Countries face significant barriers to managing their menstrual cycles safely and easily. Only 12 percent of India's menstruating women use sanitary napkins while the others resort to unsafe alternatives. This can drastically affect their reproductive health and educational status. Inadequate knowledge and access along with stigma and sensitivity surrounding menstruation in India impede women from actively reaching out to improve their menstrual practices. In this paper we seek to identify the cultural, psychological and economic barriers faced by poor adolescent women to practicing good menstrual hygiene. We undertook a comparative analysis of the factors affecting Menstrual Hygiene Management (MHM) in the slums of Delhi and Chennai. A total of 142 and 163 girls from Chennai and Delhi respectively, belonging to the age group of 11-20 were interviewed through a self-administered questionnaire. Additionally, Focussed Group Discussions were conducted amongst girls and their mothers. Main empirical analysis was conducted using a regression model. To construct indices for knowledge, cultural restrictions and empowerment related information, we adopted principal component analysis. Our findings revealed that knowledge (coef: 1.186), cultural restrictions (coef: 0.940) and empowerment (coef: 1.033) indices exerted positive and significant impacts on MHM. Socio-economic indicators, like religion, mother's education, access to toilets and family size exerted significant influence on MHM. Qualitative findings supported these claims, information discerned via FGDs elucidated that cultural and social beliefs pertaining to menstruation varied greatly amongst the residents of Delhi and Chennai. Hence, policies undertaken for metropolitan cities in general may not work in all settings. Policy initiatives must be made to eradicate the challenges pertaining to obtaining absorbent materials, subsidies on sanitary napkins must be provided, and efficient information channels need to be established for their effective delivery.


**Keywords:** Menstrual Hygiene Management, Barriers, cultural restrictions, financial restrictions

**JEL Classification:** I12, I14, O12.

# Menstrual Hygiene Management in Poor Adolescent Girls: A Comparative Cross-Sectional Case Study in The Slums of Chennai and Delhi[1]

Shruthi Ramesh[2] , Sumirtha Gandhi[3] and Varsha Reddy[4]

## Introduction

Menstruation is a biological process where each month blood and other material is discharged from the lining of the uterus [1]. Each day around the world, more than 800 million women and girls have their periods and nearly 75% of them suffer from premenstrual syndrome (PMS), associated with the emotional and physical turmoil occurring between the first and second week of the menstrual cycle. Majority of these women also face significant barriers to managing their periods safely and smoothly [2]. These impediments have major consequences on the educational status of women, which is directly linked to their empowerment. Evidence suggests that, majority of adolescent girls are forced to drop out of their schools or miss their classes due to problems related to menstruation. Despite their widespread prevalence, these issues are seldom analysed across the world. In fact, empirical evidence pertaining to this is almost non-existent in developing nations.

Poor menstrual hygiene leads to severe problems such as high rates of reproductive tract infections, toxic shock syndrome, stillbirths and infertility. These problems are more pronounced in developing countries. [3]. For instance, in India infections caused by use of filthy rags are rampant [4,5,6]. The problem goes one step further in African countries like Kenya, where it is common for women and girls to engage in transactional sex or seek out boyfriends in order to obtain goods that meet their basic needs, including sanitary napkins. In such unions, adolescent girls may be unable to negotiate safe sex practices, thereby increasing their risk of contracting STIs including HIV or experiencing unwanted pregnancy [7]. Moreover, menstruation itself continues to be heavily stigmatized in India and is regarded as impure and unclean. These antiquated notions have bred various cultural and social restrictions on girls, leading women and girls to feel inferior vis-à-vis boys [8].

[1] This paper was presented at the BASE University Research Seminar on April 6th 2021. The authors thank all participants for their valuable comments, which are all incorporated, and encouraging feedback
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Apart from affordability barriers, the prevalence of socio-cultural taboos related to menstruation are prominent; Menstruation is often not openly talked about, leaving women and girls uninformed. This knowledge gap often manifests into false perceptions [9]. A study in Saoner of Nagpur district has shown that 76.23% of the girls surveyed do not know the source of menstrual blood and 21.19% of them believe that it originates in the urethra [10]. These socio-cultural norms are shaped by the interplay of geographical and economic factors. A study conducted in a village in Tamil Nadu found that the families of women in rural areas publicly celebrate the onset of menarche [11], whereas another study amongst the Gujjar tribe in Kashmir found that women were asked to avoid looking in the mirror during their periods [12].

These barriers pose immense challenges to good menstrual health and hygiene, thereby making it a distant luxury for many Indian women, especially in poverty-stricken communities. The Government of India has made some policy efforts to make menstrual hygiene products affordable to the poor. In 2011, the Ministry of Health launched the Menstrual Hygiene Scheme to provide sanitary pads at subsidised prices. Despite this, the utilisation of sanitary pads is abysmally low in India. It is estimated that only 12% of India's 355 million menstruating women use sanitary napkins while the others resort to unsafe alternatives like unsanitized cloth, ashes and husk sand. Qualitative insights into the underlying issues in ground level implementation, procurement or awareness about existing schemes is limited. Moreover, empirical research on factors affecting and affected by MHM is scarce in the Indian context, especially in urban settings. Hence, we undertake a case study of menstrual hygiene management in the slums of two culturally diverse Indian cities, Chennai and Delhi. We aim to understand the barriers to MHM and provide qualitative and quantitative evidence that will inform the direction of future policies in this area.

The findings of this study would enable us to understand the components involved in generating favourable outcomes pertaining to good MHM. Thereby, allows women to adopt hygienic menstrual practices with comfort, dignity and privacy and ensure better menstrual health. A deeper investigation into factors preventing women from adopting better menstrual hygiene management practices assumes primacy as that would help frame a more targeted and focussed policy initiative.

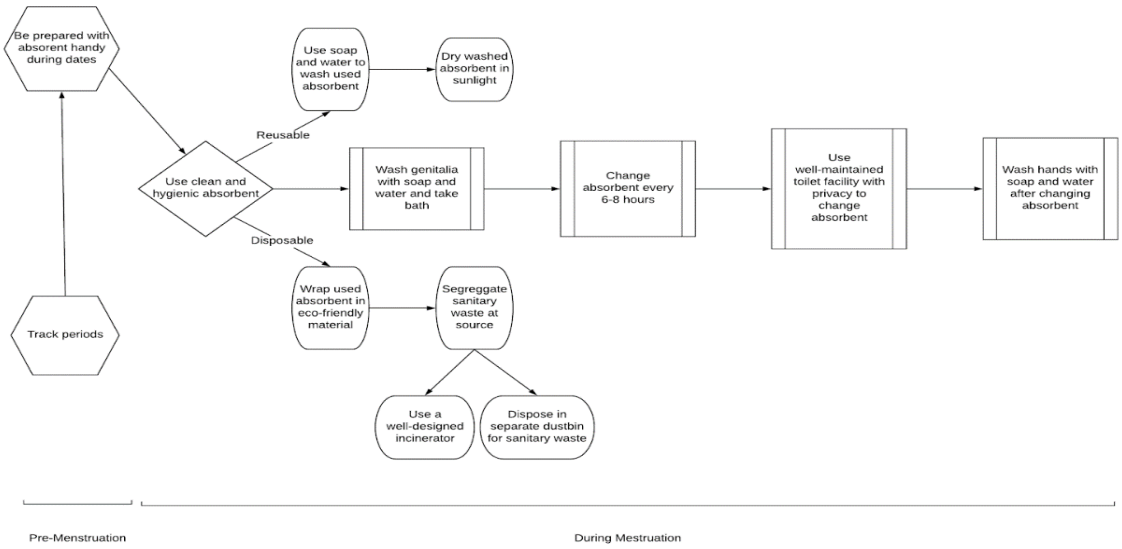
## Framework

An in-depth analysis of the existing literature on menstrual hygiene was undertaken to arrive at an optimal definition for menstrual hygiene management (MHM). World Health Organisation/ United Nations Children's Fund (WHO/UNICEF) JMP Hygiene Working Group, 2012 defined good MHM as "women and adolescent girls using a clean menstrual management material to absorb or collect menstrual blood, that can be changed in privacy as often as 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. Furthermore, they understand the basic facts linked to the menstrual cycle and how to manage it with dignity and without discomfort or fear". Based on our literature review, we concluded that there was no clear distinction between good MHM and bad MHM. For example, there was no conclusive evidence on the best absorbent to use during menstruation. Similarly, there is no agreement on the best disposal practices for sanitary waste [13]. However, a broad protocol for menstrual hygiene management could be established and hence we have formulated an over-inclusive definition for good menstrual hygiene management, as shown in Figure 1.

MHM starts well in advance of the onset of a monthly period. The woman has to first track her period and be aware that it is a monthly phenomenon. She must know the optimal interval between two periods and must be wary of an early or delayed period. Given that she tracks her period; she must have access to or must be prepared with an absorbent handy as her dates are nearing. At the onset of the period, the women must use a clean and hygienic absorbent. Every time she changes her absorbent, she must wash her genitalia with gentle soap and clean water. She must also bathe during menstruation. Further, she must change her absorbent every six to eight hours. For this purpose, she must have access to, and must be utilising a well-maintained toilet facility which gives her sufficient privacy to change her absorbent. The toilet must have an adequate supply of soap and water. The woman must wash her hands well every time she changes her absorbent. Women have two categories of absorbents to choose from: reusable and disposable. Reusable absorbents can be washed and reused, while disposable absorbents must be safely disposed and replaced. If a woman chooses to use a reusable absorbent (like menstrual cups or reusable pads), she must wash the used absorbent using soap and clean water. She must have the adequate infrastructure to sterilize the washed absorbent appropriately. On the other hand, if the woman chooses a disposable absorbent (for example, sanitary napkin or tampon), she must wrap the used absorbent in any eco-friendly material. She must then segregate the sanitary waste at the source; it should not be mixed with the other waste products. Further, she might be using a well-designed incinerator to get rid of her sanitary waste. Otherwise, she must dispose of the used absorbent in a separate dustbin, which will be collected by the municipal organisation separately and appropriately disposed of. These practices must be followed for good menstrual hygiene during every period.

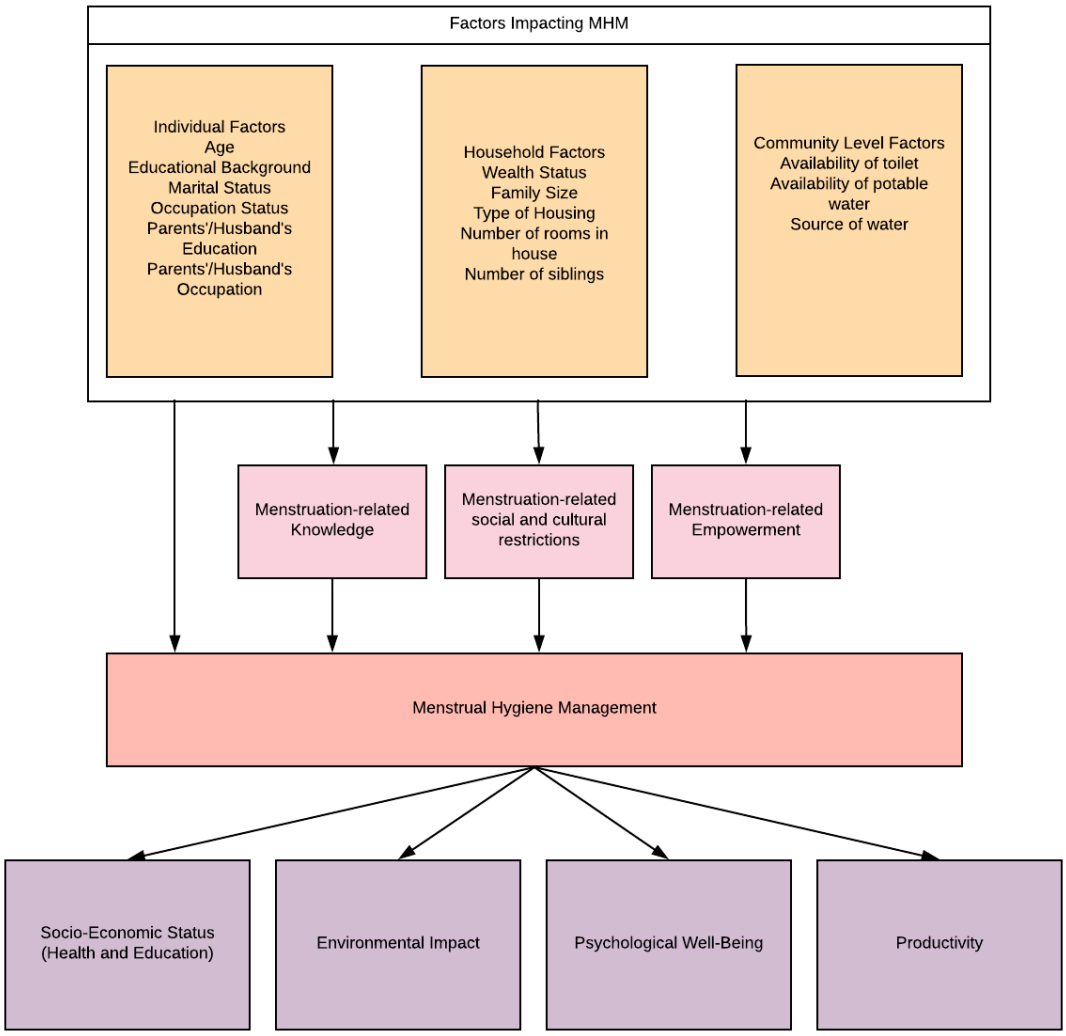
**Figure 1: Definition of Menstrual Hygiene Management**




*Source: Author's compilation from various sources*

Further, it is important to understand the factors influencing or impeding good MHM on the first level and the importance of studying menstrual hygiene management on the next level in order to appreciate the findings of the study. Literature review and the findings of our study aided us in formulating a conceptual framework encompassing the barriers to MHM and the facets of a woman's everyday life that are affected due to suboptimal MHM. This can be seen in Figure 2.

**Figure 2: Conceptual Framework**




*Source: Author's compilation from various sources*

On the first level, individual, household and community level factors are observed to have a direct impact on MHM. Individual factors comprise of age, educational background, marital status, occupation status, parents'/husband's education and parents'/husband's occupation. Household level variables include wealth status, family size, type of housing, number of rooms in the house and number of siblings, while community level factors include availability of toilet and water, source and sufficiency of water and so on.

Further, all the aforementioned factors are assumed to impact intermediary outcomes like menstruation related knowledge, cultural and social restrictions and empowerment respectively. Menstruation related knowledge encompasses crucial aspects such as the reason for menstruation, the origin of menstrual blood, whether menstruation is related to pregnancy, knowledge about the different absorbent choices available, etc. [14, 10]. Cultural and social restrictions during menstruation include all those restrictions that are imposed on women when they menstruate. These vary from context to context and may comprise of liberty to attend functions and festivals, liberty to pray or enter a place of worship, liberty to touch other people, liberty to touch drinking water, liberty to enter the kitchen, requirement to use separate utensils, to wash clothes separately, to use separate mattresses and so on [8]. Empowerment includes all factors that make a woman feel free and confident even during her period. It consists of aspects like self-confidence during periods, willingness to go out during periods, feeling restricted during periods, comfort in interacting with men about menstruation and so on. These three intermediary outcomes are likely to have strong influences on MHM, with knowledge and empowerment likely to have a positive impact and cultural and social restrictions likely to have a negative impact [14, 15].

Finally, poor MHM can have detrimental effects on the everyday lives of women. MHM is found to impact health, education, productivity, psychological wellbeing and also has environmental aspects [15]. For example, lack of supply of good absorbents or lack of toilets to change absorbents in schools might lead to huge dropout ratios around the age of puberty for girls. Most of the girls refrain from attending schools during their periods, leading to a deterioration of quality of education [16]. Poor MHM is also found to impact the reproductive health of women. Using unclean absorbents is associated with a number of reproductive tract infections and morbidities and might prove fatal in some cases [14, 17]. Women's productivity is also found to be affected during menstruation. Owing to inadequate sanitation facilities in the workplace, many women are found to stay away from work during their period. The participation rates of women in areas that require physical exertion are also very low. Menstruation is a process that has a social stigma attached to it. Poor menstrual hygiene management can greatly affect the psychological well-being of women and girls [18]. For example, girls attending school who don't have access to toilets tend to use the same absorbent throughout the day. This increases the risk of leaks and blood stains on clothes. In the event of a leak, the girl feels extremely embarrassed. People around her ostracise her and this

undermines her dignity. Menstruation in general is associated with a taboo and women during this time do not feel dignified and respected due to their own inhibitions as well as the inhibitions imposed onto them by society. Finally, unfavourable disposal of sanitary waste can have great repercussions on the environment. Women tend to wrap their sanitary waste in plastic bags due to fear of being exposed, and this prevents the sanitary waste from decomposition when buried in a landfill. Poorly set up incinerators are also found to cause huge amounts of air pollution. Disposal of sanitary waste into water bodies contaminates them. It is thus evident that MHM is indeed important and good menstrual practices must be actively promoted and studied.

## Objectives

Through this paper, we seek to

1. Empirically ascertain the relative strengths of the association of various factors with MHM
2. Understand the various hurdles that poor adolescent women face and identify the cultural, psychological and economic barriers to satisfactory menstrual hygiene management practices
3. Undertake a comparative analysis and elicit the factors impacting MHM in the cities of Delhi and Chennai.

This is a cross sectional mixed-methods study among slum dwelling adolescent girls. Sequential exploratory modelling was adopted, wherein the analysis was carried out using both quantitative and qualitative techniques. Results from both techniques were triangulated and interpretation was presented in the final stage (Creswell, J. W et al. 2003). Quantitative analysis was conducted through canvassing a structured questionnaire, while qualitative information was captured through focussed group discussions (FGDs).

Indices for Menstrual Hygiene Management, Knowledge, Cultural Restrictions, and Empowerment were constructed using Principal Component Analysis. The selection of indicators for each of the aforementioned indices was based on previous literature. The set of correlated indicators were used to form uncorrelated indices.

## Study Setting

This present study was conducted in two culturally diverse metropolitan cities: Chennai and Delhi. A sample size of 303 was chosen for the quantitative analysis, out of which 142 belonged to Chennai and

160 observations were collected from Delhi. Qualitative analysis entailed 20 FGDs accompanied by data collected by adopting observational approach. Qualitative discussions were mainly oriented towards understanding the barriers faced by adolescent girls in their everyday lives in terms of affordability, acceptability and accessibility of menstrual hygiene practices and products.

## Sampling

Two stage sampling procedures were adopted. Firstly, slums in Chennai and Delhi were selected based on a specified set of criteria namely, age of the slum, declaration status, and size of the slum. The entire list of slums was collected from the enlisted list of Chennai Slum Clearance Board and Delhi Urban Shelter Improvement Board, and a final list of 7 slums from Chennai and 8 from Delhi respectively were chosen for the analysis. In the second stage, a non-probabilistic purposive sampling methodology was adopted to select adolescent girls (11-20 years) from each of the selected slums. A final sample of 142 girls from Chennai and 160 girls from Delhi slums were interviewed.

### The Variables

Detailed description of the entire list of dependent variables and independent variables are enlisted in Table 1 (Appendix).

### Statistical Analysis

The quantitative nuances were depicted using two different methods namely, descriptive statistics and traditional ordinary least square regression method. These results were further substantiated by qualitative excerpts.

The regression equation used for empirical analysis is given below:

$$MHM_{Index} = \beta_1 + \beta_2 Knowledge_{Index} + \beta_3 Culture_{Index} + \beta_4 Empowerment_{Index} + \beta_5 Age + \beta_6 Religion + \beta_7 Mother's\ Education + \beta_8 Toilet + \beta_9 Father's\ Work + \beta_{10} Percapita\ Income + u_i$$

Where, $\beta_1$ is regression constant, $\beta_2$ to $\beta_{10}$ are respective parameters for the independent variables and $u_i$ is an error term. The above equation assumes a linear relationship between dependent variables (Menstrual Hygiene Index Score) and the selected independent variables. We hypothesize a positive relationship between MHM, knowledge score, cultural and social liberty score, empowerment score, age, religion, mother's education, availability of toilet, father's working status and per capita income. Ordinary Least Square Regression (OLS) analysis was conducted to estimate statistical relationships.

## Results and Findings

A total of 142 girls from Chennai and 160 girls from Delhi completed the interview process. Of the included study participants, it was observed that the majority of the sample consisted of Hindus (80.46%), while Muslims, Christians and others constituted 3.97%, 15.23% and 0.33% of the sample respectively. The mean age of the girls was 16.27 and all girls belonged to the age group 11-20. Only 71.19% girls attended a school or college, which means that about one-third of them had dropped out due to various reasons. It was also noted that 6.95% of the girls were married, and most of them had children. 50.99% of the mothers of the girls were illiterate, 32.12% had completed primary schooling, 15.23% completed schooling and only 1.66% of the mothers were enrolled into college. 34.44% of the fathers were illiterate, 34.44% had completed primary schooling, 26.49% had completed secondary education and only 4.64% completed graduation. Nearly, 74% of the fathers were employed in occupations like driving, painting, or selling merchandise/groceries on the streets and other similar activities. Around 68.44% were working and were mostly involved in housekeeping. Others were selling flowers or fruits and vegetables, washing clothes, tailoring, and so on. Families were usually big, with about 70% of the girls having 3 or more siblings. 47.02% of the families lived in pucca houses, 46.36% lived in semi-pucca houses and 6.62% lived in Kutcha houses. All houses were overcrowded and mostly had a single room. It was observed that only 56.88% of the households had a toilet facility in their vicinity, and others were defecating in the open. These observations are depicted in Table 1.

**Table 1: Descriptive Statistics**

| Background Characteristics | Percentage | N |
|---|---|---|
| **Religion** | | |
| Hindu | 80.46 | 243 |
| Christian | 15.23 | 46 |
| Muslim | 3.97 | 12 |
| others | 0.33 | 1 |
| **Mother's education** | | |
| Illiterate | 50.99 | 154 |

| | | |
|---|---|---|
| Primary/Middle | 32.12 | 97 |
| Secondary/ Higher | 15.23 | 46 |
| Graduate and Above | 1.66 | 5 |
| **Access to toilet** | | |
| No | 43.12 | 119 |
| Yes | 56.88 | 157 |
| **Father's Working** | | |
| No | 25.83 | 78 |
| Yes | 74.17 | 224 |
| **Number of Siblings** | | |
| 0 | 1.99 | 6 |
| 1 | 29.14 | 88 |
| 2 | 28.15 | 85 |
| 3 | 17.88 | 54 |
| 4 | 13.58 | 41 |
| greater than 5 | 9.27 | 28 |
| **Attending School/ College** | | |
| No | 28.81 | 87 |
| Yes | 71.19 | 215 |
| **Mother working** | | |
| No | 31.44 | 94 |
| Yes | 68.54 | 205 |
| **Father's education** | | |
| Illiterate | 34.44 | 104 |
| Primary/ Middle | 34.44 | 104 |
| Secondary/ Higher | 26.49 | 80 |
| Graduate and above | 4.64 | 14 |
| **Type of Housing** | | |
| Pucca | 47.02 | 142 |

| | | |
|---|---|---|
| Kutcha | 6.62 | 20 |
| Semi-Pucca | 46.36 | 140 |
| **Marital Status** | | |
| No | 93.05 | 281 |
| Yes | 6.95 | 21 |

## Comparative Analysis

As described above, the knowledge, cultural and social restrictions and empowerment index were created and the resulting scores were compared between the two cities. The scores were then substantiated using the qualitative findings from the FGDs.

### Knowledge

The variations in the knowledge scores are shown in figure 3. Chennai outperformed Delhi in terms of knowledge indicators. While close to 40% of the girls in Delhi had poor knowledge about MHM, only 20% of them possessed good knowledge of MHM. In Chennai, around 45% had good knowledge of MHM. A deeper investigation across the knowledge indicators ascertained that, except for the knowledge before menarche, the performance of Delhi remained consistently poor compared to Chennai. The qualitative findings strongly supported these observations.

The variations in the knowledge scores are shown in figure 3.

**Figure 3: Variations in Knowledge Index Scores**

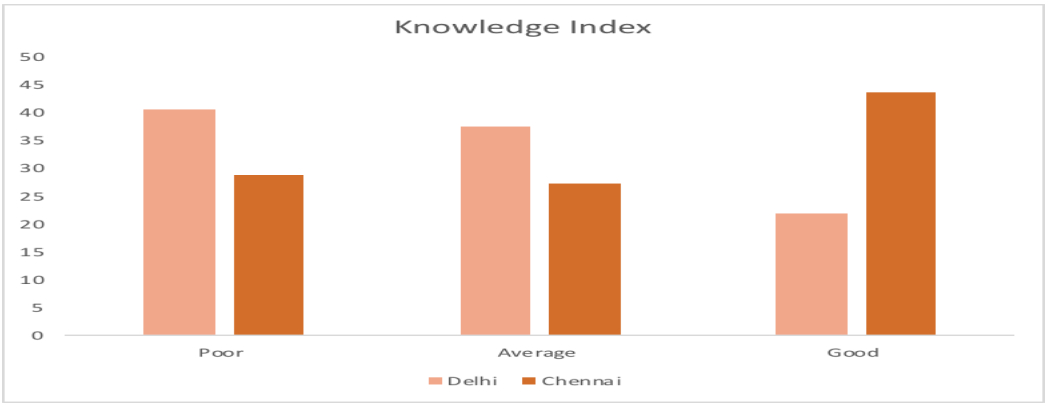
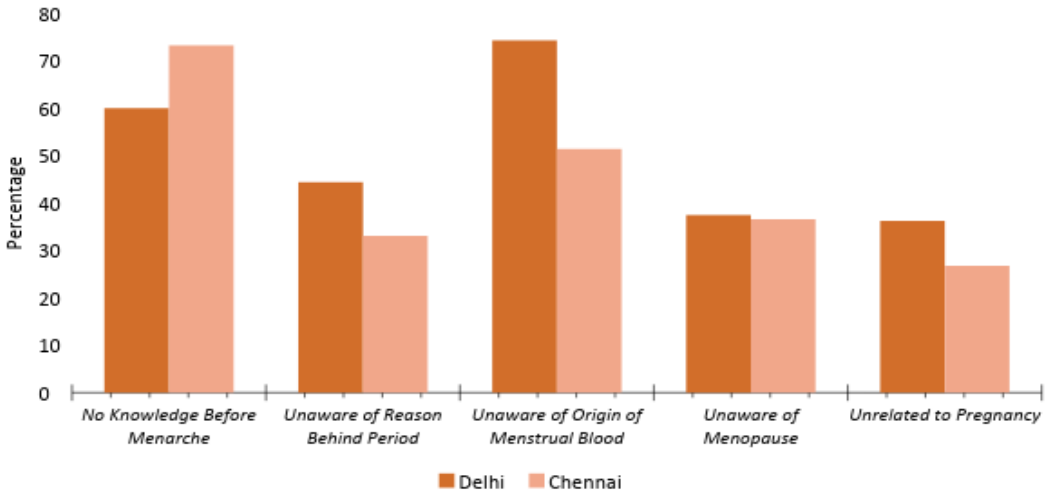


**Figure 4: Variations in Knowledge Indicators**




## Reasons behind menstruation

*Menstruation is a gift of god*
*It is not a natural process. It is a punishment of god. Why else would it happen?*
*Menstrual blood is dirty. Only with its expulsion can our body become clean and healthy again.*
Menstruation was believed to be a curse/gift of God, rather than a healthy, physiological process. Most of the girls seemed to think that menstrual blood was impure and carried disease. The periodical expulsion of this toxic blood from the system, they believed, will keep the body healthy.

## Origin of menstrual blood

*Menstrual blood comes from the stomach*
*Menstrual blood is secreted by the kidneys in addition to urine, and that is how impurities are removed from the body.*
*The urinary tract is the source of menstrual blood.*
Because the girls were not aware that menstruation was a natural physiological phenomenon, they were unable to identify the source of menstrual blood.

**Awareness about Menopause**

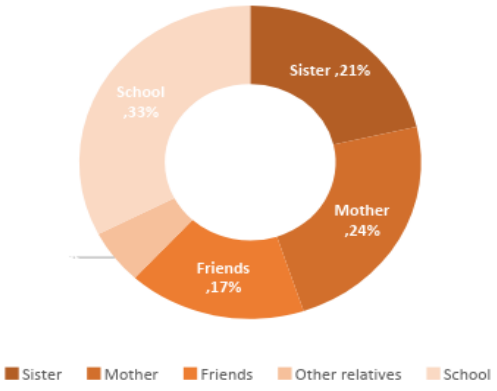
*I know for a fact that menstruation is not a lifelong process. But I don't know when it stops.*
*I think it ends at 70 to 80 years of age.*
*Menstruation stops when you are 40 to 50 years' old*

Menstruation was also believed to be a lifelong process by a few respondents. Those who did know that it was not indefinite were unsure of when exactly it ended. Further, owing to the lack of knowledge about the fact that menstruation was related to the reproductive system, a majority of girls did not know that menstruation was related to pregnancy.

**Awareness before menarche**

Most of the girls did not have any knowledge regarding menstruation prior to its onset. Those who did, learnt it from their mothers, sisters and friends or were taught about in their schools. Only 89 girls knew about the process before they started menstruating. We probed into this further to explore the source of knowledge about menstruation before menarche. The results are summarised in the figure 5 below.

**Figure 5: Source of Knowledge Before Menarche**




The majority of the girls obtained the knowledge from their schools. The second most popular source was their mother, followed by older sister and friends. Other relatives like aunt and

grandmother also played a major role in imparting knowledge about menstruation. Findings from the FGDs also supported these observations.

*I was not aware of periods when I first got mine. I was really frightened when I saw blood on my clothes. I hid it from my mother for two days because I did not know what it was or how to tell her.*
*When I saw the blood for the first time, I thought I had blood cancer. Nobody had ever told me about it.*
*It was my older sister who taught me that all girls undergo menstruation.*

Menstruation is hardly discussed. Thus, most girls reported that they were frightened or shocked at the time of menarche, when they noticed that they had blood stains on their clothes, because they were not aware of the significance it held. In Chennai, girls were forbidden from discussing their period with their mothers as they believed that this would render them infertile.

*I learnt about menstruation through an audio-visual workshop that was conducted in my school.*
*We were taught about menstruation in school by our teacher.*

However, it was reassuring to note that audio-visual workshops were being conducted in government schools, mostly in Delhi, to impart knowledge about the process. The girls who came to learn about menstruation through these workshops seemed aware of the scientific aspects of menstruations -such as the source of menstrual blood, whether it was connected to pregnancy, etc. The effectiveness and quality of these workshops are not entirely satisfactory, as most of the girls who knew about the menarche before its onset were not *adequately informed*, i.e., they were only given very limited information, such as that it happened every month and that absorbents were to be used to prevent clothes from staining. Nevertheless, the potential of these workshops shows that the active involvement of institutions like schools can go a long way in disabusing girls of the myths they hold about menstruation.

*Because it happens every month, I thought she will figure out how it works on her own.*

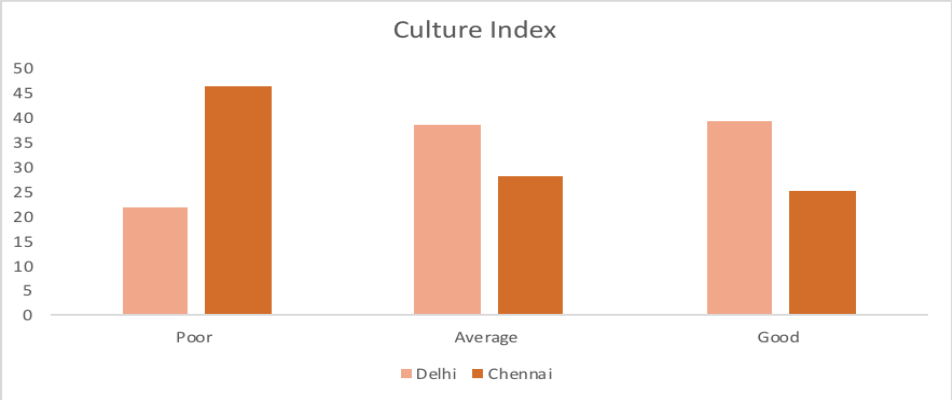
*We don't tell our daughters about menstruation because we don't want them to get curious about sex.*

In some cases, mothers even left their daughters to figure it out for themselves. They believed that since menstruation was a monthly phenomenon, the girls will eventually learn about it and acclimatise to it on their own, without any assistance from the mother. Moreover, they believed that giving their daughters complete information about menstruation necessitates a discussion on reproduction and sex, which they were uncomfortable talking about. This behaviour, again, can be attributed to the heavy stigma that surrounds both menstruation and sexual intercourse in the Indian society.

## Cultural and Social Restrictions

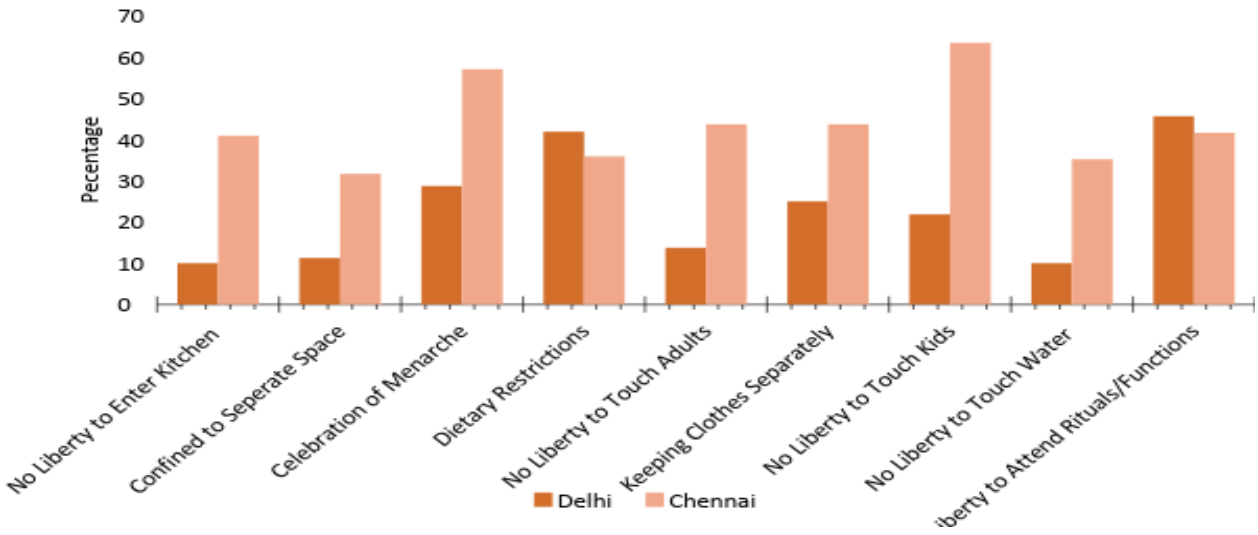
The taboo surrounding menstruation gives rise to a plethora of restrictions that are imposed on the girls owing to religious, traditional and gender-based beliefs. The cultural restrictions index was created to explore these restrictions and its performance shown in Figure 6.

**Figure 6: Variations in Cultural and Social Restrictions Scores**




It was found that Delhi performed significantly better in terms of the cultural aspects. In other words, girls from Delhi experienced greater levels of freedom during menstruation. Most of the respondents in Chennai experienced significant cultural restrictions during their period. The performance of individual factors representing cultural and social restrictions are depicted in Figure 7.

**Figure 7: Variations in Cultural and Social Restrictions**




It is clear that Delhi performs better in each of the indicators. There were few other beliefs which could not be captured through the index. These experiences are reported in the qualitative findings.

**Beliefs**

*During our periods, we must not have eye contact with anybody who does not menstruate or else their eyes will burn.*
*If you sleep next to a man during your periods, he will become thinner.*
*Dogs or snakes must not come into the vicinity of your sanitary waste. If they do, bad spirits will haunt you.*
*One must not touch mud pots during their periods or else the pots will crack and break.*
*We are not supposed to wash our hair during our periods.*
*Poisonous insects will bite you if you go to somebody else's house on your period without bathing*

The phenomenon of menstruation is riddled with unscientific, often preposterous, beliefs and myths. These notions accentuate the stigma that surrounds menstruation and further deepen the psychological discomfort girls face during their periods, leaving them feeling ashamed, guilty and ostracised. These various myths and taboos perpetuate the taboo around menstruation.

**Restrictions**

*We do not have any restrictions during our periods because if we do, boys will find out that something is going on and they will make fun of us.*

In most of the areas surveyed, the girls were not subject to too many restrictions, apart from being asked to abstain from any religious practices. This was largely because some of these restrictions were impossible to enforce. For instance, girls were not prohibited from entering the kitchen because the dwelling itself consisted of a single room. This could explain the low prevalence of restrictions across both cities, and must not be wrongly interpreted as the communities not believing in the necessity for these restrictions.

*Because our houses contain only one room, it is not possible for us to stay away from our kitchens during our periods. Moreover, who will do the cooking if we sit in a corner?*

While the paucity of space eliminates certain restrictions, it also reinforces a few. Girls are often required to sleep on separate mattresses while on their period. Living in a one-bedroom tenement, this restriction becomes something of a burden. In one case in Delhi, a girl who lived with her father and brother was forced to sleep in the damp corridor outside their single-room flat during her periods.

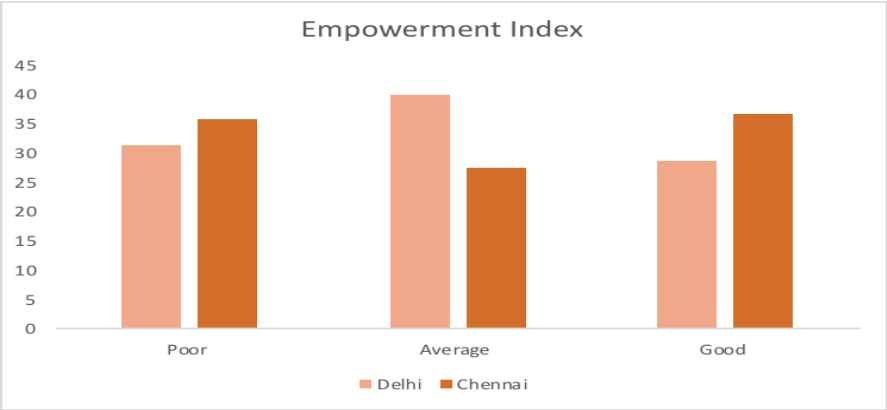
*What?! No, we do not have any function. Why will menarche be celebrated?*

In Chennai, the attainment of menarche was openly celebrated. Families, in fact, saved up money for this very occasion, even if it took a toll on their finances. If there was not enough money when the daughter attained menarche, the celebration was, surprisingly, deferred to a future date. In contrast, in Delhi, the very idea of celebrating menarche was considered inconceivable. They believed menarche was ‘unworthy’ of being celebrated as a joyous occasion.

## Empowerment

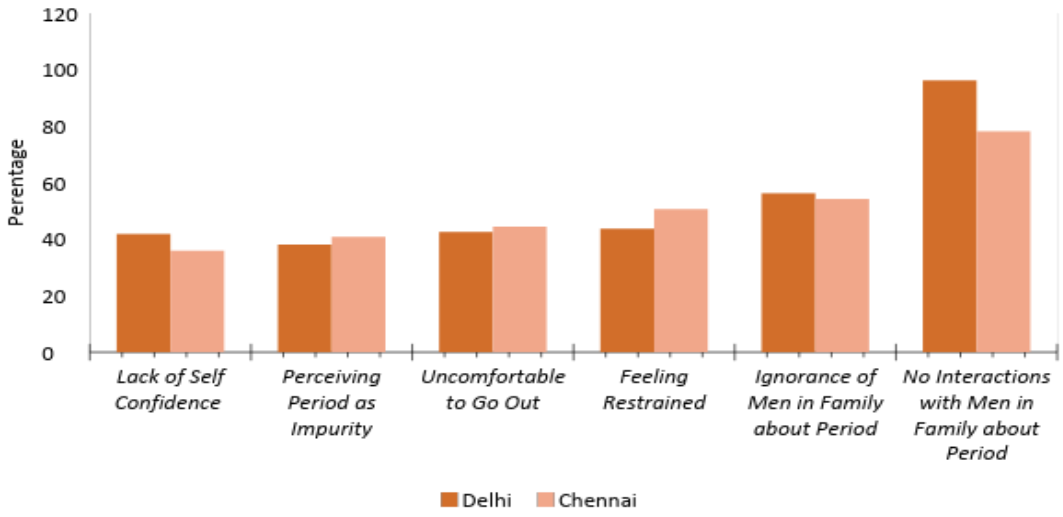
Empowering women, even during menstruation is undoubtedly important for their overall development. With this view, the empowerment index was created to capture the degree to which women feel empowered during their periods, as summarised by figure 8.

**Figure 8: Variations in Empowerment Scores**




Although no set pattern emerged for this index like that of knowledge and cultural restrictions, it is indeed disturbing to note that a very high number of women had low or average empowerment scores. Analysis of individual factors revealed that more than one-third of the girls did not feel empowered in any aspect, as shown in Figure 9.

**Figure 9: Variations in Empowerment Indicators**



Another worrying aspect was the very poor involvement of men in conversations about menstruation. In particular, close to all men avoided conversations about menstruation with their daughters or wives. Here are the findings from the FGDs:

*We need all the money we can get to make two ends meet. So we cannot afford to abstain from going to work during our periods.*

It was found that the girls did not refrain from going to work during their periods. This was largely because of pecuniary reasons. A single day off from work, they claimed, could drastically impact their finances. Moreover, some of them felt that they had acceptable facilities at their workplace/school to change their absorbent.

*I feel anxious about going out during my periods. What if my clothes get stained and I don't realise?*
*I feel guilty during my periods.*
*I feel very under-confident during my period.*

However, a lot of them reported that they felt uneasy going out during their periods, for the fear of staining their clothes. Most public toilets are poorly-equipped and changing the absorbent once you step out of the house becomes difficult. This constant fear of staining weighing on them is the reason why most girls report feeling under-confident while on their period.

*I have never talked to my father or brothers about menstruation. I don't think they even know about it.*
*How can something like this even be discussed with men?*

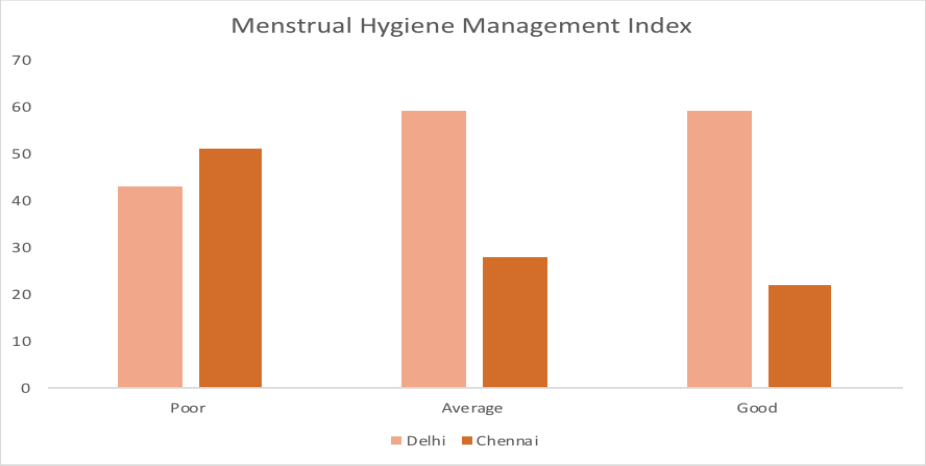
In Delhi, most of them were astonished and aghast when they were asked if they had ever discussed their periods with the men in the house and firmly dispelled the idea of their father or brother knowing about their period. They were incredulous when told that menstruation is actually openly discussed in many households. However, Chennai seemed more open to the notion and girls even admitted that the men in the households knew about their periods. There

were even instances where the girls openly told their father/older brother that they were filling a questionnaire on menstrual hygiene rather than shooing them away.

## Menstrual Hygiene Management

Menstrual hygiene management index was created by collating knowledge index, cultural restrictions index and empowerment index to capture the variations in essential menstrual practices and the scores between Delhi and Chennai were compared as shown in Figure 10.

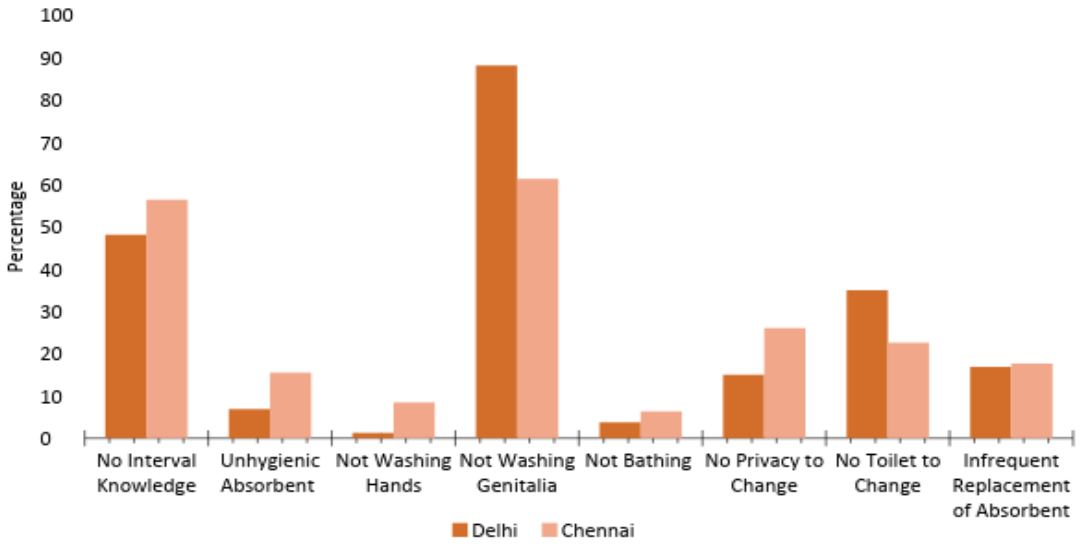
**Figure 10: Variations in MHM Scores**




Yet again, Delhi performed much better in MHM than Chennai, but the fact that over half of the respondents had poor menstrual hygiene management in both cities was very disturbing to note.

It was encouraging to note that most girls used sanitary napkins during their period, washed hands after changing their absorbent, and bathed during menstruation. However, it was indeed shocking to find that most of the girls did not wash their genitalia, and had no knowledge about the right interval between two periods. A quarter of the girls did not have privacy to change their absorbent and did not use a toilet to do so.

**Figure 11: Variations in MHM indicators**




*We change our absorbents in the government-built public toilet, which is a little distance from here. So we cannot change our napkins at night because it is not safe to go out then.*

*The nearest toilet is a twenty-minute walk away from here.*

*I have to ask my father to go out of the room so I can change my absorbent.*

*I change my sanitary napkin only once a day because my flow is very light.*

*I change my absorbent amidst the bushes and throw the used absorbent right there. I do have access to a toilet, but I am used to this practice and I am unwilling to go to the toilet.*

Most of the slums in both Delhi and Chennai that were surveyed had one or two government-built communal toilets which were shared by the households. More often than not, these toilets were, logically, located far away from the dwellings. In one slum in Chennai, we were informed that a one-way commute to the nearest public toilet took a whopping 20 minutes by walk. Thus, most girls preferred changing their absorbent within their homes, either in the bathing area or inside a room. Because the dwellings in these slums often consist of only one or two rooms, there was no privacy to change their absorbent. The girls often found themselves in the quandary of having to request the men in the household to go out of the house so that they could change their absorbent. This, they claimed, is very inconvenient but they have little sway over it. Out of hesitation to ask, they defer changing their absorbent. It was observed that most girls changed their absorbent based on the flow rather than the duration. They were not aware that the absorbent must be changed every 4-6 hours; those who were,

disregarded it as they did not deem it 'necessary'. Unchanged absorbents are a breeding ground for bacteria such as staphylococci, which can result in complications such as the Toxic Shock Syndrome.

*We only use sanitary napkins if we can afford it for that month.*

It was observed that mothers in fact sacrificed their own menstrual well-being for the sake of their daughters'. Because of the exorbitant prices of sanitary napkins, mothers resorted to using cloth, while purchasing pads for their daughters. This could be the reason behind the fact that most girls used hygienic absorbents.

*Why do we need to use sanitary napkins when cloth, which is more affordable, can be used instead?*

Some of them believed that there was no difference between sanitary napkins and cloth and they fulfilled the same ends anyway. They preferred using cloth because it was more affordable and "got the job done".

*I always wrap the sanitary napkin in a newspaper, put it in a cover and then throw it in the dustbin*

A majority of the girls disposed of the sanitary napkins in a trashcan after wrapping it in newspaper/plastic. Wrapping it in plastic however is detrimental to the environment as that prevents the sanitary waste from decomposition. However, there were also instances where the sanitary napkin was washed off the blood under a tap before it was wrapped and thrown in the trash. This was to protect themselves from black magic, lest the blood on the disposed waste was inadvertently acquired by someone practising witchcraft.

*I wash off all the blood on the sanitary napkin under running tap water before disposing of it.*

*Sanitary napkins should only be disposed of in running water.*

Some of them also believe that sanitary waste should only be disposed of in a running water body such as a *nala.* Most of them condemned the practice of flushing the napkins down the toilet. They were aware that it would clog the pipes and lead to bigger problems. While disposal practices at the micro-level are laudable, there is no proper waste disposal system in place. Thus, the absorbent ultimately ends up in makeshift landfills created in the vicinity of the slums. The putrid odours attract dogs and other vermin which drag it out into the open. In a Delhi slum, small drains located at the interstices of dwellings were converted into open toilets for infants and small children. Sanitary napkins wrapped in plastic were also disposed of in these drains, as the public toilets provided by the government were located far away from the place of residence.

*I place all my sanitary waste in a cover. At midnight, I go to a field and burn it. Menstrual waste is foul and tainted. Burning ensures that it does not remain on earth.*

Burning used sanitary waste in the open was also a prevalent practice. This led to foul odours emanating from the burned waste and also caused air pollution.

## Regression Results

Ordinary least square regression was employed to understand the determinants of MHM menstrual hygiene management. Before undertaking least square regression, a test of multicollinearity was conducted using the vif command. According to the rule of thumb, none of the variables scored more than 10 indicating the absence of multicollinearity, hence all of the variables were retained for final analysis. The set of explanatory variables were selected based on the previous literature. MHM index was regressed against each explanatory variable in the ordinary least square regression model and the significant variables were retained for the multivariate model. According to the regression results, a strong and significant relationship was found between religion and MHM; We found a negative relationship between MHM and following Muslim religion. Mother's educational status and MHM were positively related. As expected, the availability of a toilet facility was positively associated with good MHM. Compared to people without access to a toilet, people with access to a toilet had a higher MHM score. Most importantly, knowledge index, cultural and social restrictions index and empowerment index assert significant influence on MHM and the coefficient values indicated an increase of MHM by 0.94 units due to cultural and social restrictions index, 1.186 due to empowerment index and 1.03 attributing to knowledge index. These results are summarised in Table 2.

**Table 2: Regression Results**

| MHM Index | Coefficient | SE | Confidence Interval (CI) |
|---|---|---|---|
| Age | 0.006 | 0.045 | -0.082 - 0.094 |
| **Religion** | | | |
| Hindu (Ref) | | | |
| Christian | -0.547 | 0.329 | -1.195 - 0.100 |
| Muslim | -2.763* | 0.531 | -3.809- -1.717 |
| Others | 1.286 | 1.747 | -2.154 - 4.726 |
| **Mother's Education** | | | |
| Illiterate (Ref) | | | |

| | | | |
|---|---|---|---|
| Primary/ Middle | 0.305 | 0.248 | -0.184 - 0.793 |
| Secondary/ Higher | 0.860* | 0.330 | 0.211- 1.510 |
| Graduate and Above | -1.082 | 1.053 | -3.155 - 0.991 |
| **Access to toilet** | | | |
| Yes (Ref) | | | |
| No | -0.701* | 0.232 | -1.157 - -0.244 |
| **Father's Occupation** | | | |
| No (Ref) | | | |
| Yes | -0.065 | 0.268 | -0.593- 0.464 |
| Per Capita Income | 0.000 | 0.000 | 0.000 - 0.000 |
| Knowledge Index | 1.033* | 0.057 | 0.921 - 1.146 |
| Culture Index | 0.940* | 0.041 | 0.859 - 1.021 |
| Empowerment Index | 1.186* | 0.066 | 1.055 - 1.317 |
| Constant | -1.139 | 1.138 | -3.380 - 1.103 |

Note: *= less than 1%, **= less than 5% and ***= less than 10%, $R^2 = 0.1109$, N= 269

## Discussion

In this study we have undertaken a comparative analysis of MHM practices in two urban slums of Chennai and Delhi. We conducted a micro-level analysis by triangulating both quantitative and qualitative findings. The aim of this study is to understand the preparedness for menarche and knowledge of menstruation practices in the urban slums of India and to exhibit how it varies across different cultural settings. Existing evidence indicates that poor management of menstrual hygiene in schools results in school absenteeism and has a severe economic impact on the future of the country.

We have found that MHM practices vary considerably across these two settings, and this points to the fact that contextually specific policies need to be framed for achieving the desired results. We found that residents of Delhi and Chennai slums struggled to manage their monthly periods and MHM scores were exceptionally poor in both these settings. Overall, the understanding of menstrual hygiene was predominantly influenced by knowledge and culture related factors. However, we did observe that, the

performance of knowledge was comparatively better in Chennai, whereas cultural restrictions were relatively lesser in Delhi.

The knowledge before menarche, whether through formal or informal sources, had an impact on the practices during menstruation. Information about menstruation before menarche has the potential to change the way girls perceive this entire process and has a positive impact on their emotional

psychological wellness. The absence of knowledge pertaining to menstruation left the girls of Delhi and Chennai scared (25.49%), feeling worried and disgusted (10.59%). Similar findings were found by a previous study [19]. In these studies, mothers were the key informant about menstruation related information. However, we found that teachers and workshops conducted in schools played an important role in disseminating information to the majority of girls. Nevertheless, mothers were the second most popular source of information in our study. The strong relationship between MHM and mother's education indicates that educating the mother can have far-reaching impacts on the health of the offspring as observed before.

One of the previous reviews has indicated that the usage of insertable menstrual absorbents such as menstrual cups and tampons was very low, despite the presence of local manufacturers. It has been noted that menstrual cups are highly cost effective, as one cup can last up to 10 years. International studies further discovered that the lower usage of insertable products may be related to concerns about virginity, despite invalidation of a connection between virginity and breaking the hymen [24]. However, the respondents of our study were unaware of the existence of insertable absorbents such as tampons and menstrual cups. Upon being asked about them, they responded by saying that those were tools used to prevent pregnancy and had the potential to render women infertile.

Further, we also observed that girls faced a myriad of issues during menstruation but were not equipped enough to deal with them. This led to a fall in their productivity and also hampered their emotional wellbeing. Some of the problems they faced during menstruation were body ache [3], abdominal pain [83], vomiting and nausea during menstruation [5], irregular periods [7], burning and itching sensation due to the absorbent [4], excessive white discharge [3] and the tendency to become unconscious during menstruation [4]. Unfortunately, the girls were unable to share these problems with their parents for fear of being reproached. In most of the cases, mothers were unable to provide solutions, mothers reported that they did not know when to take a problem seriously and visit a doctor and when to perceive it as a normal phenomenon associated with menstruation. They also reported that a female doctor was not available to them and that they were unwilling to share such concerns with a male doctor. Thus, many of them resorted to consulting a traditional healer and believed in supernatural interventions to treat menstrual issues. Similar findings were reported by the studies conducted in West Bengal [21].

Another striking finding of our study was that the availability of a well-maintained toilet facility had a high impact on MHM practices of the respondents. This could possibly be attributed to the fact that a

lot of practices that improve MHM like washing hands, washing genitalia, changing absorbent and frequent bathing can be carried out if a toilet facility is available and accessible. This is in line with the findings of [21]. However, as noted by [22], it should be kept in mind that toilet availability is not a one-stop solution to MHM. The commonly observed disposal practices among the respondents was throwing the absorbent out in the open, burning it and throwing it in the dustbin. In other settings, most of the girls flushed the sanitary waste down the latrine [19,21,23]. Hence, the government should ensure the availability of clean toilet facilities in the slums of India. Moreover, the waste collection mechanism has to be implemented at frequent intervals.

## Limitations

Our study does have some limitations. Firstly, owing to the stigma surrounding menstruation, many girls were reluctant to openly discuss their menstrual practices with us. This was made worse due to the lack of privacy in the slum environment, with inquisitive male members further discouraging the girls from speaking up. Sometimes, the mothers of the girls answered on the girls' behalf, and thus some information might have been misrepresented. Further, there exists a possibility of selection bias, as the data was collected using purposive sampling.

## Recommendations and Conclusion

Menstruation, a mere biological process could range from a slightly discomforting to a debilitating experience. Hence, transmitting basic information or awareness related to menstrual hygiene is immensely crucial. Puberty education has the potential to reduce school dropout rates among adolescent girls and also improve their health outcomes. Given the strong role that schools as well as mother's play in imparting necessary knowledge relating to menstruation, the roles of these two stakeholders can be demarcated. Schools must take up the responsibility of educating girls about the physiology behind menstruation: understanding that menstruation is nothing but a natural process could go a long way in curbing unwanted cultural and social restrictions. Additionally, boys also need to be given information about menstruation which might sensitise them towards this process. Ergo, efforts must be made to provide teachers with the requisite resources and skills - through training and workshops. On the other hand, mothers can take up the role of educating girls about their menstrual practices and influence the products they use: they could urge their daughters to use toilets and encourage them to change their absorbents frequently. To achieve this end, however, mothers need to be given adequate education and this could be achieved by community health workers.

It should be kept in mind that poor MHM has the potential to harm the psychological and emotional wellbeing of girls. Removing the taboo associated with menstruation can go a long way in reducing the emotional stress women and girls face. In order to achieve this, men also need to be educated about this process and open discussions between male and female family members need to be encouraged. Participatory discussion groups held by community mobilisers or health volunteers, for both male and female members could take us closer to this objective.

With the unambiguous evidence presented in our study, the government and other stakeholders must design hardware interventions focussing on making products and facilities available combined with software interventions to improve knowledge to overcome cultural and social barriers. It must be kept in mind that these interventions must be highly context specific; the cultural beliefs that shape the acceptability of interventions and the needs of the target population need to be kept in mind.

Policy initiatives must also be made to eradicate the challenges pertaining to obtaining absorbent materials: women must be educated about safe, low-cost MHM materials; subsidies on sanitary napkins must be provided for those who cannot afford it; environmentally-friendly absorbents must be popularised and finally, taxes on absorbents must be removed or reduced. Importantly, women and girls need to be informed about the various policies and programmes they can benefit from, and an efficient channel through which these programmes can reach the maximum number of beneficiaries needs to be established. Distributing sanitary napkins through schools might serve this purpose, but as mentioned before, dropout rates need to be curbed and girls' enrolment ratios need to increase. This could probably be achieved by establishing adequate sanitation infrastructure including toilets in schools and workplaces. Further research is required in this direction as the effects of improved sanitation on dropout rates and the other strategies that exist to achieve this objective are ambiguous.

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## Appendix

**Table 1: Description of dependent and independent variable used in the econometric modelling**

| Variable type | Indicator | Description | Reference |
|---|---|---|---|
| Dependent variable | Menstrual Hygiene Management Index | Principal component analysis was undertaken to create the index using the following variables: knowledge pertaining to the optimal interval between two consecutive periods, type of adsorbent used, number of times absorbent is changed, hands washed after changing absorbent, genitalia washed during period, bathing during period and use of a well-maintained toilet facility with privacy to change the absorbent. | 14, 10, 19, 8, 17 |
| Independent variable | Knowledge Index | Principal component analysis was used to create the index using the following variables: knowledge about menstruation before menarche, reason behind period, origin of menstrual blood, whether menstruation is a lifelong process, relation of periods with pregnancy, and knowledge about absorbent choices. | 14, 10, 19, 17 |
| | Cultural and Social Restrictions Index | PCA was used to create the index and the answers to the following questions were used: liberty to enter kitchen, confinement to a seperate space during periods, celebration of menarche, dietary restrictions, liberty to touch adults or kids, keeping clothes separately, liberty to touch water and liberty to attend functions or rituals during periods. | 10, 19, 8, 17 |
| | Empowerment Index | PCA was used to create the index and the answers to the following questions were used: lack of self-confidence during periods, perception of periods as a sign of impurity, willingness to go out during periods, feeling restricted during periods, knowledge of men at home about periods and freedom to interact with them about it. | |

| | | | |
|---|---|---|---|
| | Age | Age is defined as a continuous variable | |
| | Religion | Categorised as Hindu, Muslim, Christian and Other | |
| | Mother's Education | Categorised as illiterate, primary level, secondary level and graduate | 14 |
| | Availability of Toilet | Categorised as Yes or No | |
| | Work Status of Father | Categorised as Yes or No | |

**Questionnaire**

The questionnaire was designed by the authors after scrutinising the previous studies and government guidelines for MHM. A comprehensive list of questions was listed individually by all the authors and then they were compiled. Upon a series of discussions, we arrived at the final questionnaire. This questionnaire was then given to two translators: one who knew the local language in Chennai and one who knew the local language in Delhi. After the translation into the local language, the questions were translated back to the original language by common people who knew both languages. This was carried out to ensure there were no semantic barriers. Conflicts in the translation were resolved between the authors and the translators. We pretested the questionnaire among 10 adolescent slum-dwelling girls and made the required changes. Finally, the final draft of the questionnaire was prepared and floated among the selected sample. If any information was found to be missing in the collected sample, the slums were revisited and the requisite information was collected from the girls.

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