

How socio-demographic and mass media factors affect sanitary item usage among women in rural and urban India

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Abstract: *Our study's objective is to examine the various socio-demographic and mass media factors of sanitary item usage among rural and urban women in India. We have used data from the Indian version of the Demographic and Health Survey, conducted in 2015–16 for this study, with a sample of 247,833 women in the age group of 15 to 24 years. Binary logistics regression was performed separately for urban and rural women to understand the various determinants of sanitary item usage. We found that three-quarters of women in urban areas use sanitary items compared to half of the women in rural areas. Indian women in rural areas appear to be at a considerable disadvantage compared to their urban counterparts with regard to sanitary item usage. Factors determining sanitary item usage did not vary between urban and rural areas. However, education, wealth, mass media, and toilet facility were the major factors in understanding the improvement in sanitary item usage in urban and rural areas. At the policy level, there is need to focus on (a) disseminating knowledge about menstrual hygiene management (MHM) practices and provisioning of sanitary items; and (b) providing exposure to traditional media channels to potentially reduce the social stigma associated with these issues and bring critical conversations to the forefront, especially among the socio-economically disadvantaged groups.*

Keywords: menstrual hygiene management, menstruation, menstrual health and hygiene, sanitary item usage, Demographic Health Survey

ADOLESCENCE IS A PHASE OF HUMAN life marked by physical, psychological, and behavioural changes experienced while transitioning from childhood to adulthood. Children in the age group of 10 to 19 are called adolescents and comprise around 18 per cent of the world's population (1.2 billion) as of 2011 (UNICEF, 2012). This transition is referred to as experiencing puberty, which includes the development of the adolescents' reproductive organs and hence their capability to reproduce. Menstruation is one such physiological process reflecting these changes for females, which prepares their bodies for pregnancy and adulthood

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(UNICEF, 2013; Alberda and Simavi, 2018). During menstruation, girls and women aged between 10 and 50 (on average) bleed every ~28 days. This 28-day period may vary from 21 to 35 days for different girls and women, and allows the ovaries to prepare eggs for fertilization and the uterus to prepare for pregnancy by developing a tissue lining on its inside wall. If the egg(s) are not fertilized during or by the end of that 28-day period, the uterus sheds its inner lining in the form of bleeding through the vagina. This periodic bleeding every ~28 days is referred to as 'periods' or 'menstrual cycle' and typically lasts for 3–7 days (Alberda and Simavi, 2018). By the end of the menstrual period, the body is ready to prepare for the next pregnancy cycle.

While menstruation is a natural biological process, women and girls experience discrimination, abuse, and neglect resulting from the myths and misconceptions built around menstruation. Such practices have been observed across the world, but more so in low- and middle-income countries (House et al., 2012; Sommer et al., 2016a; Mason et al., 2017).

In India, most adolescent girls experience their first menstrual cycle with limited knowledge of the menstruation process (Van Eijk et al., 2016). This experience is compounded by various myths and misconceptions associated with menstrual hygiene imposed by their families and societies, like restrictions on bathing, entering the kitchen, visiting the temple, and other forms of discriminatory behaviour (including untouchability) by their family members and others (Khanna et al., 2005; House et al., 2012).

Such prejudices and practices perpetuating myths have potentially deeper impacts on girls, including their absenteeism from school during menstruation, and eventually dropping out of school altogether (Lidonde, 2004). Further, inadequate sanitation facilities in schools have been observed to significantly impact enrolment rates for adolescent girls across the world (Fentiman et al., 1999; Mahon and Fernandes, 2010; Adukia, 2017). Sustainable Development Goal 6.2 specifically entails adequate and equitable sanitation for all, including sanitation facilities and adequate treatment and disposal of human excreta and waste (UN General Assembly, 2015).

Access to sanitation facilities and menstrual hygiene awareness is lacking among girls and women in most South Asian countries (Mahon and Fernandes, 2010). Studies have found that girls and women face various gynaecological problems like reproductive tract infections (RTIs), bacterial vaginosis (BV), candida, and *Trichomonas vaginalis* (TV) due to lack of toilets and poor hygiene during menstruation (Bhatia and Cleland, 1995; Torondel et al., 2018). The absence of a menstrual hygiene component in the school curriculum is cited as one of the potential reasons for girls' low awareness levels, as curricula are primarily limited to the narrow description of the reproductive systems (UNESCO, 2014). Additionally, girls are subjected to various social, emotional, and physical barriers within their homes and communities (like no baths, social exclusion impacting their psychological well-being) with the onset of their menstruation cycle (House et al., 2012). House and colleagues (2012) have also shown in their research that around 30 per cent of female students in South Asian countries

do not attend schools during their menstruation period. Research studies have consistently argued for focusing on proper provisioning of water, sanitation, and hygiene (WASH) facilities within schools, including sanitary products for girls (Adukia, 2017; Agarwal, 2018). Past studies have focused on the importance of understanding the process of menstruation and associated menstrual hygiene practices among schoolgirls (Van Eijk et al., 2016; Sharma et al., 2020). However, there is limited understanding around how non-schooled and young women apply these practices (Rajagopal and Mathur, 2017; Muralidharan, 2019), especially from using large surveys that are reliable and cover an entire country like India with its huge diversity, not only in terms of the geography but also in its culture and societal norms.

Adequate menstrual hygiene facilities include providing a clean private space for girls to change their clothes, soap and water to clean, and dustbins to dispose of their menstrual/sanitary waste (Sommer and Sahin, 2013). Along with access to these facilities, adopting hygienic practices during menstruation is also critical and is collectively referred to as menstrual hygiene management (MHM). Women generally use different products, including cloth, locally prepared napkins, commercially sold sanitary napkins, and tampons. The National Family Health Survey Round-4 (NFHS-4) report categorizes hygienic menstrual protection methods to include locally prepared sanitary items, sanitary items (commercially produced), and tampons. In contrast, cloth and other products (like rags) are referred to as unhygienic menstrual protection methods (IIPS and MacroInternational, 2017). Effective MHM (i.e. maintaining hygienic practices during menstruation) is the key to a healthy lifestyle for girls and, therefore, needs to be adopted in their daily lives.

Past research has also depicted psychosocial consequences due to poor MHM (Sommer, 2009), such as experiencing shame, social stigma, and stress, among others (Crichton et al., 2013; Sommer et al., 2015). Women during menstruation also face various human rights violations, including their right to human dignity, adequate standard of living, education, work, and non-discrimination and gender equality (UNFPA, 2020).

Van Eijk et al. (2016) and Sharma et al. (2020) in their systematic review have shown that most of the studies have tried to understand aspects of the menstrual hygiene practices among schoolgirls. However, these studies do not adequately capture the urban–rural differences between sanitary item usage. In India, around 20 per cent of women lie in the age group of 15–24, and 72 per cent of these women live in rural areas (IIPS and MacroInternational, 2017), thus making it essential for them to understand their menstrual needs and safe MHM practices. Meta-analysis and systematic review by Van Eijk et al. (2016) that used data from 138 studies involving 97,000 adolescent girls point out various reasons for the disparity in sanitary item usage in the rural and urban areas, including availability of toilets at home, multiple taboos and myths around menstruation, poor menstrual knowledge, costs of sanitary items, and inadequate disposable facilities. Almeida-Velasco and Sivakami (2019) showed that only 24 per cent of women from urban areas use sanitary items compared to 4 per cent in rural areas, using

a cross-sectional dataset from the District Level Household and Facility Survey-3 (DLHS-3), conducted in 2007–08. However, this study was conducted based on a dataset from almost a decade ago; hence, there is a need to understand the issues based on a more recent dataset.

Choudhary and Gupta (2019) conducted a study in urban and rural areas of Jodhpur, and found 65 per cent of women used sanitary pads in the urban area. The authors also attributed various socio-demographic and personal reasons for the low usage of the sanitary items, including parental education, religion, caste, poor menstrual knowledge, restrictions due to taboos and myths, hygienic practices during menstruation, and toilet facilities at home. In contrast, only 29 per cent of women in rural areas use sanitary pads. However, the study was restricted only to sanitary pads and did not include other items. These studies show the inequality in the usage of sanitary items among women in rural and urban India. Thus, it is crucial to understand the difference in the usage of sanitary items among women in rural and urban areas and women at the country level using a recent dataset; and understand which factors drive these rural–urban differences in the usage of the sanitary items.

Building upon the work done by Anand et al. (2015), that focused on the association between socio-demographic factors and usage of menstrual items, our study expands the scope of research by including other socio-economic and mass media factors like access to media (newspaper/magazine, radio, and television). We also study how these factors vary among women in rural and urban areas of India. By exploring these questions, the study aims to shed light on various relevant socio-demographic factors that impact sanitary item usage in rural and urban areas. While building the literature on sanitary item usage, the study findings also offer useful insights for improving the design and implementation of policies and programmes targeted at improving MHM practices in India and other low- and middle-income countries.

Methodology

Data

This study has used the nationally representative, large-scale, publicly accessible Demographic and Health Survey, popularly known as the National Family Health Survey-4 (NFHS-4), conducted in 2015–16. This survey is administered by the Ministry of Health and Family Welfare, in coordination with the International Institute of Population Sciences, Mumbai. NFHS-4 collects data using two questionnaires: household questionnaires, which collect data from all the household members; and women's questionnaires, which collect data from women in the households on their characteristics and reproductive health, including information on the menstrual cycle, among other things. NFHS-4 data was collected from the former 29 states and six union territories with 601,509 household interviews and includes data for 699,686 women and 112,122 men. For menstruation-related questions, NFHS-4 provides data for 247,833 women in

the age group of 15 to 24 years. However, information on caste was not available for 10,186 women and hence these women were excluded from the sample. Our final sample included for study is 237,647 women with 171,633 in the rural areas and 66,014 in the urban areas.

Dependent variable

The following questions have been considered to identify the dependent variables for this study using the NFHS-4 questionnaire.

1. 'Women use different methods of protection during their menstrual period to prevent blood stains from becoming evident. What do you use for protection, if anything? Anything else?' There were six response options (1 = Cloth, 2 = Locally prepared napkins, 3 = Sanitary napkins, 4 = Tampons, 5 = Nothing, 6 = Other). In this paper, women who use locally prepared napkins, sanitary napkins, and tampons are considered to be using sanitary items (IIPS and MacroInternational, 2017). In contrast, those using cloth, other items, or nothing are considered as not using sanitary items. We have converted this variable into a binary variable 'sanitary item usage', which is coded as '1' if the items used during menstruation are locally prepared napkins, sanitary napkins, or tampons, and coded as '0' if the items used are cloth, other items, or nothing.

Independent variables

Based on the literature review, we have used several independent variables in this study including: Age group (15–19 years, 20–24 years), Caste (Scheduled Caste (SC), Scheduled Tribe (ST), Other Backward Classes (OBC), General, Don't Know), Wealth (Poorest, Poorer, Middle, Richer, Richest), Religion (Hindu, Muslim, Christian, Sikh, and others), Frequency of reading the newspaper, listening to radio and watching television (Not at all, Less than once a week, At least once every week, Almost every day), Education level of the respondent (No education, primary, secondary, higher), Toilet facility at home (improved, unimproved), Distance to health facility (no problem, big problem, not a big problem), Time to get water (less than 30 minutes, more than 30 minutes), Number of members in the household, and Age of the household head.

Data analysis

We have performed our data analysis (descriptive statistics and binary logistics regression) in Stata Version 15.1. We started our preliminary investigation with the descriptive statistics for urban and rural areas. Then we performed binary logistic regression separately for urban and rural areas to understand how socio-demographic and mass media factors impact sanitary item usage. The study also presents the odds ratio to show our estimates' precision at a 95 per cent confidence interval.

Results

Descriptive statistics of various socio-economic factors

Descriptive statistics for all the key variables used in the study are presented in Table 1. The study uses data for 237,647 women in the age group of 15 to 24 who participated in the NFHS-4 survey. Around 72 per cent of the women in our sample live in rural areas, whereas 28 per cent live in urban areas. The Hindu population has been found dominant in both the regions, followed by the Muslim population. In rural areas, around 40 per cent of the women belong to OBC and SC/ST category, followed by 18 per cent in the General category. In contrast, in urban areas, approximately 44 per cent of the women belong to the OBC category, 30 per cent to the SC/ST category, followed by 25 per cent to the General category. About 54 per cent of women from rural areas belong to the lowest two wealth strata (the poorest and the poor) compared to only 12 per cent in urban areas.

Around 31 per cent of households in the rural areas and 16 per cent of the households in the urban areas access drinking water in less than 30 minutes. Eighty per cent of toilets in the urban areas and 43 per cent of toilets in the rural areas are improved. Thirty-two per cent of the households found distance to the health facility as a big problem.

Table 1 Descriptive statistics for sanitary item usage by area of living

<i>Background characteristics</i>	<i>Rural</i>		<i>Urban</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Sanitary item usage	87,627	48.85	51,867	75.76
Religion				
Hindu	136,875	76.31	45,481	66.44
Muslim	22,976	12.81	15,236	22.26
Christian	11,626	6.48	5,158	7.53
Sikh	3,562	1.99	1,148	1.68
Others	4,355	2.43	1,436	2.10
Caste				
Scheduled Caste	34,971	20.38	11,430	17.29
Scheduled Tribe	36,254	21.12	7,976	12.07
OBCs	69,765	40.65	29,450	44.55
General	29,917	17.43	16,891	25.55
Don't know	726	0.42	357	0.54
Education level of respondent				
No education	22,406	12.49	4,221	6.17
Primary	17,810	9.93	4,423	6.46

(Continued)

Table 1 Continued

<i>Background characteristics</i>	<i>Rural</i>		<i>Urban</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Secondary	119,992	66.89	43,965	64.22
Higher	19,166	10.68	15,850	23.15
Wealth index				
Poorest	45,728	25.49	2,287	3.34
Poorer	50,580	28.20	5,949	8.69
Middle	42,103	23.47	12,247	17.89
Richer	26,716	14.89	21,341	31.17
Richest	14,250	7.94	26,635	38.91
Frequency of reading newspaper				
Not at all	102,416	57.10	23,354	34.11
Less than once a week	36,624	20.42	13,263	19.37
At least once a week	25,599	14.27	14,975	21.87
Almost every day	14,735	8.21	16,867	24.64
Frequency of listening to radio				
Not at all	148,558	82.82	54,868	80.15
Less than once a week	12,412	6.92	4,586	6.70
At least once a week	11,437	6.38	5,280	7.71
Almost every day	6,967	3.88	3,725	5.44
Frequency of watching television				
Not at all	49,841	27.79	5,248	7.67
Less than once a week	16,373	9.13	2,977	4.35
At least once a week	22,778	12.70	6,070	8.87
Almost every day	90,382	50.39	54,164	79.12
Time to get water				
More than 30 mins	123,977	69.12	57,538	84.05
Less than 30 mins	55,397	30.88	10,921	15.95
Toilet facility				
Unimproved	102,772	57.29	13,350	19.5
Improved	76,602	42.71	55,109	80.50
Distance to health facility				
Big problem	67,302	37.52	11,825	17.27
No problem	50,029	27.89	34,988	51.11
Not a big problem	62,043	34.59	21,646	31.62
Total sample size	171,633	100	66,014	100

The average number of members in the household in both urban (5.9) and rural areas (6.2) was 6. Similarly, average age of the household head in both urban and rural areas is same at 48.5 years.

Around 49 per cent of women have reported using sanitary items in rural areas as compared to 76 per cent in the urban areas. The usage of sanitary items increases with the increase in wealth in both areas. In the poorest wealth strata, the usage of sanitary items is around 21 per cent and 32 per cent in rural areas and urban areas respectively, whereas in the richest wealth strata, the usage is as high as 85 per cent and 90 per cent in rural and urban areas respectively. The usage of sanitary items is more prevalent among women who belong to Sikh, Christian, and other religions (Buddhist, Jain, Jewish, Parsi, no religion) than the women who belong to Hindu and Muslim religions in both urban and rural areas. Similarly, women in the General category reported higher usage of sanitary items than women from the SC/ST/OBC category in both rural and urban areas.

The educational qualification of women played an important role in improving sanitary items. Only 20 per cent of women with no education use sanitary items, in comparison to 85 per cent of women with higher education. Similarly, the usage of sanitary items increases with the increase in the use of mass media.

The odds ratio for sanitary item usage in rural and urban areas

The results of the binary logistic regression model are shown in Table 2. Most of the independent variables fit in the final model and are statistically significant. The odds ratio for women's educational levels is very high, showing that it is the most influential factor in the usage of sanitary items. Women who are educated up to high school had greater odds of using sanitary items than women who are not, in both rural and urban areas (OR = 4.662 in rural areas and OR = 4.437 in urban areas).

Hindu and Muslim women are less likely to use sanitary items than women from all other religions in urban and rural areas. Women from Sikh, Christian, and other religions are nearly twice more likely to use sanitary items than Hindu women in both rural and urban areas. The usage of sanitary items increases with an increase in the wealth of the families. Women from the richest strata are six times more likely to use sanitary items, in both rural and urban areas compared to the women from the poorer households (OR = 6.211 for rural areas and OR = 6.246 for urban areas). Women from the General category are more likely to use sanitary items than women from a scheduled caste in urban and rural areas.

Another critical factor affecting the usage of sanitary items is access to different media platforms, including newspapers, radio, and television. Women who read newspapers or magazines every day are two times more likely to use a sanitary item than women who do not read them, both in urban and rural areas (OR = 1.884 for rural areas and OR = 1.864 for urban areas). In rural and urban areas, women who listen to the radio every day are one-and-a-half times more likely to use sanitary items than women who do not listen to the radio (OR = 1.140 for

urban area and OR = 1.207 for rural area). Women who watch television every day are twice as likely to use sanitary items in urban and rural areas than women who do not watch television every day (OR = 1.884 for rural areas and OR = 1.718 for urban areas).

Next, we take a look at the WASH facilities and distance to the health facilities in understanding their effects on the sanitary item usage. Women who have an improved toilet facility at home are one-and-a-half times more likely to use sanitary items in both urban (OR = 1.112) and rural areas (OR = 1.17) than those who do not have an improved toilet. Women in households who take less than 30 minutes to get drinking water (OR = 1.112) have higher odds of sanitary item usage in comparison to those who take more than 30 minutes in the urban areas. These results reverse in the rural areas where women in households who take less than 30 minutes to get drinking water have reduced odds of sanitary item usage in comparison to the women who take more than 30 minutes to get drinking water.

Table 2 Odds ratio for sanitary item usage in rural and urban areas

<i>Background characteristics</i>	<i>Rural</i>	<i>Urban</i>
	<i>Odds ratio</i>	
Age group		
15–19		
20–24	0.890***	0.820***
Religion		
Hindu		
Muslim	0.984	0.828**
Christian	2.747***	2.178***
Sikh	1.523***	1.480***
Others	2.522***	1.575***
Caste		
Scheduled Caste		
Scheduled Tribe	0.889***	1.013
OBC	0.920***	0.875***
General	1.13***	1.12***
Others	0.77***	1.096
Education level of respondent		
No education		
Primary	1.242***	1.196***
Secondary	2.295***	2.140***
Higher	4.698***	3.622***

(Continued)

Table 2 Continued

<i>Background characteristics</i>	<i>Rural</i>	<i>Urban</i>
	<i>Odds ratio</i>	
Wealth index		
Poorest		
Poorer	1.703***	1.492***
Middle	2.570***	2.139***
Richer	3.870***	3.331***
Richest	6.211***	6.246***
Frequency of reading newspaper		
Not at all		
Less than once a week	1.522***	1.259***
At least once a week	1.779***	1.576***
Almost every day	2.094***	1.864***
Frequency of listening to radio		
Not at all		
Less than once a week	1.034	1.211***
At least once a week	0.984	1.137***
Almost every day	1.207***	1.140**
Frequency of watching television		
Not at all		
Less than once a week	1.340***	1.305***
At least once a week	1.524***	1.394***
Almost every day	1.884***	1.718***
Time to get water		
More than 30 mins		
Less than 30 mins	0.965***	1.048*
Toilet facility		
Unimproved		
Improved	1.147***	1.089***
Distance to health facility		
Big problem		
No problem	1.245***	1.370***
Not a big problem	1.100***	1.139***
Age of household head	1.004***	1.002***
Number of household members	0.944***	0.941***
Constant	0.111***	0.240***
Log likelihood	-94285.99	-30360.98

Note: * $p < 0.1$, ** $p < .05$, *** $p < .01$

Women who consider distance to health facility as 'no problem' (OR = 1.245 for rural and OR = 1.370 for urban) or 'not a big problem' (OR = 1.100 for rural and OR = 1.139 for urban) in both urban and rural areas are more likely to use sanitary items than those who consider it as a big problem.

Sanitary item usage decreases with the increase in the number of members in the household in both urban (OR = 0.941) and rural areas (OR = 0.944). Sanitary item usage also increases with the increase in age of the head of household in both urban (OR = 1.002) and rural areas (OR = 1.004).

Discussion

Our study tries to understand the socio-demographic and mass media differences among women in rural and urban India and how these factors affect the sanitary item usage of the women in the age group of 15 to 24. Our study has made multiple contributions to the existing literature. First, the study helps us understand the rural-urban differences in the usage of sanitary items among the women using a recent nationally representative dataset, and the factors that could potentially explain these rural-urban differences including socio-demographic, household level, and mass media factors. Second, we have also added factors on access to WASH facilities (i.e. type of toilet facility used and time to get drinking water), distance to health facility, and household factors including age of the household head and number of members in the household. While reflecting on these findings, the study raises some critical questions for improving sanitary item usage among girls and women.

Our results show that women in urban areas use a higher percentage of sanitary items than the women in rural areas. However, a closer look at the factors impacting sanitary item usage shows that women in both urban and rural areas share most of the socio-economic and mass media factors and are consistent with the previous findings (Sommer et al., 2014).

Our analysis depicts a significant increase in sanitary item usage over time in rural and urban areas, from 4 per cent and 24 per cent (IIPS, 2010) in 2007–08, respectively, to 49 per cent and 76 per cent, in 2015–16. This increase can be attributed to the different policy level measures over the last decade. Despite such increase over the years, there still seems to be a disparity between rural and urban areas in terms of sanitary item usage. Consistent with the results of Almeida-Velasco and Sivakami (2019) conducted using DLHS-3 data, our results affirm that women in urban areas have significantly improved access to sanitary items than women in rural areas, suggesting that rural disadvantage continues to play a role in access to sanitary items. A more in-depth analysis shows that the socio-demographic and mass media factors that affect sanitary item usage are similar among the women from rural and urban India. Previous studies from India have shown that women in urban areas have higher sanitary item usage than those in rural areas (Anand et al., 2015; Goli et al., 2020; Roy et al., 2020). These studies use the area of living (urban/rural) as one of the independent variables and, thus, found that women in urban areas have better MHM practices than women in rural areas.

As discussed, sanitary item usage has reportedly increased over the past decade in India (IIPS, 2010; IIPS and MacroInternational, 2017). However, nearly 23 per cent of women in urban areas and 49 per cent in rural areas use cloths during their menstrual cycles. These findings are consistent with the previous studies showing that women from both areas prefer using cloths over other sanitary items (Sommer et al., 2014; Van Eijk et al., 2016; Almeida-Velasco and Sivakami, 2019). NFHS-4 restricts the definition of sanitary item usage to only locally prepared sanitary napkins, sanitary napkins, and tampons, and hence does not consider use of cloths as a hygienic method for menstrual protection. However, with the shift in discourse towards sustainable menstruation, the usage patterns are reversing to reusable cloth pads, menstrual cups, and more sustainable and biodegradable options. Further research is required to understand the experiences and menstrual practices of girls and women using cloths and cloth pads to be able to comment upon the hygienic component of this practice.

Previous studies have shown that sanitary items made from cloths are relatively cheaper and accessible, environmentally friendly, and hygienic if they are washed and dried properly in the sunlight (Hennegan and Montgomery, 2016). In India, washing and drying cloths is a challenge due to the lack of access to WASH facilities, and a private place to dry these cloths (Narayan et al., 2001). Further, the stigma associated with it forces women and girls to dry these cloths in a secluded place or even hide them (Khanna et al., 2005), thereby compromising their hygiene (Anand et al., 2015).

Associations of socio-demographic factors identified in the study with higher sanitary item usage are found to be similar to those reported in the previous studies conducted in India (Anand et al., 2015; Almeida-Velasco and Sivakami, 2019; Goli et al., 2020). Our analysis suggests that women in urban areas completing their primary and secondary education are more likely to use sanitary items than their rural counterparts. However, in contrast, the trend reversed for higher education; that is, women with higher education in rural areas are found to be more likely to use sanitary items than their urban counterparts. This may be because women in rural areas who have completed higher education are more likely to earn more than the women with no education and, therefore, have higher bargaining power in the household, so their personal needs get higher priority than other household needs (Sivakami et al., 2019; Goli et al., 2020).

The government has taken multiple initiatives to improve women's participation in education. Specifically, the Indian Government started campaigns such as *Swachh Bharat*, *Swachh Vidyalaya* (Clean India, Clean School) in 2014 (*Swachh Bharat Swachh Vidyalaya | SE Shagun*, no date), and MHM Scheme under National Health Mission (Kaiser, 2015). The government also provided subsidized sanitary napkins in the rural areas (Garg et al., 2012), vending machines for the supply of sanitary pads, and incinerators (Sommer et al., 2013). Studies on evaluation of *Swachh Bharat*, *Swachh Vidyalaya* in the north-east and other parts of India (Karnataka) show most of the schools have gender-segregated toilets and regular sanitary napkin supply, but with poor disposal facilities. These programmes are reported to have focused largely on the hard infrastructure, but miss out on

the complementary soft components like behavioural changes and improved curriculum to advance awareness levels among children, which can potentially have deeper and longer-term impact on sanitary item usage and other MHM practices (Borthakur and Baruah, 2019; Subhashree et al., 2020). Further, sadly, such campaigns remain limited to the schools and do not effectively engage the non-schooled women and other community members. Hence, one may see a difference in sanitary item usage between the schooled and non-schooled women. In our sample, 83 per cent and 62 per cent of women with no education in rural and urban areas use no sanitary items, whereas, 20 per cent and 10 per cent of women with higher education in rural and urban areas use no sanitary items. Thus, making girls aware of the menstrual processes via different programmes as mentioned above is essential, not only for educational purposes but also for their well-being. Improved awareness levels and understanding have also been found to help them fight and overcome the barriers of shame, stigma, and stress, feel positive about their bodies, and eventually experience higher motivation, confidence, and efficacy levels (Sommer et al., 2015; Montgomery et al., 2016).

Thus, educating girls to a minimum of high school education brings in hygiene as an essential factor in their menstrual management and overall reproductive health choices and practices. Thus, emphasizing girls' education is observed to have a positive impact on multiple fronts. This knowledge and awareness potentially helps them to burst myths, particularly in rural areas, where these taboos are reported to persist more than in urban areas (Yaliwal et al., 2020).

WASH facilities (toilet and access to water at home) are other important factors in understanding sanitary item usage as they help women in conducting their daily life activities with ease (Sommer et al., 2016b). Lack of basic WASH facilities is cited as one of the major reasons for absenteeism of the teachers as well as girls in the school during their periods (Goli et al., 2020). Our results, resonating with those from previous studies, highlight the importance of providing access to safe and hygienic toilet facilities (Muralidharan et al., 2015; Almeida-Velasco and Sivakami, 2019; Goli et al., 2020).

Affordability is another factor potentially contributing to the limited usage, compounded by challenges due to lack of availability, awareness, and safe disposal facilities (Garg et al., 2012). The usage of sanitary items increases in both urban and rural areas with the increase in wealth and is consistent with the previous findings (Anand et al., 2015; Almeida-Velasco and Sivakami, 2019). As quoted by Garg et al. (2012), the average expenditure on sanitary pads for rural women during a typical menstrual period is around Rs 48 (US\$0.64), which has been cited as 'expensive' for households in low wealth quintiles. Collective efforts need to be made by government, bureaucrats, policymakers, and various NGOs towards making the sanitary items available at no or a minimal cost, which can potentially help in easing the financial burden on women (particularly from rural and low-income backgrounds) for using sanitary items during their periods.

Goli et al. (2020) have argued that cheap or low-cost alternatives to sanitary items including menstrual cups are not actively promoted and, hence, most women do not know about them. Additionally, women in the rural areas may not be able to

step out by themselves to purchase sanitary pads from a male shopkeeper, or might hesitate to ask their husbands/male members of the family to purchase them for them, due to shame and social stigma attached to sanitary pads. Men, on the other hand, might also feel uncomfortable in purchasing sanitary pads, owing to similar reasons of stigma and feelings of embarrassment (Madhok, 2014). In most of the families, discussions rarely happen between the husband and wife on menstruation and MHM (Kaur et al., 2018).

For the above-mentioned reasons, women in rural areas end up using cloths and old rags (considered unhygienic) during menstruation to absorb the blood (Van Eijk et al., 2016), and further insist that other women and young girls in their families follow the same practice (Santhya et al., 2017). Using an old piece of cloth or rag, or other unhygienic methods for absorbing menstrual blood can be unsafe and risky, potentially leading to RTIs (Anand et al., 2015). Thus, merely provisioning of sanitary items will not bring behavioural changes towards usage of sanitary items during menstruation within the community. Such measures need to be complemented with educational programmes for enhancing community engagement as well as bringing behavioural change towards better MHM.

Lastly, mass media has increasingly become a critical factor in improving menstrual awareness and eventually sanitary item usage for women (Anand et al., 2015; Almeida-Velasco and Sivakami, 2019). Our results show that the chances of sanitary item usage are higher for women in rural areas who listen to radio or watch television every day compared to the women in the urban areas. In contrast and unsurprisingly, sanitary item usage is higher for women in urban areas who read newspapers every day. Our results build on the evidence pointed out by Anand et al. (2015) and Almeida-Velasco and Sivakami (2019) on the impact of access to traditional media in improving sanitary item usage. As highlighted above, there are numerous myths and taboos prevalent around menstruation, especially in rural areas (Yaliwal et al., 2020). Around 63 per cent of women in rural areas watch television at least once a week or every day, thus, mass media can act as an important medium to burst these taboos and myths.

Our results show that reading newspapers or watching television even once a week helps women improve sanitary item usage in rural areas. In contrast, there is no impact of watching television less than once or at least once a week in urban areas. For women in the rural areas, lower sanitary item usage has been linked to lower awareness levels, coupled with taboos, myths, and several other factors (Garikipati and Boudot, 2017). Therefore, awareness via traditional media channels can potentially reduce the social stigma associated with these issues and bring critical conversations to the forefront, especially in rural areas.

We need more research to understand how and in what ways access to different media channels contributes to enhanced knowledge of the population on menstrual cycles so that the awareness messages and ad campaigns can be strategically designed to address the specific needs. This can potentially also help reduce the social stigma associated with these issues and bring conversations on such critical aspects to the forefront. This can also potentially help students engage in more meaningful and informative conversations within schools and at home.

Limitations

The literature on menstruation is very sparse and limited to certain aspects of menstruation in detail. It is a relatively new and growing area of interest for researchers within public health, education, and allied areas. Our paper is limited to the quantitative assessment of the relationship between socio-economic factors and women's knowledge levels on menstruation and usage of sanitary items, using a nationally representative NFHS-4 dataset. Second, our study sample is restricted to the age group of 15 to 24 years, because the sanitary item usage in NFHS-4 is limited to this age group. Third, the NFHS-4 survey did not ask for information on other menstrual products like menstrual cups. Thus, our final results might slightly under-represent the population (even from the age group of 15–24) using sanitary items. Fourth, while the preliminary results from the National Family Health Survey Round-5 (NFHS-5) have been released recently, they are limited to 23 states and union territories only and do not provide a complete dataset for analysis; hence we could not use the recent NFHS-5 dataset. Lastly, this study helps us understand sanitary item usage but does not offer insights and experiences of sanitary items due to the limited scope of the survey questionnaire. Despite these limitations, the study provides a factual view of sanitary item usage in India. Connecting the dots from the limited literature available and findings from our analysis does convey a strong message for the need for comprehensive adolescent programmes for improving menstrual health in India.

Conclusion

Based on our empirical evidence and past literature, the study calls for actions on multiple fronts simultaneously, ranging from affordability, a higher level of awareness via media channels, toilet facilities within households and easy accessibility, to breaking the cultural and social barriers, to ensure effective MHM practices for women living in both urban and rural communities. There is also a strong need for adolescent education programmes (Sivakami et al., 2019) to help disseminate information about menstruation and women's anatomy in rural and urban areas, which can further help reduce taboos and myths around menstruation. It is a vicious circle where myths and taboos reinforce restrictions or poor education of girls and women creates barriers to bursting these myths. Thus, educating girls can help women prioritize their personal choices and needs along with other household demands, which can further help improve women's overall health and well-being.

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