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Original Research Article

Comparative assessment of menstrual hygiene management practices among urban and rural adolescent girls: a community-based cross-sectional study from Maharashtra, India

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ABSTRACT

Background: Menstrual hygiene management (MHM) is vital for the health of adolescent girls, but practices differ widely between urban and rural areas due to sociocultural, economic, and educational factors. This study compared MHM knowledge, practices, disposal methods, restrictions, and reproductive tract symptoms (RTS) among adolescent girls in urban and rural areas of Maharashtra.
Methods: A community-based cross-sectional study was carried out involving 214 adolescent girls aged 12 to 19 years (107 from each area) in both urban and rural practice fields of a medical college, utilizing a non-probability chain-referral (snowball) sampling method. A validated questionnaire was employed for the survey, which took place over a period of 18 months. The data were analyzed using SPSS version 22, applying appropriate statistical tests.
Results: Mothers were the main source of information in both areas. Urban girls showed higher exclusive use of sanitary pads, while rural girls often combined them with cloth. Urban girls had better genital hygiene and bathing practices ($p=0.004$; $p<0.001$), but rural areas had a higher rate of proper menstrual waste disposal (55.7% versus 44.3%, $p=0.001$). Menstrual restrictions were more common among rural participants ($p<0.05$). Overall, 51.9% reported at least one reproductive tract symptom, with foul-smelling discharge ($p=0.007$) and difficulty urinating ($p=0.013$) more prevalent among urban girls.
Conclusions: Substantial urban-rural disparities exist in menstrual hygiene practices, disposal methods, and cultural restrictions. Strengthening school-based education, improving access to affordable sanitary materials, and addressing sociocultural barriers are crucial for improving adolescent menstrual health.

Keywords: Adolescent girls, Menarche, Menstruation, MHM, Reproductive tract symptoms, Rural, Urban

INTRODUCTION

India has the largest adolescent population in the world, with about one-fifth of its citizens (approximately 21.4% or 243 million individuals) in this age group. The World Health Organization (WHO) defines adolescence as the period from 10 to 19 years, a critical phase marked by significant physical, psychological, sexual, and social changes. Menstruation, a normal biological process involving the shedding of the uterine lining, occurs during this time. Despite its naturalness, menstruation is often surrounded by cultural taboos and social stigma, particularly in low- and middle-income countries (LMICs).[1] Effective menstrual hygiene management (MHM) is essential for the health and dignity of adolescent girls. According to the WHO, proper MHM includes using safe absorbent materials, washing the genital area with soap and water, and having access to appropriate disposal facilities for menstrual waste.

India ranks 135th out of 146 countries on the global gender inequality index, with menstruation posing a

significant barrier to gender equality.[2] Inadequate menstrual hygiene is linked to absenteeism, social withdrawal, and increased risk of infections.[3] Many menstruating girls face cultural restrictions, such as exclusion from social gatherings and prohibitions on certain activities.[4]

The National Family Health Survey (NFHS-5, 2019-2021) reveals disparities in menstrual hygiene practices in India, with 87.6% of urban women using hygienic absorbents compared to 57% in rural areas.[5] This highlights ongoing challenges in ensuring equitable access to menstrual hygiene products. Urban and rural areas differ greatly in infrastructure and access to resources, with urban slum communities particularly affected by poor sanitation, which impacts menstrual hygiene.[6] Given these issues, this community-based cross-sectional study aimed to assess MHM practices among adolescent girls in urban and rural Maharashtra, compare their knowledge and information sources about menstruation, and estimate the prevalence of self-reported genitourinary or reproductive tract infection symptoms.

METHODS

Study setting

The present study was a community-based cross-sectional survey conducted in the urban and rural field practice areas of Seth G. S. Medical College and KEM Hospital in Mumbai, Maharashtra. The urban area focused on health post 1 in the Malvani-Malad region, serving around 126,973 residents from various socio-cultural backgrounds, including a significant number of migrants. The rural area was under the jurisdiction of PHC Khadavali, which has a population of 36,901.

The study included adolescent girls aged 12-19 years who had attained menarche and resided in the area. Girls with mental disabilities were excluded. The sample size was calculated based on previous literature on sanitary pad usage among urban (64%) and rural (45.1%) adolescent girls, resulting in 107 participants per group and 214 respondents in total.[7] A non-probability chain referral (snowball) sampling method was used for the recruitment of participants. The study was conducted over 18 months (April 2023-September 2024). Data were collected through home-based interviews using a validated semi-structured questionnaire prepared in English and translated into the local languages. The tool included sections on sociodemographic characteristics, knowledge, and sources of information regarding menstruation, hygiene practices, disposal methods, and cultural restrictions. Written informed consent was obtained from the parents or guardians, and assent from the participants.

Statistical analysis

Data were entered into Microsoft Excel 2021 and analyzed using IBM SPSS Statistics version 22.0 (IBM Corp., Chicago, IL, USA). The Chi-square test was used to determine the associations between categorical variables, and a p value <0.05 was considered statistically significant. Wherever the expected frequency in any cell was less than five, the Fisher's exact test was applied to ensure valid statistical inference.

RESULTS

A total of 214 adolescent girls participated in the study, with equal representation from rural (n=107) and urban areas (n=107). The mean age of the participants was 14.8±1.8 years. The majority (43.9%) were in the 15-17-year age group. Most participants were Hindus in rural areas (77.1%) and Muslims in urban areas (82.7%). Mothers of urban girls were more educated, with 73.8% completing at least middle school and 12% having pre-degree or higher education, compared to only 37.8% of mothers in rural areas. Nuclear families predominated (67.3%), more commonly in urban areas (56.9%) than in rural areas (43.1%). Access to water and toilet facilities was adequate in both groups, although a higher proportion of rural households had separate bathrooms (63%) than urban households (37%) (Table 1).

Knowledge and awareness about menstruation

Awareness of menstruation before menarche was reported by 50.9% of the participants, with no significant rural-urban difference (p=0.831). The majority (92.5% in rural and 62.6% in urban areas) reported mothers as their primary source of information, while teachers accounted for 22% of the urban sources. Regarding beliefs, 48.1% perceived menstruation as a normal physiological process, 26.6% as an illness, and 4.2% as a curse (p=0.105). Knowledge of the uterus as the organ of origin of menstrual blood was significantly higher among urban girls (60.6%) than rural girls (39.4%) (p=0.007). The belief that menstrual blood is "impure" was more common among rural girls (70.1%) than among urban girls (54.2%) (p=0.017) (Tables 2 and 3).

Menstrual hygiene practices

A statistically significant difference (p<0.001) was observed in the type of menstrual absorbent used at home among rural and urban adolescent girls. The majority of urban participants (55.4%) reported using only sanitary pads, whereas rural girls more often combined sanitary pads with old cloth (79.5%). Exclusive use of sanitary pads was considerably higher in urban areas. Genital hygiene practices showed significant variation, with 60.4% of urban girls washing before and after each pad change compared with 39.6% of rural girls (p=0.004). The frequency of bathing also differed significantly: 63% of urban girls bathed daily versus 37% of rural girls, whereas 61.5% of rural girls bathed once every 2-3 days (p<0.001) (Table 4).

Table 1: Sociodemographic profile of adolescent girls in urban and rural areas.

Variables	Categories		Area		Total (n=214)
			Rural (n=107)	Urban (n=107)	
Age groups (years)	12-14	N	45	56	101
		%	44.6	55.4	100.0
	15-17	N	56	38	94
		%	59.6	40.4	100.0
	18-19	N	6	13	19
		%	31.6	68.4	100.0
	Mean age		14.78±1.6	14.79±1.9	14.8±1.8
Level of education	Middle	N	45	56	101
		%	44.6	55.4	100.0
	High School	N	56	38	94
		%	59.6	40.4	100.0
	College	N	6	13	19
		%	31.6	68.4	100.0
	Mean education		9.01±1.37	9.12±2.05	9.07±1.7
Religion	Hindu	N	84	25	109
		%	77.1	22.9	100.0
	Muslim	N	17	81	98
		%	17.3	82.7	100.0
	Buddhist	N	6	1	7
		%	85.7	14.3	100.0
Mothers education	Illiterate	N	30	9	39
		%	76.9	23.1	100.0
	Primary	N	46	28	74
		%	62.2	37.8	100.0
	Middle	N	11	31	42
		%	26.2	73.8	100.0
	High School	N	20	27	47
		%	42.6	57.4	100.0
	Predegree	N	0	6	6
		%	0.0	100.0	100.0
	Graduate	N	0	6	6
		%	0.0	100.0	100.0
Type of the family	Nuclear	N	62	82	144
		%	43.1	56.9	100.0
	Joint	N	44	17	61
		%	72.1	27.9	100.0
	3 Generation	N	1	8	9
		%	11.1	88.9	100.0
Sanitation facility	Water facility at home (available)	N	85	92	177
		%	48.0	52.0	100.0
	Separate toilet (available)	N	91	79	170
		%	53.5	46.5	100.0
	Separate bathroom (available)	N	87	51	138
		%	63.0	37.0	100.0
Total		N	107	107	214
		%	50.0	50.0	100.0

Disposal of menstrual waste

Overall, 81.3% of participants disposed of menstrual absorbents appropriately. Correct disposal (wrapping and discarding in bins) was higher among rural (90.6%) than urban (72.0%) participants (p=0.001). Rural girls more often reported burning (90.4%), while urban participants used community rubbish systems (97.8%) (Table 5).

Table 2: Beliefs regarding menstruation among rural and urban adolescent girls.

Beliefs about the menstrual cycle		Area		Total (n=214)
		Rural (n=107)	Urban (n=107)	
Curse	N	4	5	9
	%	44.4	55.6	100.0
Illness	N	33	24	57
	%	57.9	42.1	100.0
Don't know	N	27	18	45
	%	60.0	40.0	100.0
Normal physiological phenomenon	N	43	60	103
	%	41.7	58.3	100.0
Total	N	107	107	214
	%	50.0	50.0	100.0
Pearson Chi-Square=6.13, df=3 p value =0.105.				

Table 3: Knowledge about the organ of origin of menstrual blood.

Where does the menses blood come from?		Area		Total (n=214)
		Rural (n=107)	Urban (n=107)	
Stomach	N	18	12	30
	%	60.0	40.0	100.0
Urethra	N	17	4	21
	%	81.0	19.0	100.0
Vagina	N	33	31	64
	%	51.6	48.4	100.0
Uterus	N	39	60	99
	%	39.4	60.6	100.0
Total	N	107	107	214
	%	50.0	50.0	100.0
Pearson Chi-Square=11.999, df=3 p value =0.007.				

Table 4: Comparison of the frequency of washing genitals and frequency of baths during the menstrual period amongst rural and urban adolescent females.

Frequency of genital wash during periods		Area		Total (n=214)
		Rural (n=107)	Urban (n=107)	
Every time before and after changing the absorbent	N	42	64	106
	%	39.6	60.4	100.0
Irrespective of changing absorbent	N	35	29	64
	%	54.7	45.3	100.0
Sometimes	N	30	14	44
	%	68.2	31.8	100.0
Total	N	107	107	214
	%	50.0	50.0	100.0
Pearson Chi-Square=10.94, df=1 p value=0.004				
Frequency of baths during periods				
Twice a day	N	20	8	28
	%	71.4	28.6	100.0
Everyday	N	37	63	100
	%	37.0	63.0	100.0
Every 2-3 days	N	48	30	78
	%	61.5	38.5	100.0
At the end of the period only	N	2	6	8
	%	25.0	75.0	100.0
Total	N	107	107	214
	%	50.0	50.0	100.0
Pearson Chi-Square=18.097, df=1 p value<0.001				

Values are expressed as frequency (percentage). Chi-square test applied; Fisher's Exact Test used where expected frequency <5. Significant at p<0.05.

Cultural restrictions during menstruation

Nearly all the girls (94.4%) reported observing at least one restriction during menstruation. Such restrictions were significantly more frequent in rural areas (97.2%) than in urban areas (91.6%) (p=0.045). Common restrictions included avoiding religious places (79.9%), not cooking or entering kitchens (15.9% overall, p<0.001), and staying separately during menstruation (p=0.007) (Table 6).

Reproductive tract infection symptoms /genitourinary symptoms

Approximately 51.9% of the participants reported at least one reproductive tract or genitourinary symptom. The

most common symptoms were lower abdominal pain (27.6%), itching (17.3%), and abnormal discharge (22.9%). Symptoms such as foul-smelling discharge (p=0.007) and difficulty in micturition (p=0.013) were reported significantly more frequently among urban girls (Table 7).

Table 5: Comparison of the mode of disposal of menstrual products at home amongst rural and urban adolescent females.

Mode of disposal of menstrual products at home		Area		Total (n=214)
		Rural (n=107)	Urban (n=107)	
Burned	N	75	8	83
	%	90.4	9.6	100.0
Community rubbish	N	1	45	46
	%	2.2	97.8	100.0
Household bin	N	29	51	80
	%	36.3	63.8	100.0
Into the latrine/toilet	N	2	3	5
	%	40.0	60.0	100.0
Total	N	107	107	214
	%	50.0	50.0	100.0

Table 6: Comparison of restrictions during periods amongst rural and urban adolescent females.

Restrictions during periods		Area		Total (n=202)	P value
		Rural (n=104)	Urban (n=98)		
Did not visit any religious place	N	94	77	171	0.181
	%	55.0	45.0	100.0	
Don't eat certain food items	N	20	27	47	0.102
	%	42.6	57.4	100.0	
No household work done	N	38	12	50	<0.001
	%	76.0	24.0	100.0	
Didn't attend school	N	11	2	13	0.018
	%	84.6	15.4	100.0	
Didn't attend any celebration	N	24	6	30	0.001
	%	80.0	20.0	100.0	
Was not allowed in the kitchen	N	36	2	38	<0.001
	%	94.7	5.3	100.0	
Wasn't allowed to consume common water	N	32	0	32	<0.001
	%	100.0	0.0	100.0	
Wasn't allowed to cook	N	34	0	34	<0.001
	%	100.0	0.0	100.0	
Wasn't allowed to sleep in bed	N	17	2	19	<0.001
	%	89.5	10.5	100.0	
Stayed in a different room	N	8	0	8	0.007
	%	100.0	0.0	100.0	
Wasn't allowed near the water source	N	7	0	7	0.011
	%	100.0	0.0	100.0	

Values are expressed as frequency (percentage). Chi-square test applied; Fisher's Exact test used where expected frequency <5. Significant at p<0.05.

Overall knowledge and MHM practices

Adequate menstrual knowledge was observed in 63.3% of urban and 36.7% of rural girls (p=0.034). The level of menstrual hygiene practice was satisfactory in 43.5% of the participants, with urban girls performing significantly better than rural girls (p=0.039). In the rural area, a statistically significant association was found between religion and the level of menstrual hygiene practice. A higher proportion of Hindu adolescent girls (60.7%) had satisfactory practices compared to Muslim girls (17.6%). In contrast, in the urban area, no significant association was observed between religion and menstrual hygiene

practices. The presence of perceived reproductive tract symptoms was also significantly associated with unsatisfactory menstrual hygiene among urban participants (p=0.002) (Table 8).

Table 7: Comparison of self-reported RTI symptoms amongst rural and urban adolescent females.

RTI symptoms		Area		Total n=111	P value
		Rural n=57	Urban n=54		
Pain/burn sensation	N	18	25	43	0.232
	%	41.9	58.1	100.0	
Lower abdominal pain	N	34	25	59	0.169
	%	57.6	42.4	100.0	
Itching	N	14	23	37	0.104
	%	37.8	62.2	100.0	
Rashes	N	12	8	20	0.348
	%	60.0	40.0	100.0	
Lumps/blister	N	1	3	4	0.313
	%	25.0	75.0	100.0	
Vaginal discharge	N	23	26	49	0.625
	%	46.9	53.1	100.0	
Foul-smelling discharge	N	0	7	7	0.007
	%	0.0	100.0	100.0	
Micturition difficulty	N	0	6	6	0.013
	%	0.0	100.0	100.0	

Values are expressed as frequency (percentage). Chi-square test applied; Fisher's Exact test used where expected frequency <5. Significant at p<0.05.

Table 8: Association between perceived RTI symptoms and level of practice of menstruation amongst rural and urban adolescent females.

RTI symptoms ever		Rural			Urban		
		Level of practice		Total	Level of practice		Total
		Unsatisfactory	Satisfactory		Unsatisfactory	Satisfactory	
Yes	N	29	28	57	41	13	54
	%	50.9	49.1	100.0	75.9	24.1	100.0
No	N	24	26	50	27	26	53
	%	48.0	52.0	100.0	50.9	49.1	100.0
Total	N	53	54	107	68	39	107
	%	49.5	50.5	100.0	63.6	36.4	100.0
Pearson Chi-Square=0.088, df=1, p value=0.766					Pearson Chi-Square=7.207, df=2, p value=0.002		

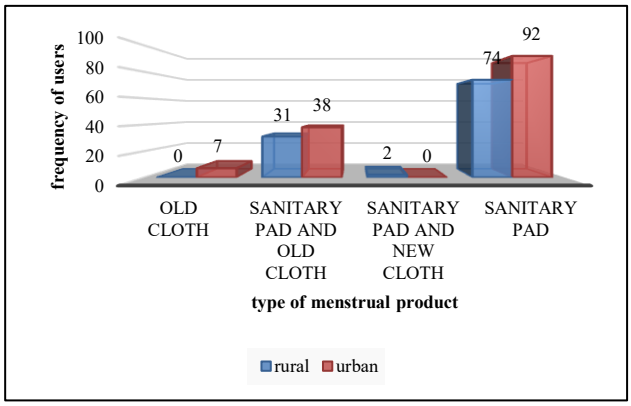

Figure 1: Comparison of menstrual material used at home amongst rural and urban adolescent females.

DISCUSSION

This study was conducted among 214 adolescent females, half of whom were from rural areas and the other half from urban areas. The purpose of the study was to determine the MHM techniques adopted by both settings. The main objectives of the study were to find out the knowledge, source of information, and practices regarding MHM techniques, and to find out the proportion of adolescent females with self-reported genitourinary/reproductive tract infection symptoms.

Sociodemographic variables

In the present study mean age of respondents was found to be 14.78±1.6 years among rural and 14.79±1.9 years

among urban girls, and the majority of respondents belonged to the Hindu religion in rural (77.1%) and the Muslim religion (82.7%) in urban areas. Similar results were reported by Senapathi et al where the mean age of respondents was 15.11±1.71 years in rural areas and 14.78±1.94 years in urban areas.[8] Similar results were reported by Paria et al.[7] In the family type, most of our study participants from rural 72.1% belonged to joint families, whereas the majority of urban participants were from nuclear families. This was similar to the study conducted by Fatima et al.[9]

Awareness regarding menarche and menstruation

In our study, awareness before menarche is almost equal in rural (54, 49.5%) and urban (55, 50.5%) females, with no significant difference (p=0.831). This was similar to the study conducted by Deo et al their study at Ambajogi also found that 42.5% of rural and 55.4% of urban girls were aware of menstruation before the attainment of menarche.[10] Patle et al in their study in Maharashtra, they found that only 21.3% of girls in urban and 16.3% in rural areas were aware of menstruation before menarche.[11]

Source of information

In our study, we found that 92.5 % of adolescent females from rural areas reported their mothers as the primary source of information about their periods, whereas in urban areas, it was found that 62.6% females receive information from their mothers, and about 22% receive information from their teachers. Paria et al in a similar study in West Bengal also reported that before menarche mother was the first informant in 76.84% of the cases.[7] Similar findings were also observed by Gupta et al, that the majority (71.3%) of the study participants in urban as well as in rural areas (57.7%) received first information about menarche from their mothers only.[12] However, in a foreign study in Egypt by El-Gilany et al, mass media was brought out as the main source of information about menstrual hygiene, followed by mothers.[13]

Knowledge and beliefs about menstruation

In our study, beliefs about the menstrual cycle among adolescent females in rural and urban areas were mainly similar. Most viewed it as a normal physiological process (43 rural girls, 41.7%; 60 urban girls, 58.3%), while a small minority considered it a curse (4 rural girls, 44.4%; 5 urban girls, 55.6%). According to Senapathi et al, 67.42% of rural and 72.32% of urban participants recognized menstruation's physiological nature, although 2.27% of rural school girls believed it was a curse from God.[8] Only 39 rural girls (39.4%) and 60 urban girls (60.6%) correctly identified the uterus as the source of menstrual blood, with misconceptions more common among rural girls (p=0.007). Similarly, Gebre et al found that 49.6% of participants in Ethiopia correctly identified the uterus as the source of menstrual blood.[14]

Menstrual products used during menstruation

This study found that most adolescent females used sanitary pads during menstruation, with 44.6% in rural areas and 55.4% in urban areas. However, a significant proportion of rural females (79.5%) also used old cloth alongside sanitary pads, compared to only 20.5% of urban females. These results are consistent with Thakre et al, who reported that 60.5% of urban girls and 30.8% of rural girls used sanitary pads, highlighting a statistically significant difference (p<0.01).[15]

Hygiene of the external genital area and bathing habits.

In our research, most rural females used soap and water (46, 79.3%) for cleaning, unlike urban females (12, 20.7%). Urban females were more likely to use only clean water (93, 60.4%) compared to rural females (61, 39.6%), and only urban respondents reported not cleaning at all (2, 100%). This difference was statistically significant (p<0.001), indicating that urban females adhere more to hygienic practices, suggesting a gap in menstrual hygiene education. Similar findings were reported by Gupta et al.[12] Urban females were also more consistent in bathing daily during their periods (63, 63.0%) versus rural females (37, 37.0%), who bathed less often, with more bathing every 2-3 days (48, 61.5%) or only at the end of their periods (2, 25.0%). The difference was significant (p<0.001).

Reproductive tract infections- In the surveyed population, 51.4% of rural and 48.6% of urban adolescents reported symptoms of reproductive tract infections (RTIs). The Pearson Chi-Square test indicated a significant link between education and menstrual hygiene practices in rural areas (p=0.017), but not in urban areas (p=0.395). Additionally, religion influenced menstrual hygiene practices in rural settings (p<0.001), with Hindu participants exhibiting the best practices. In urban areas, a significant association was found between RTI history and menstrual practices (p=0.002), suggesting adolescents with RTIs tend to have poorer menstrual practices.

Sociocultural restriction practices during menstrual periods

Nearly all girls (94.4%) reported at least one restriction during menstruation, with higher prevalence in rural areas (97.2%) compared to urban areas (91.6%) (p=0.045). Common restrictions included avoiding religious places (79.9%), not cooking or entering kitchens (15.9%, p<0.001), and staying separately during menstruation (p=0.007). Senapathi et al also noted various restrictions practiced during menstruation.[8]

The study employed a non-probability snowball sampling technique, which may have limited the representativeness of the sample and introduced selection bias. The study was limited to the field practice areas of a single institution, restricting generalizability.

CONCLUSION

The study demonstrates clear urban-rural disparities in menstrual hygiene knowledge, practices, and cultural restrictions among adolescent girls in Maharashtra. Urban participants exhibited better hygiene behaviours, while rural girls reported more restrictions but practiced safer disposal methods. Targeted menstrual health education, improved access to sanitary materials, and culturally sensitive community interventions are essential to strengthen menstrual hygiene management across both settings.

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