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Original Research Article

MENSTRUAL HYGIENE MANAGEMENT IN THE DIGITAL AGE: A COMPARATIVE CROSS-SECTIONAL STUDY AMONG URBAN AND RURAL WOMEN OF REPRODUCTIVE AGE GROUP

Borde AN[1], Sonal Deshpande[2], Apurva Borde[3], Shweta Patil[4], Shraddha Patel[5]

[1]*Professor, Department of Community Medicine, JMF ACPM Medical College, Dhule, Maharashtra, India*
[2]*Associate Professor, Department of Community Medicine, JMF ACPM Medical College, Dhule, Maharashtra, India*
[3]*Assistant Professor, Department of Pediatric and Preventive Dentistry, D Y Patil Dental School, Pune, Maharashtra, India*
[4]*Intern, ACPM Medical College, Dhule, Maharashtra, India*
[5]*Associate Professor, Department of Community Medicine, JMF ACPM Medical College, Dhule, Maharashtra, India*

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Corresponding Author:
Dr. Sonal Deshpande,
Associate Professor, JMF ACPM medical college, Dhule, Maharashtra, India
Email: sonal.deshpande@gmail.com

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ABSTRACT

Background: Menstrual Hygiene Management (MHM) plays a critical role in maintaining the health and dignity of women. In recent years, the use of digital technology has emerged as an influential factor in shaping menstrual hygiene practices. However, significant disparities exist between urban and rural women in terms of awareness, practices, and access to technology. The study aims to assess the urban-rural divide in MHM, focusing on the role of digital technology in menstrual hygiene awareness and practices among women of reproductive age.

Materials and Methods: A cross-sectional study was conducted between September and December 2024, involving 197 participants (101 urban and 96 rural women) of reproductive age. Data were collected using a structured questionnaire through Google Forms, addressing MHM practices, sources of information, access to digital technology, and the use of mobile applications for menstrual tracking. The study analyzed responses related to absorbent use, frequency of changing pads, disposal methods, access to the internet, and online menstrual health resources. Chi-square test and t-test were used to identify significant differences between urban and rural women.

Results: The study revealed significant urban-rural differences in MHM practices. Urban women had better access to commercially available disposable pads (83.17%) compared to rural women (66.67%). Rural women were more likely to use old reusable cloth (22.92%).Rural women reported higher dependence on others' smartphones (31.25%) for internet access. Urban women spent more time on the internet, with 42.57% using it for more than 4 hours daily, compared to only 5.21% of rural women. Furthermore, urban women were more likely to purchase menstrual products online and seek information regarding menstrual problems online (37.62% vs. 18.75% in rural women). The findings indicate a higher awareness of hygienic practices among urban women, driven in part by better access to digital resources.

Conclusion: The study highlights a significant urban-rural divide in menstrual hygiene management, particularly in the use of digital technology. Urban women benefit from greater access to digital resources, which aids in improving menstrual hygiene practices. On the other hand, rural women face barriers such as limited access to the internet and health information. These findings emphasize the need for targeted interventions to improve MHM in rural areas, focusingon increasing access to menstrual health education and digitaltechnology.

Keywords: Menstrual Hygiene Management, MHM Practices, Digital Technology, Urban-Rural Divide, Mobile Applications, Menstrual Products.

INTRODUCTION

WHO and UNICEF Joint Monitoring Programme (JMP) for drinking water, sanitation, and hygiene has defined Menstrual Hygiene Management (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. They understand the basic facts linked to the menstrual cycle and how to manage it with dignity and without discomfort or fear.[1]

Inadequate water, sanitation, and hygiene (WASH) facilities, especially in public places, pose a major challenge to women for MHM. Multiple systematic reviews and meta-analyses of studies of MHM behaviour and practices in low and middle-income countries, including India, show that women and school girls report substantial health, as well as social challenges when it comes to managing their menstruation.[2,3] Recent studies have noted changes in practices and improvement in women's knowledge of menstrual hygiene. Awareness Programmes in schools have contributed to improving MHM. An array of MHM initiatives in India has been put up.[4]

The use of digital technology has changed lives in many ways. Smartphones are now the new normal. One of the telecommunications reports suggests that the smartphone penetration rate was 71% in 2023.[5] Thus, access to the Internet has become handy with an abundance of information. Various smartphone health applications (apps) are now available for tracking health behaviours and data, and a subset of these apps focus exclusively on menstruation. Various apps like Cycles, Monthly Cycles, iPeriod, and Period Tracker Lite focus on menstruation.[6] Oky is an app developed by UNICEF.[7] Use of social media is rampant today. Thus, an increasing number of women are turning to Web and app-based gynaecological resources for their menstrual hygiene queries. But is this information able to tackle myths and taboos surrounding menstrual hygiene?

Online shopping and easy access to sanitary products at supermarkets seem to have affected the rate of sanitary product use in a positive direction. National Family Health Survey (NFHS)- 5 data show marked disparity in the mass media exposure and internet usage among urban and rural women.[8] Urban-rural differences in MHM practices as recorded by various studies.[9-12] Therefore, we intend to focus on this variable in light of technological advancement and digitalisation. Most of the studies previously conducted are focused on adolescent girls. We intend to cover a wider age group. MHM is important for all ages, especially those in middle age who are more vulnerable due to childbirth and abortions. Near menopausal women have a different set of challenges. Thus, the present study is planned.

Aim

To compare the knowledge, attitudes, perceptions and practices about menstrual hygiene management (MHM) among urban and rural women of reproductive age.

Objectives

1. To compare the level of knowledge about menstrual hygiene among urban and rural women of the reproductive age group
2. To understand differences in attitudes and practices of urban and rural women of reproductive age regarding menstrual hygiene
3. To compare the use of digital technology (internet, smartphones, and social media) for MHM among urban and rural women.
4. To understand the perception of women on the impact of digital technology on MHM.

MATERIALS AND METHODS

The study was conducted as a cross-sectional research between September and December 2024. Considering the difference in knowledge of urban and rural women about menstrual hygiene to be 20 percentage points, Power as 80% and at 95% CI, Sample size of 96 for each group (Total 192 women) was calculated from Open Epi statistical software. Ethical approval for the study was obtained from the Institutional Ethics Committee at ACPM Medical College (vide letter no.153IEC/ACPMMC/Dhule dated 19/06/2024), A total of 197 participants, with 101 women from urban areas and 96 women from rural areas were included. The urban participants were recruited from the ACPM Medical College and Hospital in Dhule, while the rural participants were selected from the Family Adoption Programme Village, Kusumba, in Dhule District. The operational definition for women of reproductive agewas menstruating females. Women who did not consent to participate in the study were excluded from the study.

A Google Form, which included informed consent, demographic details,and a set of questions pertaining to knowledge, attitudes, and practices related to menstrual hygiene, was used for data collection. Additionally, questions about the use of digital technology and the participants' perception of its impact on MHM were included. Informed consent was obtained from all participants before data collection.

The data were gathered through an interview method, with participants answering the questions on the form, and the data were directly entered into the Google Forms for analysis.

For the analysis, descriptive statistics, including numbers and percentages, were used to summarize the responses. A chi-square test was employed for

categorical variables to assess significant differences between urban and rural women. The study aimed to measure menstrual hygiene management based on the standards defined by UNICEF, which includes the use of clean materials to absorb menstrual blood, access to privacy for changing absorbents, and hygienic practices such as washing with soap and water. Score of one point was given for all the seven points. The data analysis employed a mean score calculation, with standard deviation for the MHM scores to quantify the level of MHM among urban and rural women. A Student's t-test was used to assess the statistical significance of the differences in MHM scores between the two groups. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The results of this study provide a comprehensive comparison of menstrual hygiene management (MHM) practices, knowledge, attitudes, and perceptions between urban and rural women of reproductive age.

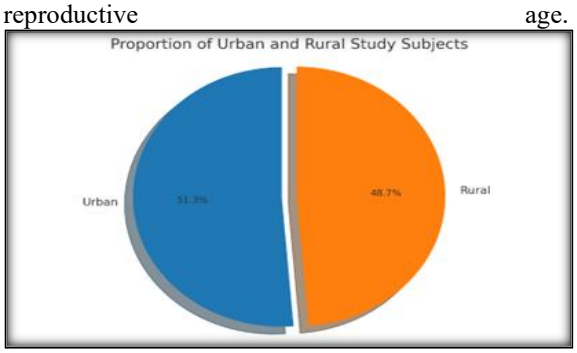

Figure 1: Proportion of urban and rural study subjects

Among all 197 participants, 101 (51%) were from the urban area and 96 (49%) were from the rural area. (Figure. 1)

Table 1: Source of information about menstruation.

Source of information	Urban (101)	%	Rural (96)	%	Total (197)	%	P value (Chi square test)
Mother	90	89.11	77	80.21	167	84.77	0.04 (S)
Sister	19	18.81	22	22.92	41	20.81	0.5 (NS)
Friend	33	32.67	24	25.00	57	28.93	0.3 (NS)
Session at school	48	47.52	31	32.29	79	40.10	0.02 (S)
Health care worker	4	3.96	18	18.75	22	11.17	<0.01 (S)
Internet/Social Media	27	26.73	5	5.21	32	16.24	<0.01 (S)
TV/ Radio	25	24.75	7	7.29	32	16.24	<0.01 (S)
Aunt/ Sister-in-law/ Grandmother	1	0.99	6	6.25	7	3.55	0.057 (NS)

[Table 1] shows the source of information for the participants about menstruation. Out of 197 participants, 167 (84.77%) got information from their mother; this proportion was higher in urban than rural area. A higher proportion of participants in urban area, 48 (47.52%), had attended a session on menstruation in school than in rural area, i.e. 31 (32.29%), and the difference was statistically significant. While a higher proportion of participants from rural area 18 (18.75%) had received information from health care workers, as compared to urban area 4 (3.96%). Significantly higher proportion of urban participants, 52 (51.48%), obtained information from sources like the Internet, social media, radio, and TV in comparison with rural 12 (12.5%).

Table 2:Awareness about hygienic measures to be taken during menstruation.

Hygienic Measures	Urban (n=101)	%	Rural (n=96)	%	Total (N=197)	%	P value (Chi square test)
Using clean absorbent	95	94.06	82	85.42	177	89.85	0.04 (S)
Intimate hygiene	77	76.24	69	71.88	147	74.62	0.24 (NS)
Changing pads/ absorbent materials frequently	86	85.15	73	76.04	159	80.71	0.11 (NS)
Washing hands with soap and water after changing pads	96	95.05	44	45.83	140	71.07	<0.001 (S)
Personal hygiene, including regular bathing	69	68.32	69	71.88	138	70.05	0.58 (NS)

[Table 2] presents the awareness regarding hygienic measures during menstruation among urban and rural women. All the participants were aware of one or other hygienic measures to be taken during menstruation. A higher proportion of urban women (94.06%) were aware of the importance of using clean absorbents compared to rural women (85.42%), with this difference being statistically significant (p-value = 0.04). Awareness about intimate hygiene was relatively similar between the two groups, with 76.24% of urban women and 71.88% of rural women acknowledging its importance, showing no significant difference (p-value = 0.24). Regarding the frequency of changing pads or absorbent materials, urban women (85.15%) showed slightly higher awareness compared to rural women (76.04%), but the difference was not statistically significant (p-value = 0.11). A clear urban-rural divide emerged when it came to washing hands with soap and water after changing pads, with

95.05% of urban women aware of this practice, compared to only 45.83% of rural women. This disparity was highly significant (p-value < 0.001), reflecting a critical gap in WASH practices between the two groups. Awareness of the need for personal hygiene, including regular bathing, was similarin both urban (68.32%) and rural (71.88%) women, with no significant difference (p-value = 0.58). Overall, the data highlight that urban women generally demonstrated better awareness of key hygienic measures compared to their rural counterparts, particularly with regard to hand hygiene after changing absorbents.

Table 3: Awareness about the risks of not changing absorbent materials frequently

Risks of not changing pads frequently	Urban (n=93)	%	Rural (n=90)	%	Total (n=183)	%	P value (Chi square test)
Itching	70	75.27	74	82.22	144	78.69	0.22 (NS)
Rashes	71	76.34	72	80.00	143	78.14	0.46 (NS)
Bad odour	65	69.89	70	77.78	135	73.77	0.20(NS)
Infection	66	70.97	64	71.11	130	71.04	0.84(NS)
Cancer	6	6.45	4	4.44	10	5.46	0.59 (NS)Fisher Exact

[Table 3] illustrates the awareness of the risks associated with not changing absorbent materials frequently, comparing urban and rural women. Among all the participants, 14 (eight urban and six rural), were not aware of any risks associated with not changing pads frequently. Most recognized risks were itching and rashes, with 75.27% of urban women and 82.22% of rural women reporting awareness of these risks, although the difference between the two groups was not statistically significant (p-value = 0.22). A similar trend was observed for the risk of rashes, where 76.34% of urban women and 80% of rural women were aware, and again, no significant difference was found (p-value = 0.46). Awareness of bad odour as a risk was reported by 69.89% of urban women and 77.78% of rural women, with the difference also not reaching statistical significance (p-value = 0.20). The risk of infection was recognized by 70.97% of urban women and 71.11% of rural women, with no significant difference between the two groups (p-value = 0.84). The risk of cancer, was acknowledged by only 6.45% of urban women and 4.44% of rural women, with no significant difference observed (p-value = 0.59, Fisher Exact). Overall, the awareness of these risks did not show significant urban-rural differences.

[Figure 2], "Urban vs Rural Perspectives on Open Discussion of Menstruation," visually represents the differences in how urban and rural women discuss the topic of menstruation. The chart shows that a significantly higher proportion of urban women (62) feel comfortable discussing menstruation openly compared to rural women (22). In contrast, rural women are more likely to only discuss menstruation with other females (62) while urban women also report a notable proportion (27) who limit the discussion to females. Additionally, a small group of urban women (7) and rural women (17) indicated that they do not discuss menstruation openly at all. This difference in proportion was statistically significant (P value <0.001)

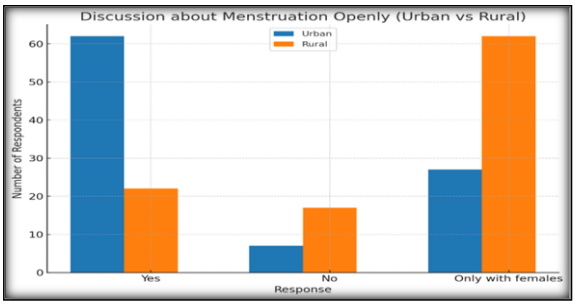

Figure 2: "Urban vs Rural Perspectives on Open Discussion of Menstruation"

A larger proportion of rural women (60) report feeling embarrassed sometimes, compared to urban women (41). Additionally, a notable portion of rural women (9) feel embarrassed always, while only 5 urban women report the same. On the other hand, urban women (55) are more likely to never feel embarrassed during menstruation compared to rural women (27). This disparity highlights that rural women may face greater societal pressure or stigma surrounding menstruation, contributing to higher levels of embarrassment compared to their urban counterparts, who generally report more comfort and openness regarding menstruation.

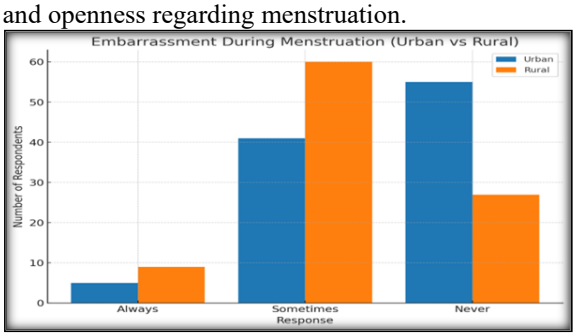

Figure 3: Urban vs Rural Perceptions of Embarrassment During Menstruation"

The chart shows a significant urban-rural difference in perception. A higher proportion of rural women (84) believe that there is stigma surrounding menstruation, compared to urban women (57), indicating that rural areas may have stronger cultural or societal taboos related to menstruation.

Conversely, urban women (44) are more likely to believe there is no stigma around menstruation, with only 12 rural women sharing this view.

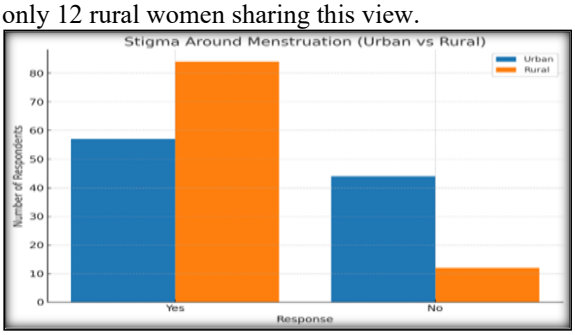

Figure 4: "Perception of Stigma Around Menstruation: Urban vs Rural Women"

Table 4: Comparison of Menstrual Hygiene Practices Between Urban and Rural Women

Category	Urban (n=101)	%	Rural (n=96)	%	Total (n=197)	%	P value (Chi square test)
1) Absorbent Used							
Commercially available disposable pads	84	83.17	64	66.67	148	75.13	0.007
Old Reusable cloth	9	8.91	22	22.92	31	15.74	0.006
New cloth	6	5.94	10	10.42	16	8.12	0.25(NS)
Menstrual cup/ menstrual panty	2	1.98	0	0	2	1.02	0.13(NS) Fisher exact
2) Frequency of Changing Pads							
2-3 hours	5	4.95	8	8.33	13	6.60	0.33(NS)
4-6 hours	45	44.55	46	47.92	91	46.19	0.63(NS)
7-10 hours	11	10.89	14	14.58	25	12.69	0.43(NS)
Once in a day	1	0.99	3	3.13	4	2.03	0.28(NS)
As required	39	38.61	25	26.04	64	32.49	0.059(NS)
3) Disposal of Pads (total is more than 100%)							
Wrap in paper	66	65.35	63	65.63	119	60.41	0.96(NS)
Burn	8	7.92	15	15.63	17	8.63	0.09(NS)
Wash with soap and water	20	19.80	34	35.42	54	27.41	0.01 (S)
Commercially available wraps	4	3.96	0	0	4	2.03	0.03 (S) Fisher Exact
Bury	0	0	1	1.04	1	0.51	0.24(NS)Fisher Exact
Use of disinfectant	13	12.87	5	5.21	18	9.14	0.06(NS)
4) Restrictions Followed							
Yes	99	98.01	96	100	195	98.98	

A significantly higher proportion of urban women 84 (83.17%) use commercially available disposable pads compared to rural 64 (66.67%). Overall, the proportion of women using "hygienic material" was higher among urban women 86 (85.15%), compared to rural 64 (66.67%). There are no differences in the frequency of changing pads or other absorbent material between urban and rural women. More than half of all women 119 (60.41%) dispose of pads by wrapping them in paper, but there is no significant urban-rural difference. A significantly higher proportion of rural women washed cloth with soap and water. Use of commercially available wraps was uncommon and only among urban women 4 (3.96%).

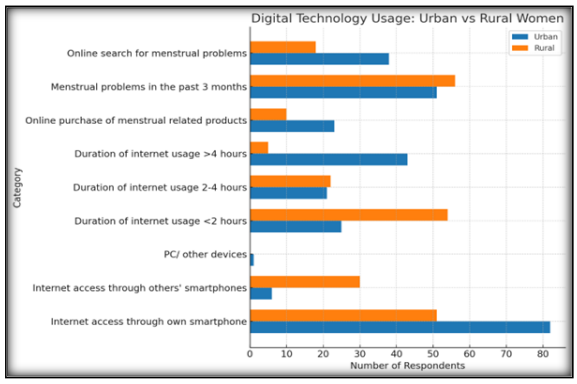

Figure 5: "Comparison of Digital Technology Usage and Menstrual Health Access: Urban vs Rural Women"

Restrictions were imposed/followed by almost all the participants. The most common restrictions were not going to the temple, not attending certain

functions, and washing hair on day four of the cycle. [Table 4]

To summarise the overall MHM among urban and rural women, scores were given for different MHM points as defined by UNICEF.
The mean score (+ SD) for urban women was 5.89 + 1.12, whereas for Rural women it was 5.01 + 1.76. Thus, the mean score for urban women was higher. Student's t-test was used as a test of significance, and the P-value was <0.001 (highly significant).

A significantly higher proportion of urban women had internet access, and a higher proportion of urban women had access through their smartphone as compared to rural women. The proportion of urban women using the internet for more than four hours per day was higher among urban women. The proportion of urban women purchasing menstruation-related products through online platforms was significantly higher than rural women. Among all the women surveyed, 107 (54.31%) reported suffering from some or other Menstrual problems in the past three months. The proportion of women with menstrual problems was similar in both groups. Around half of the women with menstrual problems, 56 (52.33%), had searched online about their problem. The proportion of urban women searching online was significantly higher than rural. [Figure 5]Most searches were on the Google search engine. Some of them relied on YouTube videos. Other media were blogs, vlogs, and social media accounts by influencers. Only one woman said she tried to search the World Health Organisation (WHO) site. None of the participants was using any App for tracking menstruation.

Table 5: Perception about the impact of digital technology on MHM

Questions	Urban (n=101)		Rural (n = 96)		Total (n=197)		P value*
	n	%	n	%	n	%	
1)Online purchase is convenient (Among those who purchase online, n=33)							
Strongly agree/ Agree	23	69.69	8	80.00	31	93.93	0.042 (S)
Neutral	0	00	2	20.00	2	6.07	
Disagree/ Strongly disagree	0	00	0		0	00	
2)Influence of social media on MHM							
Strongly agree/ Agree	57	56.43	38	39.58	95	48.22	0.017 (S)
Neutral	12	11.88	5	5.21	17	8.63	
Disagree/ Strongly disagree	32	31.68	53	55.21	85	43.15	
3) Technology has improved MHM							
Strongly agree/ Agree	56	55.45	38	39.58	94	47.72	0.025(S)
Neutral	30	29.70	35	36.45	65	32.99	
Disagree/ Strongly disagree	15	14.85	23	23.95	38	19.29	

*P value for Chi square test, df=1

Among all the 33 women (rural & urban) who ever purchased absorbent material or other menstrual hygiene related products online, 31 (93.93%) agreed/ strongly agreed that it is convenient. A significantly higher proportion of urban women agreed/ strongly agreed that social media has influenced MHM, and the use of digital technology has improved MHM [Table 5]

DISCUSSION

The present study was conducted to compare the knowledge, attitudes, perceptions, and practices regarding menstrual hygiene management (MHM) among urban and rural women of the reproductive age group. Most of the studies comparing urban-rural differences focus on the adolescent age group, while the present study included a wider age group of 14 – 45 years. The rural area in the current study is in a tribal region of northern Maharashtra. While some of the studies are focused on pre- and post-test MHM management by educational intervention through digital platforms,[13,14] none have addressed the use of digital technology and participants' perception of its impact on MHM.

A significantly higher proportion of urban women had gained information about menstruation from their mothers. A similar finding is noted by various studies conducted across India and abroad.[9,11,12,15,16] A contradictory finding was reported in a study by Mahvish F et al,[17] where a higher proportion of rural girls received information from their mothers.
The proportion of urban girls attending sessions on menstruation at school was higher than that of rural girls. A similar finding was noted by Choudhary N et al,[15] where the proportion of girls ever counselled for menstrual hygiene at school was higher among urban girls. In a study conducted by Paria B et al,[9] teachers were the source of information for around one-fourth of girls. Some of the studies noted that less than five per cent of girls said teachers were a source of information.[18,19]
In the present study, the proportion of rural women receiving information from health care workers was higher than urban. This can be predicted as an indirect impact of the Menstrual Hygiene Scheme (MHS) by the Ministry of Health and Family Welfare,[20] where ASHA workers are involved at the village level to increase awareness about menstrual hygiene.
A significantly higher proportion of urban participants, 52 (51.48%), obtained information

from sources such as the Internet, social media, radio, and TV, compared to rural participants, 12 (12.5%). A similar result is found by Fatima M et al.[17] A finding that supports this result is found in a study by Chakrabarty M et al,[10] where exposure to mass media for urban participants was in the category of high exposure. NFHS-5 data also supports this finding.[8]

A significantly higher proportion of urban women were aware of hygienic measures to be taken during menstruation. Similar findings are noted by other studies.[11,17] In the present study, knowledge about the risks of not changing pads frequently was similar across both groups. The most cited risks were itching and rashes, followed by bad odour, which can be technically termed as symptoms rather than risks. Infection as a risk was identified by about 70% of women, while only 5.46% of women recognised the potential increased risk of cancer. A small subset—14 women (eight urban, six rural)—were entirely unaware of any of the risks. These findings align with previous research indicating that while general awareness of menstrual hygiene may be growing, specific knowledge about health risks remains limited, especially regarding long-term consequences such as cancer.[17,21,22]

The present study found that a significantly higher proportion of urban women discuss menstruation openly. The proportion of women who felt embarrassed during menstruation and who think there is stigma associated with it is significantly higher among rural women compared to urban women. Other studies also suggest that exclusion and shame are common during menstruation.[23]

All the studies comparing differences between urban and rural women regarding menstrual practices echo similar findings. The urban-rural gap as depicted in the NFHS-5 report for Maharashtra was 18.16%.[8] A significantly higher proportion of urban women used hygienic material than rural women.[12,17] The probability of the use of hygienic materials among rural women is 0.42 compared to 0.68 for their urban counterparts.[10] The continued use of reusable cloths with a higher proportion among rural women is seen in most of the studies.[2,9,10,12,17] In a study by Mukerjee et al,[24] it was found that the percentage of using hygienic material was high; this might be because they considered, besides sanitary pads, single-use cloth, and reused cloth, which is washed with soap and water and dried in the sun as appropriate absorbents.

To summarise MHM, the mean score for MHM, calculated based on MHM points as defined by UNICEF, was significantly higher for urban women than for rural women. In a study by Ha and Alam,[25] a significant difference in MHM practices among adolescent girls between urban and rural areas (32.3% vs. 27.7% good users, $p \leq 0.05$) was found.

Urban women had significantly greater access to the internet and smartphones, and were more likely to use the internet for extended periods. This digital divide translated into differences in information-seeking behaviour: about half of women with menstrual problems searched online for solutions, predominantly using Google and YouTube, with minimal use of reliable sites like the WHO and MOHFW.

Urban women were also more likely to purchase menstrual hygiene products online, and nearly all who did so find it convenient. Furthermore, a significantly higher proportion of urban women agreed that social media and digital technology have influenced their MHM.

These results highlight the transformative potential of digital technology in improving MHM, especially in urban settings. However, the reliance on non-expert sources for health information raises concerns about the accuracy and reliability of the content accessed. Efforts to bridge the digital divide and promote credible, evidence-based resources are essential, particularly for rural women who may benefit most from improved access to information.

CONCLUSION

Marked urban-rural differences in menstrual hygiene management are prevalent. The level of awareness regarding hygienic measures to take during menstruation is higher among urban women than rural women. Knowledge about the risks of not changing pads frequently is similar between the two groups. A significantly higher proportion of urban women discuss menstruation openly. The percentage of women who feel embarrassed during menstruation and believe there is stigma associated with it is significantly higher among rural women compared to urban women. The rate of women using hygienic materials is greater among urban women. Urban women purchase menstrual hygiene products online, with nearly all who do so find it convenient. Furthermore, a significantly higher proportion of urban women agree that social media and digital technology have influenced their MHM.

Limitations: The study has all the inherent limitations of a cross-sectional study. The sample size, while adequate for initial insights, was insufficient in some subgroup analyses.

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