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Menstrual Hygiene among the Women Aged 15-24 in India: Prevalence, Practices and Correlates (NFHS 4 & 5)

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Abstract

The study explores the urban-rural differentials and the variation in the menstrual hygiene practices between the two nationally represented health surveys among women aged 15-24 years in India. Data has been utilized from two rounds of national family health survey, NFHS-4 and NFHS-5. Bivariate and multivariate analyses were carried out with the selected socio-economic and demographic factors and WASH (water and sanitation) access associated with the use of hygienic methods during menstruation. Decomposition analysis was utilised to find the urban-rural gap in the use of hygienic method. The proportion of women who practised the hygienic method to prevent blood stains from appearing has increased from 58 per cent in NFHS-4 to 77 per cent in NFHS-5. The differences between the urban and rural areas have narrowed down. Years of schooling, caste/tribe, wealth quintile, region, marital status, structure of the house and exposure to mass media were statistically significant with the use of hygienic methods. Type of toilet facility and location of source for water are the determinants of maintaining hygiene during menstruation. Educational and economic status and exposure to mass media contribute for the urban-rural gap. Lack of basic infrastructure and water facilities in rural areas hinder the women from menstruating with hygiene and dignity. Designing a system to address and provide access to healthy menstruation habits is crucial.

Keywords: Menstrual hygiene, urban, rural, NFHS-4, NFHS-5, India.

I. Introduction

Globally, approximately 50 per cent of the female population (24 per cent of the total population) is of reproductive age (United Nations, 2022). The majority of these women and girls menstruate for two to seven days per month. Menstruation is not only a matter of hygiene; it is also an issue of Human Rights that affects every day 800 million women and girls all around the world (Sanitation and Water for All, 2016). A normal aspect of the reproductive cycle is menstruation during which blood is released through the vagina. Nonetheless, it is still a taboo and rarely discussed. As a result, several socio-cultural elements contribute to the practical difficulties of menstruation hygiene.

Menstrual hygiene means using clean materials to absorb menstrual blood, having accessibility to water and soap, changing absorbents in privacy and disposing-off used absorbents (WHO-UNICEF Joint Monitoring Programme, 2012). Adolescent girls' inadequate management of menstrual hygiene is a public health issue, particularly in low- and middle-income nations. The main obstacles are a lack of understanding of menstrual hygiene management (MHM) and a shortage of proper menstrual absorbents owing to cultural or economic norms (van Eijk et al., 2015; Miiro et al., 2018).

Due to the usage of unhygienic methods such as clothing and rags during menstruation, a majority of women in rural India are more vulnerable to reproductive tract infections (RTIs). The findings from a community-based cross-sectional study indicate that a significant association between RTIs and the menstrual hygiene practice, particularly in rural communities' menstrual

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hygiene, is an imperative component of RTIs (Yasmin & Mukherjee, 2012; Surya & Ravivarman, 2019). Around 14 per cent of women in India reportedly suffer from menstrual infections, including white discharge (leucorrhoea), itching/burning, ovaries swelling and frequent urination (WaterAid, 2010). Menstruation and menstrual activities are still subject to several sociocultural restrictions. Many women and girls lack knowledge about sanitary habits and scientific facts, which has a negative impact on their health.

In India, the use of reusable absorbent material among non-pregnant women (>18 years) attending outpatient clinics, was associated with a two-fold increase in urine and reproductive tract infections (including bacterial vaginosis and candida), while increased wealth and more space for personal hygiene were protective (Torondel et al., 2018; Das et al., 2015). Therefore, proper menstrual hygiene can protect the womenfolk from this suffering. Before making any changes to menstrual practices, it is important to teach girls on the realities of menstruation, its physiological effects, its relevance in the development of secondary sexual traits, and, most importantly, about good hygiene with the use of disposable sanitary menstrual absorbents (Dasgupta & Sarkar, 2008).

Many girls in low- and middle-income nations struggle with MHM, particularly while attending school. The cornerstone of progress and a gateway to various activities, such as political, economic, and social engagement, is a girl's education. Yet, schoolgirls throughout the world skip classes while they are menstruating. In India, one out of four girls are absent to attend school during the menstrual period (Mokhasi et al., 2016). Other studies conducted in India showed that the proportion of good MHM practice among urban adolescents was almost two times compared with rural girls (Ram et al., 2020; Anand et al., 2015).

Although it is directly linked to gender equality and female empowerment through its significant relationship on women's reproductive health, unaddressed menstruation hygiene is also considered to hinder the fulfilment of several of the sustainable development objectives (Kathuria & Raj, 2018). Women's capacity to manage menstrual hygiene is impacted by a variety of variables including lack of knowledge and awareness about menstruation, high cost of menstrual products, inadequate sanitation and hygiene infrastructure and services, and a lack of privacy, safety, and security.

II. Menstrual hygiene management and WASH access

Women and girls must have access to water and sanitation facilities in order to manage menstruation hygienically. Women require a private space to change their pads or sanitary cloths, access to clean water for washing their hands and rinsing off spent clothing, and facilities for properly discarding used items or drying them if they are reusable. Water sanitation, and hygiene (WASH) organisations and others which prioritise sexual and reproductive health and education have mainly ignored menstrual hygiene. Millions of women and girls are still being denied their rights to WASH, health, education, dignity and gender equity as a result (WHO, 2012).

A study conducted eight focus group discussions in rural Odisha, India by interviewing 69 women and young girls. It observed that sanitation is a complex problem for girls and young people. During the process of urinating, defecating, entering or leaving toilets, bathing at menstrual onset, washing, drying, and disposing of menstrual products, women are concerned about being seen and feel shamed (Caruso et al., 2017). As a result, menstruation and menstrual hygiene management practices continue to be a significant challenge for girls and women across Odisha and India. Women and teenage girls, on the other hand, experienced a variety of difficulties when it came to managing menstruation hygiene in a safe and healthy way. Lack of access to sanitary facilities such as clean water, soap and private spaces for disposing of waste creates hurdles in maintaining personal hygiene which might have a detrimental effect on health (Behera et al., 2022).

Studies carried out in eastern India show that managing menstruation is more challenging in places with limited access to WASH. Girls and female instructors are known to skip schools during

menstruation because of a lack of essential amenities including enough fresh water, sanitation system and sanitary circumstances (Kumar et al., 2016).

In a systematic review of 138 studies of menstrual hygiene practices in India, only 17 studies investigated girls' changing practices in school premises and 21 studies asked if girls had a toilet at home, with only half of girls reporting this to be the case (van Eijk et al., 2016). The authors noted the poor quality of the included studies, most of which failed to engage with the role of girls' access to infrastructure for menstrual management. A cross-sectional study conducted in Kaduna state, Nigeria reported that women had a higher chance of maintaining menstrual hygiene when they had access to a basic sanitation facility, compared with an unimproved facility (Hennegan et al., 2018).

Studies in India have explored women's MHM challenges beyond adolescence, but have focused primarily on issues related to WASH including sanitation insecurity, experiences with sanitation-related psychosocial stress and reproductive tract infections (Caruso et al., 2017; Das et al., 2015). Menstruation issues, however, go past puberty and WASH. Hence, a focus on women's menstrual difficulties at various periods of their lives—including, but not limited to WASH issues—justifies special attention (Sahoo et al., 2015).

The national menstrual hygiene guidelines for India recommend sanitation facilities to support menstrual hygiene by having separate latrines for men and women to ensure privacy, water and soap for cleaning, enough room in the cubicle for changing and washing, a shelf to keep clothing or menstrual absorbents dry, a mirror for checking stains, and a clean functional latrine (Ministry of Drinking Water and Sanitation, 2015). Significantly, only the last aspect of these adheres to the standards for sanitary facilities now in use, which concentrate on the control of human excreta (WHO, 2017). Studies also have the significance of metrics measuring menstrual hygiene in bringing attention to the problem, guiding policy and discovering long-term solutions. Concerning menstrual hygiene, the WASH sector, in particular, has taken the lead (Loughman et al., 2016; Sommer et al., 2017).

According to NFHS-4, 77 per cent of women in urban areas and 48 per cent in rural areas were reported to use hygienic methods during menstruation. NFHS-5 showed an improvement with 90 per cent of urban women and 72 per cent of rural women using hygienic methods. Though the gap has decreased, a disparity between urban and rural areas in menstrual hygiene practices remains evident. Though there is a growing body of literature on menstrual hygiene, research on urban-rural disparities among adolescent women in India is lacking. Understanding how the use of hygienic methods differs between rural and urban areas among the various socio-economic groups is crucial for effectively addressing existing disparities. While prior studies in India have examined factors influencing menstrual product usage among adolescent women separately in rural and urban settings (Ram et al., 2020; Goli et al., 2020), few have specifically investigated the factors contributing to the urban- rural disparity in hygienic method usage. This study aims to explore variations in the urban-rural gap concerning hygienic method usage among adolescent women through consecutive nationally representative surveys across various socioeconomic groups. Moreover, it endeavours to assess and measure the impact of various factors on the urban-rural disparity in the utilization of hygienic methods among adolescent women in India.

III. Data and methodology

The research utilised the data from NFHS-4 and NFHS-5. NFHS-4, conducted during 2015–2016, gathered information from 6,01,509 households and 6,99,686 women aged 15–49 years. In NFHS-5, conducted in 2019-21, 7,24,115 women within the same age group were interviewed from 6,36,699 households, covering 28 states, eight union territories and 707 districts of India. The present study focuses specifically on adolescent women aged 15-24 years comprising 2,44,517 women (78,417 urban and 1,66,100 rural) in NFHS-4 and 242,793 women (71,908 urban and 1,70,885 rural) in NFHS-5. This age range was chosen because the data did not include information on the use of hygienic methods for women older than 24 years.

Outcome variable

The respondents constituted 2,44,500 women from NFHS-4 and 2,41,983 women from NFHS-5 of aged 15-24 years. The respondents were asked what they used for protection during their menstrual period to prevent bloodstains from becoming evident and the option included cloth, sanitary napkins, locally prepared napkins, tampons, any other method not included previously and nothing. These methods are categorised into two: hygienic (women who use sanitary napkins, locally prepared napkins, tampons and menstrual cups) and unhygienic (use of cloths and others).

Predictor variables

The choice of the predictor variables was made only after a careful consideration and an extensive review of the literature on factors associated with knowledge, attitude and practice on menstruation among adolescent girls (UNICEF, 2018; Dasgupta & Sarkar, 2008; UNICEF, 2013; Malhotra et al., 2016). For this study, the respondent's socio-demographic backgrounds were considered (i.e., age, wealth quintile or economic category that she belongs to, the religion that she follows, her social group, level of educational attainment and the level of exposure to mass media) as predictor variables.

We included categorical variables for the respondent's age (15-19 and 20-24 years), her number of completed years of schooling (i.e., no schooling, less than five years, 5-7 years, 8-9 years, 10-11 years and 12 or more years) and her religion (Hindu, Muslim, Christian and others which included no religion). Education has been classified into four categories (no schooling, less than five years, 5-7 years, 8-9 years, 10-11 years and 12 or more years) and the wealth quintile is categorized as poor, poorer, middle, richer and richest. The marital status of the women is classified into three categories (never married, currently married and the widowed/divorced/separated). Also, the variable, the type of toilet facility they used, is classified as flush, pit, no facility/open space and others. As an independent variable, binary variable of exposure to mass media is also used. Women were asked whether they watch television, listen to radio and read newspaper. Based on these, the variable categorised into two: 'no' (not access to any media) and 'yes' (access to any one of the media). Region of residence was classified according to the standard classification in India: northern, central, eastern, north-eastern, western and southern. The location of the source of water has been grouped as within own premises and outside the household.

Statistical analysis

Descriptive and inferential statistics have been computed for the overall sample. Next, we conducted bivariate analyses to examine individual associations between the outcome and independent variables for the overall sample. The sample weight was used to estimate the percentages. We conducted bivariate and multivariate logistic regression analyses using two models to identify factors independently associated with young women's use of hygienic method. The first model controls all of the variables and the independent association of each variable with the outcome. The second model examines the associations between use of hygienic method and access of WASH facilities. The regression results are presented by estimated odds ratios (ORs) with 95 per cent confidence intervals (CIs). The analyses were conducted using STATA-15.

Finally, the urban-rural difference in use of hygienic methods is computed, and then these differentials are decomposed into their separate underlying factors by Fairlie decomposition analysis. The Blinder-Oaxaca decomposition technique is a commonly used approach to identify and quantify the factors associated with inter-group differences in the mean level of outcome. In this study, we have used this analysis to show how differences between the groups can explain differences in the use of hygienic method during menstruation between the rural and urban populations (Fairlie, 1999; Fairlie, 2005).

$$z^{-R} - z^{-U} = \left[\sum_{i=1}^{N^R} \frac{F\left(k_i^R \hat{\beta}^U\right)}{N^R} - \sum_{i=1}^{N^U} \frac{F\left(k_i^U \hat{\beta}^U\right)}{N^U} \right] + \left[\sum_{i=1}^{N^R} \frac{F\left(k_i^R \hat{\beta}^R\right)}{N^R} - \sum_{i=1}^{N^R} \frac{F\left(k_i^R \hat{\beta}^U\right)}{N^R} \right]$$

Here we define Z^j as the average probability of the binary outcome of the interest group j and F is the cumulative distribution function from the logistic distribution. Here 'R' stands for rural, 'U' stands for urban and 'N' stands for sample size. The first terms provide an estimate of the contribution of urban- rural differences in the entire set of independent covariates to the urban-rural gap in the use of hygienic method during menstruation. To find the total contribution, we need to calculate two sets of predicted probabilities by urban-rural and take the differences between the average values of the two. 'F' also known as the "explained part," whereas the second term represents the portion of urban-rural differences due to differences in the coefficients or "returns" to the exogenous covariates. The second term also captures the proportion of the urban-rural gap due to group differences in unmeasurable or unobserved endowments. Similar to most previous studies applying the decomposition technique, this "unexplained" portion of the gap is not focused because of the difficulty in interpreting results (Cain, 1986).

IV. Results

Table 1 shows the profile of the women in urban and rural areas in NFHS-4 and -5. Almost 70 per cent women in both the surveys belong to rural area. Women were evenly distributed in the age group of 15-24 years in both the surveys. The percentage of women with five or fewer years of schooling was 2.5 per cent in urban areas and 4 per cent in rural areas in NFHS-4. By NFHS-5, these figures decreased to 1.6 per cent and 2.5 per cent for urban and rural areas respectively (Table 1). In both urban and rural areas, there was an increase in the proportion of women who completed 12 or more years of schooling, from 41 per cent and 23 per cent in NFHS-4 to 45 per cent and 29 per cent in NFHS-5 respectively. Similarly, in NFHS-4 and -5, 67 per cent and 72 per cent of women were never married in urban areas and 58 per cent and 57 per cent lived in non-nuclear family structure in rural areas respectively.

A majority of women covered in both the surveys were Hindus (close to three-fourths) followed by Muslims, Christians and others. In urban areas, schedule caste individuals were 18 per cent and 21 per cent in NFHS-4 and NFHS-5, while in rural areas they were 23 per cent in both the surveys. As for other backward class individuals, in urban areas they accounted for 46 per cent and 43 per cent, while in rural areas they were 45 per cent and 43 per cent respectively. Little more than half of the women (53-55 per cent) belonged to the poorest and poorer wealth quintiles in both the surveys. A majority of the women were exposed to mass media in both the rural and urban areas in them.

A slightly higher proportion of women from the southern region lived in urban areas. Though the access to toilet facility increased from NFHS-4 to -5, still one-fourth of them did not have it in rural areas in NFHS-5. In NFHS-4 and -5, 43 per cent and 37 per cent women in urban areas and 49 and 39 per cent women of rural areas respectively had the source of water located outside their premises. Close to two-fifths of the women in urban and rural areas having their source of water outside their premises had an impact on hygienic management of menstruation.

The proportion of women who used hygienic method to prevent bloodstains from becoming evident increased from 77 per cent in NFHS-4 to 89 per cent in NFHS-5 in urban areas and from 48 per cent to 73 per cent in rural areas respectively (Table 2). NFHS-5 indicates that more than one-fourth of the women in rural areas (27.7%) practised hygienic menstrual methods. The use of hygienic methods was evenly distributed among both the age groups of 15-19 and 20-24 years in

both urban and rural areas. Only 48 per cent of women of both age groups in the rural areas practised hygienic method in NFHS-4 which improved to 72 per cent in NFHS-5.

As the number of years of education rose, the use of hygienic practices also increased in both urban and rural areas. Forty per cent women of rural area who never attended school practised hygienic method in NFHS-5 but it was only 15 per cent in NFHS-4. Among the women who completed 12 or more years of schooling in urban and rural areas, the use hygienic absorbents during their menstruation in urban and rural area in NFHS-5 was 95 per cent and 87 per cent respectively.

Interestingly, in both the rounds of NFHS, currently married women in rural areas had a lower prevalence of hygienic practices (42% in NFHS-4 and 68% in NFHS-5) as compared with never married women (53% in NFHS-4 & 75% in NFHS-5). The use of hygienic method was low among women following Hindu and Muslim religions as compared with women following Christianity and other religions in rural area. During NFHS-5 the use of hygienic methods during menstruation in urban areas was 90 per cent among Hindus, 85 per cent among Muslims and 95 per cent among Christians and others. The use of hygienic methods among women from scheduled tribes improved in both urban and rural areas. Wealth quintile is one of the foremost predictors in the use of hygienic methods. As the wealth quintile increases, the prevalence of hygienic methods also increases.

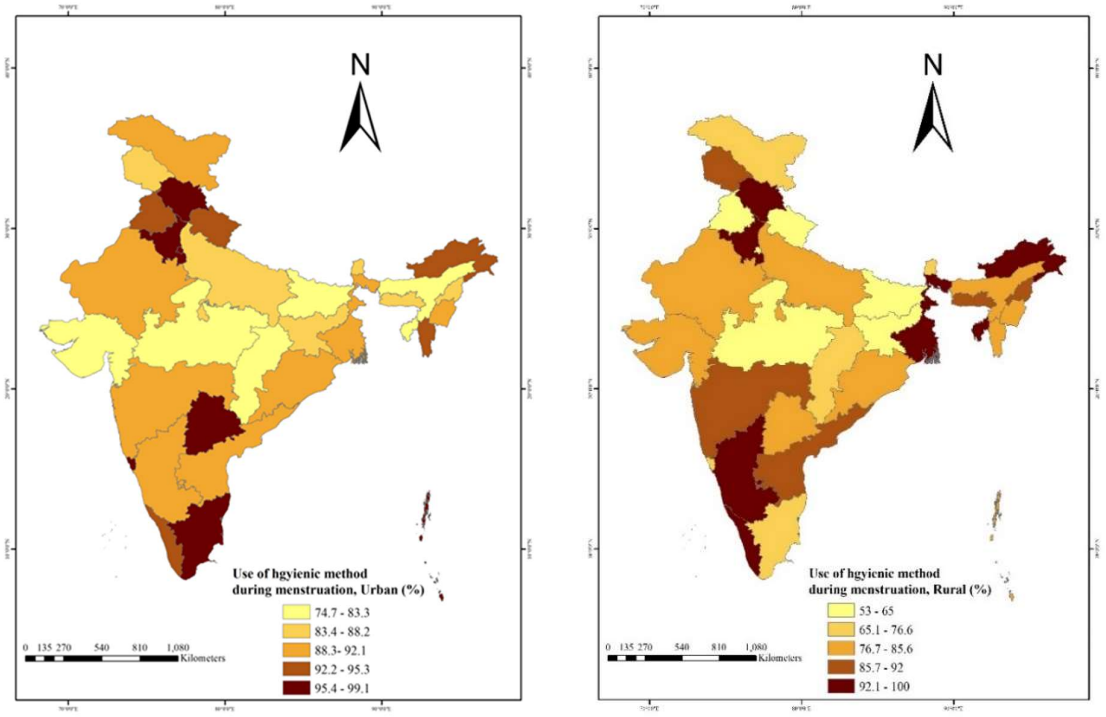
Exposure to mass media was also a deciding factor of hygienic practices. In both the surveys, the practice of hygienic methods was higher among the women who were exposed to mass media than those who were not exposed to any media in both areas. Almost 85 per cent women of rural area in the northern region practised hygienic methods in NFHS-5 as compared with only 37 per cent in NFHS-4. There was not much improvement in the use of hygienic methods among the women in rural and urban areas of central region. A higher proportion of women who had access to improved toilet facility (flush/pit) practised hygienic methods compared with women having no facility in rural and urban areas during both the surveys. In NFHS-5, among the women in urban areas who had a water source located in their own premises, the use of hygienic methods was 88 per cent, while in rural areas the corresponding figure was 70 per cent. The use of hygienic method was higher among the women who had presence water at hand in washing places compared with those who did not in both the surveys in rural and urban areas.

Figures 1 and 2 show state-wide variation in the percentage of women opting for hygienic methods during menstruation in urban and rural areas in NFHS-5. In urban region, Puducherry had the highest prevalence of hygienic methods (99%), followed by Tamil Nadu (98%). Union territories showed the highest values including Andaman & Nicobar (98%), Delhi (97%), Chandigarh (93%) and Ladakh (91%). Bihar stands out as the low prevalence state in the use of hygienic methods with as low as 74 per cent. The proportion using hygienic methods in rural area are highest in Andaman and Nicobar (99%) followed by Delhi (98%), Tamil Nadu (98%) and Goa (97%). About 10 states are below the national average (below 72%) in terms of using hygienic menstrual absorbents with Madhya Pradesh standing lowest, where only 53 per cent of the girls use menstruation protection.

Statistical analysis

Table 3 presents the logistic regression results for the use of hygienic methods separately for rural and urban areas for NFHS-4 and NFHS-5. The first and second model for NFHS-4 examined the independent association between the respondent's socio-demographic characteristics and the use of hygienic methods between the urban and rural women. The third and fourth models examined the same for NFHS-5. Odds of using hygienic methods increased with increase in the years of education in urban and rural areas of both the surveys. For instance, the women who attended 12 or more years of schooling were 3.5 times more likely in urban areas (OR 3.49, $p<0.001$) and 4.5 times more likely in rural areas (OR 4.45, $p<0.001$) to use hygienic methods than the women who never attended schools in NFHS-5.

Figures 1 & 2: State-wise prevalence of use of hygienic methods during menstruation among the women aged 15-24 years in urban and rural areas, NFHS-5, 2019-2021



Compared with the never married women, currently married women (OR 0.82, p<0.01, urban; OR 0.87, p<0.001, rural) and widowed (OR 0.64, p<0.01, rural) were less likely to adopt hygienic methods during menstruation in NFHS-5. Christian women from either rural or urban (OR 1.21, p<0.001, rural) and those belonging to "other" religions (OR 1.31, p<0.001, rural) were more likely than Hindu women to report the use of hygienic methods in NFHS-5. Compared with women from schedule castes, those from the other backward classes had lower odds of using hygienic method (OR 0.91 p<0.001, rural) in rural area in NFHS-5. Also, women's odds of hygienic method use increased with increasing household wealth quintile in both urban and rural areas in both the surveys. The odds of using hygienic methods for the women from the richest quintile was five to six times higher than the women from the poorest quintile in both the surveys.

Women who had media exposure were more likely to use hygienic methods in both regions than those who were not exposed to media (OR 1.60, p<0.001; urban & rural) in NFHS-5. The odds of using hygienic methods of NFHS-5 were lower than the NFHS-4 in both urban and rural areas. Women who belonged to either rural (OR 0.51, p<0.001) or urban (OR 0.43, p<0.001) area of central region were less likely to practise hygienic methods compared with the women from northern region.

Those women who had flush toilet (OR 1.25, p<0.001, urban & rural) and pit toilet (OR 1.29, p<0.001, urban; OR 1.53, p<0.001, rural) were more likely to use hygienic methods than who didn't have any facility in NFHS-4. Similar result is observed for NFHS-5 also. Those who have source of water located inside their premises were more likely (OR 1.07, P<0.05, urban; OR 1.06, p<0.001, rural) to practise hygienic method than those having water source present outside their premises as per NFHS-4. In NFHS-5, the odds of practice of hygienic method for presence of water at hand washing place were higher (OR 1.23, p<0.001, urban; OR 1.09, p<0.001, rural) compared with those who didn't have the water present at hand washing place.

Table 1: Percentage distribution of menstruating women aged 15-24 years, NFHS-4 and NFHS-5

Background characteristics	NFHS-4				NFHS-5			
	Urban		Rural		Urban		Rural	
	%	No. of women	%	No. of women	%	No. of women	%	No. of women
Age group (years)								
15-19	47.1	36,931	51.0	84,620	48.6	34,543	51.5	88,000
20-24	53.0	41,485	49.0	81,479	51.4	36,554	48.5	82,885
Years of schooling								
No schooling	5.7	4,487	12.5	20,836	3.3	2,363	8.0	13,526
<5 years completed	2.5	2,009	4.0	6,718	1.6	1,148	2.5	4,385
5-7 years completed	9.6	7544	13.8	23,028	6.7	4,800	10.6	18,198
8-9 years completed	18.3	14,403	25.5	42,486	19.0	13,490	27.0	18,198
10-11 years completed	22.6	17,764	20.3	33,822	24.0	17,051	22.5	38,568
12 or more years completed	41.0	32,207	23.6	39,207	45.3	32,243	29.3	50,113
Marital status								
Never married	66.7	52,329	55.2	91,841	72.1	51,311	60.0	102,428
Currently married	32.6	25,590	44.0	73,176	27.3	19,464	39.5	67,526
Widowed/divorced/separated	0.6	496	0.6	1,082	0.4	322	0.5	930
Type of family								
Nuclear	51.7	40,596	41.5	69,033	53.5	38,076	42.7	72,994
Non-nuclear	48.2	37,821	58.4	97,067	46.4	33,021	57.2	97,890
Religion								
Hindu	72.6	56,948	82.2	1,36,537	74.8	53,206	82.5	141,132
Muslim	21.9	17,179	13.0	21,558	20.1	14,297	13.2	22,584
Christian	2.3	1,828	1.8	3,097	2.5	1,781	1.8	3,186
Others	3.1	2,460	3.0	4,907	2.5	1,812	2.3	3,982
Caste/tribe								
Schedule castes	18.6	14,059	23.5	37,641	20.7	14,772	23.8	40,701
Schedule tribes	4.6	3,467	12.3	19,818	4.3	3,099	11.8	20,185
Other backward classes	46.0	34,546	45.3	72,591	43.0	30,596	43.5	74,429
Others	30.7	23,132	18.8	30,111	31.8	22,629	20.8	35,568
Wealth quintile								
Poorest	3.0	2,293	25.6	42,624	3.3	2,368	27.1	46,345
Poorer	7.4	5,860	27.7	46,003	8.0	5,702	27.5	47,063
Middle	17.0	13,257	23.6	39,264	17.1	12,192	22.6	38,638
Richer	31.6	24,777	15.5	25,778	30.5	21,721	15.6	26,687
Richest	41.0	32,224	7.4	12,430	41.0	29,112	7.1	12,151
Exposed to mass media								
No	4.5	3,531	21.0	34,847	7.8	5,546	24.7	42,273
Yes	96.0	74,886	79.0	1,31,252	92.2	65,551	75.2	128,612
Region								
North	15.6	12,282	13.0	21,434	16.1	11,447	13.5	23,080
Central	21.7	17,019	29.4	48,936	22.3	15,857	30.8	52,771
East	14.8	11,670	26.8	44,626	17.3	12,355	27.4	46,911
Northeast	2.0	1,530	4.0	6,712	2.0	1,478	4.1	7,066
West	19.7	15,453	10.7	17,799	11.7	8,322	7.7	13,219
South	26.0	20,461	16.0	26,591	30.4	20,272	16.2	27,836
Type of toilet facility								
No facility/open space	11.0	8,602	50.6	84,197	6.0	4,265	24.2	41,404
Flush	79.1	62,090	34.7	57,789	83.7	59,569	55.2	94,320
Pit	4.5	3,570	7.8	13,005	4.7	3,386	7.8	13,423
Others	5.3	4,153	6.6	11,107	5.4	3,877	12.7	21,737
Location for source of water								
In own premises	57.0	22,220	50.7	69,786	62.8	20,965	60.6	80,321
Outside	43.0	16,825	49.2	67,826	37.1	12,397	39.3	52,163
Availability of water at handwashing place								
No	6.3	4,857	16.1	25,859	3.5	2,436	9.7	15,932
Yes	96.6	71,724	83.8	134,493	96.4	66,626	90.2	148,101
Total	32.0	78,417	67.9	166,100	29.3	71,098	70.6	170,885

Table 2: Prevalence of use of hygienic methods during menstruation among the women aged 15-24 years in urban & rural area.

Background characteristics	NFHS-4		NFHS-5	
	Urban	Rural	Urban	Rural
Age group (years)				
15-19	78.4	48.6	89.7	72.7
20-24	76.5	47.6	89.0	71.8
Year of schooling				
No schooling	40.0	15.5	62.9	39.8
<5 years complete	44.6	22.3	66.7	46.8
5-7 years complete	57.9	30.9	73.4	55.1
8-9 years complete	70.9	42.7	85.6	67.2
10-11 years complete	83.1	61.8	91.7	81.3
12 or more years complete	89.1	74.1	94.7	87.2
Marital status				
Never married	81.3	53.2	91.2	75.2
Currently married	69.9	42.0	84.5	68.1
Widowed/divorced/separated	53.8	34.5	83.3	58.9
Religion				
Hindu	79.0	48.2	90.2	72.4
Muslim	69.5	41.4	84.7	67.8
Christian	90.0	65.6	94.6	80.4
Others	86.1	66.1	95.9	84.9
Caste/tribe				
Schedule castes	75.1	46.7	87.6	72.3
Schedule tribes	68.8	35.2	84.7	62.3
Other backward classes	76.4	48.2	89.1	72.5
Others	81.3	58.1	91.3	77.3
Wealth quintile				
Poorest	31.8	20.5	62.5	52.8
Poorer	48.5	40.3	75.0	70.2
Middle	64.4	59.0	84.1	81.0
Richer	78.8	73.6	90.4	87.6
Richest	90.2	85.0	95.7	93.1
Exposed to mass media				
No	40.3	18.9	71.1	51.8
Yes	79.2	55.9	90.9	79.0
Region				
North	68.6	37.3	94.5	84.5
Central	89.4	61.5	85.2	64.9
East	73.7	41.4	85.6	67.7
Northeast	79.7	61.1	85.2	65.7
West	82.4	46.1	85.1	69.5
South	79.0	51.8	93.7	86.9
Family structure				
Nuclear	78.6	48.7	90.4	72.0
Non-nuclear	76.2	47.8	88.1	72.4
Type of toilet facility				
No facility/open space	53.0	35.5	74.8	58.5
Flush	81.4	65.1	91.0	78.9
Pit	72.3	53.2	83.6	71.7
Others	72.2	50.0	84.6	70.2
Location of source for water				
Within own premises	76.0	46.1	87.5	70.2
Outside	70.0	43.0	88.1	69.7
Availability of water at hand washing place				
No	64.3	36.4	77.8	64.0
Yes	78.3	50.9	89.8	73.3
Total	77.4	48.1	89.3	72.3

Table 3: Result of logistic regression estimates: adjusted percentages of place of residence for the use of hygienic methods among menstruating women aged 15–24 years

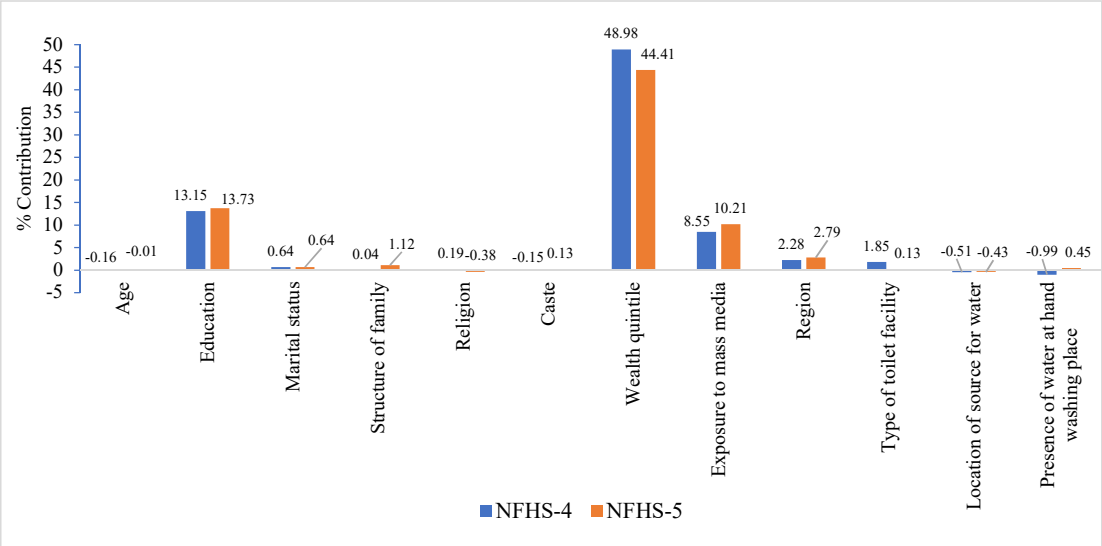
Background characteristics	NFHS-4		NFHS-5	
	Hygienic methods		Hygienic methods	
	Urban	Rural	Urban	Rural
	Model I	Model II	Model III	Model IV
Age group (years)				
15-19®				
20-24	0.87*** (0.79-0.92)	0.94*** (0.90-0.98)	0.90 (0.81-1.00)	0.90*** (0.86-0.93)
Year of schooling				
No schooling®				
<5 years completed	1.13 (0.96-1.32)	1.22*** (1.13-1.33)	1.08 (0.83-1.40)	1.03 (0.99-1.16)
5-7 years completed	1.46*** (1.31-1.64)	1.53*** (1.45-1.62)	1.20 (1.00-1.44)	1.44*** (1.27-1.45)
8-9 years completed	2.15*** (1.93-2.38)	2.28*** (2.16-2.39)	1.86*** (1.57-2.20)	2.01*** (1.92-2.11)
10-11 years completed	3.48*** (3.11-3.89)	3.74*** (3.54-3.94)	2.72*** (2.27-3.24)	3.23*** (3.07-3.40)
12 or more years completed	4.81*** (4.30-5.38)	5.42*** (5.14-5.73)	3.49*** (2.92-4.17)	4.45*** (4.21-4.70)
Marital status				
Never married®				
Currently married	0.92** (0.86-0.99)	0.88*** (0.85-0.91)	0.82** (0.72-0.93)	0.87*** (0.84-0.90)
Widowed/divorced/separated	0.64** (0.42-0.85)	0.87 (0.78-1.22)	0.77 (0.43-1.39)	0.64*** (0.55-0.74)
Family structure				
Nuclear®				
Non-nuclear	0.96 (0.93-1.06)	0.93*** (0.89-0.96)	0.85*** (0.77-0.94)	0.99 (0.96-1.01)
Religion				
Hindu®				
Muslim	0.76*** (0.70-0.81)	0.82*** (0.84-0.92)	0.72*** (0.65-0.81)	0.81*** (0.77-0.84)
Christian	1.94*** (1.67-2.45)	2.54*** (2.37-2.72)	1.26* (1.03-1.72)	1.21*** (1.13-1.29)
Others	1.97*** (1.60-2.43)	1.99*** (1.84-2.15)	1.06 (0.76-1.49)	1.31*** (1.20-1.44)
Caste/tribe				
Schedule castes®				
Schedule tribes	0.94 (0.83-1.06)	0.88*** (0.84-0.92)	1.04 (0.87-1.23)	0.80***(0.77-0.84)
Other backward classes	0.88*** (0.81-0.95)	0.91*** (0.88-0.95)	1.04 (0.89-1.12)	0.91***(0.89-0.97)
Others	1.15*** (1.08-1.33)	1.18*** (1.13-1.24)	1.09 (0.95-1.25)	0.99 (0.93-1.04)
Wealth quintile				
Poorest®				
Poorer	1.40*** (1.23-1.58)	1.66*** (1.60-1.72)	1.47*** (1.22-1.78)	1.41*** (1.35-1.46)
Middle	1.91*** (1.68-2.16)	2.54*** (2.44-2.65)	2.09*** (1.73-2.53)	2.07*** (1.99-2.16)
Richer	3.09*** (2.71-3.54)	3.98*** (3.77-4.20)	3.30*** (2.70-3.89)	2.95*** (2.78-3.13)
Richest	6.06*** (5.22-7.03)	6.43*** (5.93-6.97)	5.92*** (4.84-7.23)	4.58*** (4.13-5.07)
Exposed to mass media				
No®				
Yes	2.06*** (1.84-2.30)	1.93*** (1.81-2.04)	1.60*** (1.43-1.80)	1.64*** (1.59-1.69)
Region				
North®				
Central	2.29*** (1.76-2.99)	1.23*** (1.11-1.36)	0.43*** (0.36-0.52)	0.51*** (0.48-0.54)
East	0.95 (0.86-1.06)	0.71*** (0.68-0.74)	0.70*** (0.58-0.85)	0.84* (0.80-0.88)
Northeast	1.71*** (1.55-1.88)	1.58*** (1.51-1.65)	0.64*** (0.51-0.79)	0.77*** (0.75-0.86)
West	1.50*** (1.35-1.67)	1.15*** (1.10-1.20)	0.49*** (0.39-0.62)	0.60*** (0.55-0.66)
South	1.33*** (1.22-1.44)	1.17*** (1.13-1.21)	1.04 (0.84-1.28)	1.27*** (1.18-1.36)
Type of toilet facility				
No facility/open space®				
Flush	1.29*** (1.19-1.40)	1.25*** (1.21-1.29)	1.23** (1.07-1.42)	1.20*** (1.16-1.24)
Pit	1.29*** (1.19-1.67)	1.53*** (1.46-1.60)	1.28** (1.05-1.54)	1.24*** (1.18-1.31
Others	1.30*** (1.14-1.48)	1.37*** (1.30-1.44)	1.32** (1.09-1.59)	1.32*** (1.27-1.38)
Location of source for water				
Within own premises®				
Outside	1.07* (1.01-1.14)	1.06*** (1.03-1.09)	1.16** (1.05-1.26)	1.01 (0.98-1.03)
Availability of water at hand washing place				
No®				
Yes	1.04 (0.95-1.14)	1.09*** (1.05-1.12)	1.23* (1.04-1.45)	1.09*** (1.04-1.13)

® represents the reference category; ***, ** and * represent 1%, 5% and 10% levels of significance.

Findings from the Fairlie's decomposition analysis

The analysis reveals that the urban-rural gap in the use of hygienic methods during menstruation was 0.285 in NFHS-4 and 0.176 in NFHS-5, that means that the use was 28.5 per cent higher in urban area than rural area in NFHS-4 but it has reduced to 17.6 per cent in NFHS-5. The socioeconomic, demographic and WASH covariates explain 74 per cent of variation in NFHS-4 and 72 per cent in NFHS-5 of the overall gap (i.e., the explained part) (Figure 3). A negative contribution indicates that the specified variable reduces the urban-rural disparity in the use of hygiene methods and vice versa. The location of source for water reduces the urban-rural gap in the use of hygienic methods during menstruation. Women's year of schooling, marital status, wealth quintile, exposure to mass media and the use of improved toilet facility were the key contributors to the urban-rural gap in the use of hygienic methods. Education increased the urban-rural gap by 13.1 per cent and 14 per cent in NFHS-4 and NFHS-5 respectively. Wealth quintile contributed 49 per cent in NFHS-4 and 44 per cent in NFHS-5 and emerged as a major contributor. Exposure to mass media also contributed 8.5 per cent in NFHS-4 and 10.2 per cent in NFHS-5 to the urban-rural gap in the use of hygienic methods during menstruation.

Figure 3: Percentage contribution of each covariate to the urban- rural gap in the use of hygienic methods during menstruation among women aged 15–24 years, India, NFHS-4 and -5



The decomposition analysis results show that women's years of schooling, marital status, structure of family, wealth quintile and exposure to mass media were major contributors for the urban-rural gap in the use of hygienic methods. Among the WASH covariates, type of toilet facility contributed to the increase in urban-rural gap while the location of source for water contributed to reduce the gap between the rural and urban areas.

V. Discussion

Access to menstrual absorbents that are safe, sanitary and inexpensive is essential if we want to empower women and achieve gender equity in social and economic sectors (UNICEF, 2012; Narayan, Srinivasa, Pelto & Veerammal, 2001; Van Eijk et al., 2016). For women's health, menstrual hygiene practices are crucial. Unhygienic practices used during menstruation have a negative influence on health because they increase the risk of infection, particularly infections of the urinary tract and perineum. This usual behaviour of teenage women has been highlighted by studies from India and other underdeveloped countries (Dasgupta et al., 2008; Gilany et al., 2005).

The present study examined individual and WASH factors associated with the use of hygienic methods among adolescent women in rural and urban India in the two rounds of NFHS. Almost three-fourths of the women in rural areas used hygienic methods in NFHS-5 which was higher than NFHS-4 but lower than their urban counterparts in both the rounds. Lack of mobility rights, low household income levels, absence of private restrooms, lack of knowledge and awareness, lack of education, availability of hygienic methods, regional customs, as well as problems with disposal and storage contribute to this (Loughman et al., 2016; Narayan et al., 2001). As it may be challenging for them to keep their used napkins clean and clear of hazardous germs, these materials may put women at risk for genital infections. Due to a shortage of water, privacy concerns and cultural taboos around menstruation, washing reusable menstrual products with soap and drying them in the sun may be challenging (Mahlet & Woldetsadik, 2014).

The multivariate model identified important individual and WASH predictors of the use of hygienic methods among women in rural and urban India. It suggests the need to look beyond individual-level factors when examining the use of hygienic methods during menstruation among women. Statistically significant individual level predictors of the use of hygienic methods among adolescent women are education, marital status, religion, caste, wealth, place of residence and mass media exposure. Results also portray that WASH factors such as type of toilet facility, location of source for water and availability of water at hand washing place are statistically significant with the of use hygienic methods in urban and rural areas during both the surveys.

One of the most crucial predictors for the use of hygienic methods among the women are the level of education. Adolescent women with higher levels of education have a greater propensity to use sanitary practices as compared with illiterate women (Khanna et al., 2005). Education increases financial independence, autonomy in making decisions, understanding of the advantages of utilising sanitary practises and awareness of the dangers of unhygienic menstruation habits for women (Ram et al., 2020; Roy et al., 2021).

Religion also stands out as a predictor of the use of hygienic methods during menstruation in both urban and rural areas. Several studies have concluded with the same findings. Muslim women practice hygiene methods less than their Hindu counterparts. The cause of this behaviour in rural and urban India may be due to inadequate decision-making and autonomy, lack of knowledge regarding the accessibility of sanitary techniques as well as socio-economic conditions (Nemade et al., 2009; Roy et al., 2021; Ram et al., 2020).

Caste also emerges as a factor in the use of hygienic methods during menstruation. Women from scheduled tribes are more vulnerable than other women are less likely to adopt hygienic methods. Girls and women are unable to express their requirements for good menstruation hygiene because of subpar cultural norms and taboos surrounding the subject (Anand et al., 2015; Vishwakarma et al., 2021).

A determining element in the choice of absorbents is the economic gradient. Our findings indicate that women from the richest households use the hygienic methods five to six times more than the poorest households. According to studies, girls in families with limited resources choose more affordable/or free choices including garments they can wash and dry for reuse. Poor women, particularly in rural India, may turn to utilising rags/clothes or other filthy methods because they cannot afford sanitary alternatives (Khanna et al., 2005; Sommer, 2015; MacRae et al., 2019).

Media exposure is essential for raising awareness of the effects of using unsanitary methods. The public receives accurate information about new methods through the media, aiding their diffusion and spread to rural regions. Teenage females frequently get their knowledge on menstrual hygiene from the media. It increases their understanding of the range of free, subsidised, or inexpensive menstrual hygienic options available and the benefits of utilising them for their health (Nemade et al., 2009; Anand et al., 2005).

The disparity between urban and rural women's usage of hygienic methods may be the result of socioeconomic differences. Urban women in the southern and northern areas are more likely to employ sanitary products than urban women in the central region. These results are consistent with earlier research that found significant variations between the southern and central Indian states in the usage of sanitary materials (Van Eijk et al., 2016; Goli et al., 2020).

Most of the available studies focus on identifying the socioeconomic and demographic factors affecting menstruation and related issues. A few research studies have examined the crucial role of domestic sanitation facilities in women's menstrual hygiene management. Women and girls with access to flush and pit toilet had significantly higher odds of adopting hygienic methods compared with those without toilet facilities in multivariable models. Other studies also tried to establish the relation between WASH and adopting hygienic methods (Torondel et al., 2022; Anand et al., 2015). Research conducted in Odisha revealed that women who had access to latrines, bathing areas and piped water at the household level practised better menstrual hygiene including changing and washing menstruation clothing (Torondel et al., 2022). During menstruation, women were more likely to employ hygienic practices if they had access to a bathroom. Women who had access to flush toilets were more likely than those who didn't to have sanitary behaviour. Girls and women with improved sanitation facilities were significantly more likely to utilize the main household sanitation facilities for changing menstruation materials than those without them. This could mean that increasing household sanitation facilities will enhance women's possibilities of using them to manage their menstruation (Behera et al., 2022). The Urinary Tract Infections (UTI) were linked to inadequate access to water and a lack of a bathroom in the home (Das et al., 2015). In the large-scale menstrual hygiene evaluation, open defecation and poor sanitation indicate insufficient access to menstrual hygiene (Loughan et al., 2016).

Women and girls may face significant challenges due to inadequate WASH facilities. WASH focuses on hygiene awareness and sanitation and its application as a practice among women and children. In places with limited access to WASH managing menstruation is more challenging. Women and girls struggle to manage their menstrual hygiene in a private, safe, and dignified way due to a lack of restrooms, inability to dispose of sanitary pads, and lack of water for hand and genital washing. In rural locations, the water available at the home may not be sufficient to meet the many demands that women have when managing their menstruation. Providing water in homes, especially near sanitary facilities, may help satisfy women's requirements during menstruation. Although water and sanitation are crucial for all women, menstruating women especially need WASH facilities for personal washing and changing as well as to accommodate those who utilise reusable materials (Routray et al., 2015; Schmidt et al., 2009; Sebastian et al., 2013).

Women and girls must be able to properly control menstrual bleeding if they are to live healthy, fulfilling lives with dignity. This necessitates access to adequate water, sanitation and hygienic services, including clean water for washing and a place to dry cloths used to absorb menstrual blood, and change clothes or disposal of sanitary pads, facilities to dispose of used cloths and pads, and information about the menstrual cycle and how to manage menstruation hygienically. Absence of WASH from the menstrual hygiene means inviting diseases such as UTIs.

The Government of India's policies and programmes towards the reproductive health of women could be a reason for narrowing down the urban-rural gap and improving the use of hygienic methods between the two rounds of the surveys. Under the National Health Mission (NHM), the Government of India has made several efforts to educate young women on the importance of menstrual hygiene and promote the use of hygienic methods during menstruation. To reduce access and cost barriers to sanitary napkin use in rural areas, Accredited Social Health Activists (ASHAs) are mandated to sell NHM's subsidized sanitary napkins brand, 'Free Days' at Re. 1 per napkin, to adolescent women (National Health Mission, 2012). On International Women's Day in 2018, the Indian Government launched the 100 per cent oxy-biodegradable sanitary napkins "Suvidha" in packs of four, priced at 10 rupees (US$0.14) per pack, to be made available at *Jan Aushadhi Kendras* (pharmaceutical centres) registered under the *Pradhan Mantri Bhartiya Janaushadhi Pariyojana*

campaign. State governments also commenced programmes to improve the knowledge and affordability of hygienic methods. Uttar Pradesh (*Kishori Suraksha Yojna*), Madhya Pradesh (*Udita Yojana*), Bihar (*Kishori Shakti Yojana*), Maharashtra (*Asmita*), Rajasthan (*Udaan*) and Tripura (*Kishori Suchita Abhiyaan*) have implemented several schemes to distribute free or subsidised sanitary napkins in schools. The policy ramifications and intervention options for promoting menstruation hygiene among Indian women include boosting menstrual hygiene education, improving hygiene behaviour, providing subsidised sanitary absorbents and encouraging awareness of menstrual hygiene in school as well as in communities.

VI. Conclusion

The usage of menstrual hygiene practices for protection during periods and its correlation with many aspects of women's sociodemographic and WASH variables in rural and urban India have been emphasised by this study. The situation is still inadequate, particularly in rural areas, despite improvements in the usage of hygienic practices during menstruation. This means that future initiatives to improve teenage girls' menstrual hygiene would concentrate on closing India's urban-rural divide. The creation of a system that makes information on healthy menstruation accessible is essential. Governmental and non-governmental organisations must take action to educate rural, uneducated, lower caste and impoverished women about menstruation, menstrual hygiene management, value of indoor toilets, handwashing and diseases of the reproductive tract brought by poor sanitation. Focus needs to be placed on women's education, usage of better restrooms, media exposure and knowledge of STIs in order to promote the use of sanitary menstruation protection methods among Indian women.

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