

Menstrual Hygiene Practices and Psychosocial Impact Among School-Going Adolescent Girls Aged 10–19 Years in Indore, Central India: A Cross-Sectional Study

Dr. Srishti Sakhi¹, Ms. Ananya Julka^{2*}, Dr. Pramod Sakhi³, Dr Kumud Julka³

¹Resident, Department of Community Medicine, Sri Aurobindo Medical College & P.G Institute, Indore, MP, India

²Class 12th science Student, Shishu Kunj International School Jhalaria Indore, MP

³Professor, Department of Radio diagnosis, Sri Aurobindo Medical College & P.G Institute, Indore, MP, India

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*Corresponding author: Ms. Ananya Julka

Class 12th science Student, Shishu Kunj International School Jhalaria Indore, MP

Abstract

Original Research Article

Background: Menstruation remains surrounded by social taboos and restrictions in many low- and middle-income countries, adversely affecting hygiene practices, dignity, and psychosocial wellbeing among adolescent girls. Evidence from Central India simultaneously assessing both menstrual hygiene practice and psychosocial impact using standardised tools remains limited. Objectives: To assess menstrual hygiene practices and psychosocial impact of menstruation among school-going adolescent girls aged 10–19 years in Indore, Madhya Pradesh, and to identify sociodemographic and menstrual factors associated with poor practice and adverse psychosocial outcomes. **Methods:** A school-based, descriptive cross-sectional study was conducted among 423 school-going adolescent girls selected from ten schools in Indore using stratified systematic random sampling. Data were collected using a pre-tested, structured, self-administered questionnaire covering sociodemographic factors, menstrual characteristics, menstrual hygiene practices (11 recommended-practice items, scored 0–11; Good ≥ 6), and psychosocial impact (12-item scale, scored 0–48). Associations were assessed using Chi-square/Fisher's exact tests and multivariable logistic regression. Results: The mean age of participants was 14.63 ± 2.44 years. The mean menstrual hygiene practice score was 6.39 ± 1.99 (out of 11), with 61.5% (n=260) demonstrating good practice and 38.5% (n=163) demonstrating poor practice. The mean psychosocial impact score was 28.70 ± 5.12 (out of 48), with 19.4% (n=82) classified as experiencing high psychosocial impact (score above the 75th percentile). On multivariable logistic regression, private-school attendance (adjusted OR 0.17, 95% CI 0.10–0.29, $p < 0.001$), three-generation family type relative to broken/single-parent families (adjusted OR 4.53, 95% CI 1.52–13.53, $p = 0.007$), higher paternal education (adjusted OR 0.24, 95% CI 0.07–0.78, $p = 0.017$), and later age at menarche (≥ 12 years; adjusted OR 0.61, 95% CI 0.38–0.98, $p = 0.041$) were independent predictors of menstrual hygiene practice. No sociodemographic or menstrual factor was independently associated with high psychosocial impact. **Conclusion:** More than a third of school-going adolescent girls in this urban Central Indian population demonstrated poor menstrual hygiene practice, with school type, family structure, paternal education, and age at menarche emerging as independent predictors. Psychosocial impact, affecting approximately one in five participants, was not explained by any sociodemographic or menstrual factor, suggesting it requires a distinct, more universal intervention approach. School-based interventions addressing both structural hygiene determinants and the psychosocial dimensions of menstruation are warranted, with particular attention to government schools.

Keywords: Menstrual hygiene management; Psychosocial impact; Adolescent girls; School health; Cross-sectional study; India.

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INTRODUCTION

Menstruation is a normal physiological process and a significant milestone in the reproductive development of adolescent girls. However, despite being a natural biological phenomenon, it continues to be

surrounded by social taboos, misconceptions, and cultural restrictions in many low- and middle-income countries, including India. These challenges adversely affect menstrual health, dignity, educational participation, and the psychosocial wellbeing of adolescent girls [1]. The World Health Organization

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(WHO) defines adolescence as the period between 10 and 19 years of age, a critical stage of growth and development during which girls experience menarche and adopt menstrual hygiene practices that can influence their reproductive health and wellbeing throughout life [2].

Menstrual Hygiene Management (MHM) encompasses the use of clean menstrual absorbents, access to adequate facilities for changing and safe disposal of used absorbents, availability of water and soap for maintaining personal hygiene, and access to accurate information and education regarding menstruation and its management [3]. Globally, millions of adolescent girls face challenges in maintaining adequate menstrual hygiene due to limited access to menstrual absorbents, inadequate water, sanitation, and hygiene (WASH) facilities, and insufficient menstrual health education. These barriers may adversely affect menstrual hygiene practices and are associated with physical discomfort, increased risk of reproductive and urogenital infections, reduced school participation, and psychosocial distress [3,4].

Evidence from low- and middle-income countries indicates that menstrual hygiene practices among adolescent girls remain suboptimal. A systematic review and meta-analysis conducted in Ethiopia reported that nearly half of adolescent girls had poor menstrual hygiene practices, with inadequate knowledge identified as a key determinant of these practices [4]. Similarly, a qualitative meta-synthesis of studies conducted in low- and middle-income countries demonstrated that stigma, shame, secrecy, and sociocultural restrictions continue to profoundly shape the menstrual experiences and psychosocial wellbeing of women and girls [1].

In India, menstrual hygiene management has emerged as an important public health and adolescent health concern. Although awareness and access to menstrual hygiene products have improved in recent years through government initiatives and school-based interventions, substantial disparities persist across socioeconomic groups and geographical regions. A systematic review and meta-analysis conducted by Van Eijk *et al.*, reported substantial regional variation in menstrual hygiene practices across India and highlighted the use of unhygienic menstrual absorbents, inadequate sanitation facilities, limited privacy, and mobility restrictions as persistent challenges among adolescent girls.[5].

Menstruation also has significant psychosocial implications. Feelings of embarrassment, anxiety, fear of menstrual leakage, reduced self-confidence, and social withdrawal are commonly reported during menstruation, particularly among adolescents with inadequate menstrual knowledge or limited social support [1,6]. Cultural restrictions associated with menstruation may further limit adolescents' participation in social,

educational, religious, and recreational activities, thereby negatively affecting their emotional wellbeing and overall quality of life [6]. Sundari *et al.*, reported that a considerable proportion of adolescent girls experienced psychosocial challenges during menstruation, including emotional distress, activity restrictions, and social discomfort [6].

School absenteeism is an important consequence of inadequate menstrual hygiene management. Adolescent girls may miss school due to dysmenorrhea, fear of menstrual leakage or staining, lack of privacy, inadequate water, sanitation, and hygiene (WASH) facilities, and sociocultural restrictions. Recurrent menstrual-related absenteeism may adversely affect academic performance, educational attainment, and social participation [7]. Recognising these challenges, UNICEF has emphasised that menstrual health extends beyond hygiene and should be regarded as an issue of health, education, gender equality, and human rights [3].

Studies conducted across different regions of India have consistently reported inadequate menstrual hygiene practices and persistent psychosocial challenges among adolescent girls [7,8]. However, evidence from Central India remains limited, particularly regarding the simultaneous assessment of menstrual hygiene practices and psychosocial impact among school-going adolescent girls across different socioeconomic and educational settings. Furthermore, relatively few studies have employed standardised tools to evaluate psychosocial outcomes associated with menstruation.

Therefore, the present study aimed to assess menstrual hygiene practices and the psychosocial impact of menstruation among school-going adolescent girls aged 10–19 years in Indore, Madhya Pradesh, and to examine sociodemographic and menstrual factors associated with poor hygiene practices and adverse psychosocial outcomes.

Aim: To assess menstrual hygiene practices and psychosocial impact associated with menstruation among school-going adolescent girls aged 10–19 years in Indore, MP.

Objectives-

- To assess menstrual hygiene practices among school-going adolescent girls aged 10–19 years in Indore city.
- To assess the psychosocial impact associated with menstruation among school-going adolescent girls aged 10–19 years in Indore city.
- To identify sociodemographic and menstrual factors associated with poor menstrual hygiene practices and adverse psychosocial outcomes among school-going adolescent girls.

MATERIALS AND METHODS

A school-based, descriptive, cross-sectional study was conducted among school-going adolescent girls aged 10–19 years attending selected schools in Indore city, Madhya Pradesh. The study was carried out over 8 months, with data collection conducted from July 15, 2025 to October 14, 2025. Ten schools were selected by simple random sampling from a list of eligible schools, comprising both private and government institutions. Inclusion criteria comprised school-going adolescent girls aged 10–19 years who had attained menarche, were willing to participate, and provided assent (with parental/guardian consent where applicable). Girls who had not attained menarche, were unwilling to participate, remained absent despite a revisit, submitted incomplete questionnaires, or had known endocrine disorders, bleeding disorders, congenital reproductive tract abnormalities, or chronic systemic illness significantly affecting menstrual patterns were excluded.

Sample Size and Sampling Technique -The sample size was calculated using the formula $n = Z^2pq/d^2$, with $Z = 1.96$ (95% confidence level), $p = 48.98\%$ (prevalence of poor menstrual hygiene practice reported by Yalew *et al.*, [4]), $q = 51.02\%$, and $d = 5\%$ (absolute precision), yielding a calculated sample size of 384. After adding 10% for non-response, the final sample size was 423 participants. Stratified systematic random sampling was employed, with schools first stratified into private and government/central strata, and sample size allocated proportionately based on the number of eligible girls in each stratum. Within each school, eligible participants were serially arranged and assigned identification numbers. With an estimated 4,234 eligible girls across selected schools, the sampling interval ($k = N/n$) was approximately 10; a random starting number between 1 and 10 was selected by the lottery method, and every 10th eligible participant was included thereafter.

Study Tool - A pre-tested, structured, self-administered questionnaire was developed after reviewing published literature and adapting validated items from the UNICEF Guidance on Menstrual Health and Hygiene [3], the Menstrual Practice Needs Scale (MPNS-36) [11], the NFHS-5 Woman's Questionnaire, and previous Indian studies on menstrual hygiene and psychosocial impact [5,6,8]. The questionnaire was available in English and Hindi, with the Hindi version prepared through forward and back translation. The questionnaire comprised four sections: (A) Sociodemographic factors; (B) Menstrual characteristics (menarche age, cycle regularity/length, flow duration/amount, dysmenorrhea, associated symptoms, school absenteeism); (C) Menstrual hygiene practices, scored 0–11 with one point awarded for each of eleven recommended practices (Good practice defined as a composite score ≥ 6 ; Poor practice < 6); and (D) Psychosocial impact, a 12-item scale (Never=0 to

Always=4; range 0–48, higher score indicating greater impact), with items reflecting embarrassment, anxiety, restriction of activities, and concentration difficulties.

Data Collection and Analysis: Following permission from school authorities and written informed assent/parental consent, the self-administered questionnaire was distributed in a private classroom setting supervised by a trained female investigator, without teacher presence, to minimise social desirability bias. Data were entered into Microsoft Excel and analysed using Python (pandas, SciPy, statsmodels), consistent with the descriptive and inferential approach specified in the study protocol (OpenEpi/SPSS-equivalent methods). Descriptive statistics were presented as frequencies, percentages, means, and standard deviations. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test where expected cell counts were < 5 . Crude odds ratios (OR) with 95% confidence intervals were calculated, and variables significant at $p < 0.20$ on bivariate analysis were entered into multivariable logistic regression models, with adjusted ORs and 95% CI reported. A p -value < 0.05 was considered statistically significant. Institutional Ethics Committee approval and school authority permission were obtained prior to data collection. Written informed assent and parental/guardian consent were obtained from all participants. Confidentiality and anonymity were maintained throughout, and participation was voluntary, with the right to withdraw at any stage without any impact on schooling.

RESULTS

A total of 423 school-going adolescent girls aged 10–19 years were enrolled and analysed. One data-entry value (Participant #32's D8 item score, originally recorded as '33') was corrected to '3' (a clear transcription error, since the item scale runs 0–4); the participant's D Total Score and the sample's 75th-percentile threshold were recalculated accordingly. All other variables were complete with no missing or out-of-range data (Section C's 11-item practice score has a valid range of 0–11, consistent with the study's 11 recommended-practice items).

Sociodemographic Characteristics: The mean age of participants was 14.63 ± 2.44 years, with the largest proportion (41.1%) in the 14–16-year age group (Table 1). Slightly more than half (52.0%) attended private schools, and the majority were Hindu by religion (63.8%). Regarding family structure, 39.2% belonged to nuclear families, 31.4% to joint families, 18.7% to three-generation families, and 10.6% to broken/single-parent families. Maternal and paternal education were relatively high, with 47.3% of mothers and 72.6% of fathers having attained higher secondary education or above. Using the Modified Kuppuswamy/BG Prasad classification, participants were fairly evenly distributed across

socioeconomic strata, with the Upper Middle (28.1%) and Lower Middle (26.7%) classes most represented. Approximately two-thirds of participants (63.1%)

reported having a private space at home for changing or bathing during menstruation.

Table 1: Sociodemographic Characteristics of Study Participants (N = 423)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	10-13	144	34%
	14-16	174	41.1%
	17-19	105	24.8%
School type	Government/Central	203	48%
	Private	220	52%
Religion	Hindu	270	63.8%
	Muslim	94	22.2%
	Christian	35	8.3%
	Other	24	5.7%
Family type	Nuclear	166	39.2%
	Joint	133	31.4%
	Three-generation family	79	18.7%
	Broken/Single-parent family	45	10.6%
Mother's education	Illiterate	27	6.4%
	Primary school	67	15.8%
	Secondary school	129	30.5%
	Higher secondary & above	200	47.3%
Father's education	Illiterate	3	0.7%
	Primary school	23	5.4%
	Secondary school	89	21%
	Higher secondary & above	308	72.8%
Socioeconomic status (Modified Kuppuswamy/BG Prasad)	Upper	71	16.8%
	Upper Middle	119	28.1%
	Lower Middle	113	26.7%
	Upper Lower	82	19.4%
	Lower	38	9%
Family size	≤4 members	144	34%
	5–6 members	154	36.4%
	>6 members	125	29.6%
Private space at home for changing/bathing	Yes	267	63.1%
	No	156	36.9%

Menstrual Characteristics:

The mean age at menarche was 11.85 ± 1.20 years, with the majority (49.2%) attaining menarche between 12–13 years (Table 2). Menstrual cycles were reported as regular by 48.7% of participants, while 31.7% reported irregular cycles and 19.6% were unsure. Dysmenorrhea was reported by three-quarters of the sample, with 30.3% describing it as severe enough to

interfere with daily activities. Backache (73.8%) and premenstrual symptoms (62.2%) were the most commonly reported associated symptoms, followed by headache (47.8%) and fatigue (44.2%). Regarding school attendance, 93.6% of participants reported missing at least one school day in their last three menstrual cycles, with 23.9% missing three or more days.

Table 2: Menstrual Characteristics of Study Participants (N = 423)

Variable	Category	Frequency (n)	Percentage (%)
Age at menarche (years)	<12	184	43.5%
	12–13	208	49.2%
	≥14	31	7.3%
Cycle regularity	Regular	206	48.7%
	Irregular	134	31.7%
	Not sure	83	19.6%
Cycle length	<21 days	75	17.7%

	21–35 days	155	36.6%
	>35 days	124	29.3%
	Not sure	69	16.3%
Duration of flow	<3 days	126	29.8%
	3–7 days	193	45.6%
	>7 days	104	24.6%
Amount of flow	Scanty	80	18.9%
	Normal/Moderate	167	39.5%
	Heavy	176	41.6%
Dysmenorrhea	No	105	24.8%
	Mild (no interference)	190	44.9%
	Severe (interferes)	128	30.3%
Headache during menstruation	No	224	53%
	Yes	199	47%
Backache during menstruation	No	110	26%
	Yes	313	74%
Excessive fatigue during menstruation	No	234	55.3%
	Yes	189	44.7%
Premenstrual symptoms	No	160	37.8%
	Yes	263	62.2%
School days missed (last 3 cycles)	0 days	27	6.4%
	1–2 days	295	69.7%
	≥3 days	101	23.9%

Menstrual Hygiene Practices:

Item-wise analysis showed that use of a recommended absorbent (sanitary pad/tampon/menstrual cup) was reported by 77.5% of participants, and access to a functional school toilet with water by 73.3% (Table 3). Recommended practice was markedly lower for

restriction of routine activities (only 43.7% reported no restriction), school absenteeism (only 44.7% reported no absenteeism), and daily bathing during menstruation (49.4%), identifying these as the weakest components of hygiene practice in this population.

Table 3: Item-wise Distribution of Menstrual Hygiene Practices (N = 423)

Practice Item	Recommended Practice n (%)	Non-recommended Practice n (%)
Type of absorbent used (pad/tampon/cup vs. cloth/other)	328 (77.5%)	95 (22.5%)
Frequency of changing absorbent (≥3/day vs. <3/day)	254 (60%)	169 (40%)
Washing genital area with soap and water (yes vs. no)	271 (64.1%)	152 (35.9%)
Frequency of genital washing (≥2–3/day vs. <2/day)	238 (56.3%)	185 (43.7%)
Material used for washing (water+soap vs. water only/other)	262 (61.9%)	161 (38.1%)
Daily bathing during menstruation (yes vs. no)	209 (49.4%)	214 (50.6%)
Method of absorbent disposal (hygienic vs. unhygienic)	225 (53.2%)	198 (46.8%)
Privacy available for changing (yes, both settings vs. no/partial)	232 (54.8%)	191 (45.2%)
School absenteeism during menstruation (no vs. yes)	189 (44.7%)	234 (55.3%)
Access to functional toilet with water in school (yes vs. no)	310 (73.3%)	113 (26.7%)
Restriction of routine activities during menstruation (no vs. yes)	185 (43.7%)	238 (56.3%)

The overall mean menstrual hygiene practice score was 6.39 ± 1.99 out of a possible 11 (Table 4). Based on the pre-defined cut-off (score ≥ 6 = Good practice), the overall prevalence of good menstrual

hygiene practice — the primary outcome of this study — was 61.5% (n=260), while 38.5% (n=163) demonstrated poor practice.

Table 4: Overall Menstrual Hygiene Practice Score (N = 423)

Measure	Value
Mean $\pm$ SD practice score (11-item scale, range 0–11)	6.39 $\pm$ 1.99
Median (IQR) practice score	6 (5–8)
Good menstrual hygiene practice (score ≥ 6), n (%)	260 (61.5%)
Poor menstrual hygiene practice (score < 6), n (%)	163 (38.5%)

Psychosocial Impact of Menstruation:

On item-wise analysis of the psychosocial impact scale, the highest-endorsed concerns ('Often' or 'Always') were feeling uncomfortable attending school during menstruation (56.5% combined) and hesitancy in

discussing menstruation with others (56.1% combined) (Table 5). Difficulty concentrating in class (53.4%) and becoming irritable during menstruation (53.2%) were similarly common, indicating that psychosocial strain touches over half of participants on several dimensions.

Table 5: Item-wise Distribution of Psychosocial Impact of Menstruation (N = 423)

Statement	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)
I feel embarrassed during menstruation.	39 (9.2%)	86 (20.3%)	84 (19.9%)	125 (29.6%)	89 (21%)
I feel anxious during menstruation.	47 (11.1%)	73 (17.3%)	85 (20.1%)	113 (26.7%)	105 (24.8%)
I feel stressed during menstruation.	53 (12.5%)	88 (20.8%)	87 (20.6%)	100 (23.6%)	95 (22.5%)
I become irritable during menstruation.	38 (9%)	64 (15.1%)	96 (22.7%)	111 (26.2%)	114 (27%)
I experience mood changes during menstruation.	61 (14.4%)	84 (19.9%)	80 (18.9%)	107 (25.3%)	91 (21.5%)
I avoid social activities during menstruation.	53 (12.5%)	74 (17.5%)	89 (21%)	122 (28.8%)	85 (20.1%)
I restrict my routine activities during menstruation.	47 (11.1%)	71 (16.8%)	84 (19.9%)	102 (24.1%)	119 (28.1%)
I avoid participating in sports or physical activities during menstruation.	65 (15.4%)	54 (12.8%)	92 (21.7%)	101 (23.9%)	111 (26.2%)
I have difficulty concentrating in class during menstruation.	54 (12.8%)	66 (15.6%)	77 (18.2%)	94 (22.2%)	132 (31.2%)
I worry about leakage or staining during menstruation.	24 (5.7%)	66 (15.6%)	103 (24.3%)	96 (22.7%)	134 (31.7%)
I feel uncomfortable attending school during menstruation.	31 (7.3%)	47 (11.1%)	106 (25.1%)	119 (28.1%)	120 (28.4%)
I feel hesitant discussing menstruation with others.	43 (10.2%)	53 (12.5%)	90 (21.3%)	128 (30.3%)	109 (25.8%)

The mean psychosocial impact score was 28.70 $\pm$ 5.12 out of a possible 48, with a median of 29 (IQR 25–33) (Table 6). Using the 75th percentile (score > 33) as the cut-off for logistic regression analysis, 19.4%

(n=82) of participants were classified as experiencing a high psychosocial impact, while 80.6% (n=341) were classified as not high.

Table 6: Summary of Psychosocial Impact Score (N = 423)

Measure	Value
Mean $\pm$ SD psychosocial impact score (range 0–48)	28.7 $\pm$ 5.12
Median (IQR) psychosocial impact score	29 (25–33)
75th percentile (P75) cut-off value	33
High psychosocial impact (score $> P75$), n (%)	82 (19.4%)
Not high psychosocial impact (score $\leq P75$), n (%)	341 (80.6%)

Factors Associated with Menstrual Hygiene Practice:

On bivariate analysis, several sociodemographic factors showed strong statistically significant associations with menstrual hygiene practice. School type showed the strongest association ($p < 0.001$), with private-school students far more likely to demonstrate good practice than their

government/central-school counterparts. Family type ($p < 0.001$), mother's education ($p = 0.002$), father's education ($p < 0.001$), socioeconomic status ($p < 0.001$), family size ($p = 0.001$), and availability of private space at home ($p = 0.002$) were all significantly associated with practice category. Only age group ($p = 0.729$) and religion ($p = 0.327$) showed no significant association (Table 7).

Table 7: Association Between Sociodemographic Factors and Menstrual Hygiene Practice (Good vs. Poor)

Variable	Category	Good Practice n (%)	Poor Practice n (%)	Crude OR (95% CI)	value
Age group	10-13	85 (59%)	59 (41%)	Ref.	0.729
	14-16	108 (62.1%)	66 (37.9%)	—	
	17-19	67 (63.8%)	38 (36.2%)	—	
School type	Government/Central	78 (38.4%)	125 (61.6%)	Ref.	<0.001 *
	Private	182 (82.7%)	38 (17.3%)	7.68 (4.9–12.03)	
Religion	Christian	19 (54.3%)	16 (45.7%)	Ref.	0.327
	Hindu	174 (64.4%)	96 (35.6%)	—	
	Muslim	55 (58.5%)	39 (41.5%)	—	
	Other	12 (50%)	12 (50%)	—	
Family type	Broken/Single-parent	35 (77.8%)	10 (22.2%)	Ref.	<0.001 *
	Joint	68 (51.1%)	65 (48.9%)	—	
	Nuclear	121 (72.9%)	45 (27.1%)	—	
	Three-generation	36 (45.6%)	43 (54.4%)	—	
Mother education	Illiterate/Primary	45 (47.9%)	49 (52.1%)	Ref.	0.002 *
	Secondary & above	215 (65.3%)	114 (34.7%)	2.05(1.29–3.27)	
Father education	Illiterate/Primary	6 (23.1%)	20 (76.9%)	Ref.	<0.001 *
	Secondary & above	254 (64%)	143 (36%)	5.92(2.32–15.08)	
SES	Lower Middle/Upper Lower/Lower	118 (50.6%)	115 (49.4%)	Ref.	<0.001 *
	Upper/Upper Middle	142 (74.7%)	48 (25.3%)	2.88 (1.9–4.37)	
Family size	≤4	104 (72.2%)	40 (27.8%)	Ref.	0.001 *
	>4	156 (55.9%)	123 (44.1%)	0.49 (0.32–0.75)	
Privacy home	No	81 (51.9%)	75 (48.1%)	Ref.	0.002 *
	Yes	179 (67%)	88 (33%)	1.88 (1.26–2.82)	

OR = odds ratio (vs. reference category, listed first); CI = confidence interval. *p*-values from Chi-square test (Fisher's exact test used where expected cell count <5). * indicates *p*<0.05.

Among menstrual characteristics, flow duration showed a significant association with practice (*p*=0.021), and backache approached significance (*p*=0.092); age at menarche also showed a borderline association

(*p*=0.103) and was retained for multivariable modelling. Cycle regularity, flow amount, dysmenorrhea, headache, fatigue, and premenstrual symptoms were not significantly associated with practice category (Table 8).

Table 8: Association Between Menstrual Factors and Menstrual Hygiene Practice (Good vs. Poor)

Variable	Category	Good Practice n (%)	Poor Practice n (%)	Crude OR (95% CI)	p-value
Menarche age	<12	105 (57.1%)	79 (42.9%)	Ref.	0.103
	≥12	155 (64.9%)	84 (35.1%)	1.39 (0.94–2.06)	
Cycle regularity	Irregular/Not sure	129 (59.4%)	88 (40.6%)	Ref.	0.381
	Regular	131 (63.6%)	75 (36.4%)	1.19 (0.8–1.76)	
Flow duration	<3 days	88 (69.8%)	38 (30.2%)	Ref.	0.021 *
	≥3 days	172 (57.9%)	125 (42.1%)	0.59 (0.38–0.93)	
Flow amount	Heavy	105 (59.7%)	71 (40.3%)	Ref.	0.519
	Scanty/Normal	155 (62.8%)	92 (37.2%)	1.14 (0.77–1.69)	
Dysmenorrhea	No/Mild	180 (61%)	115 (39%)	Ref.	.773
	Severe	80 (62.5%)	48 (37.5%)	1.06 (0.69–1.63)	
Headache	No	139 (62.1%)	85 (37.9%)	Ref.	.792
	Yes	121 (60.8%)	78 (39.2%)	0.95 (0.64–1.4)	
Backache	No	75 (68.2%)	35 (31.8%)	Ref.	.092
	Yes	185 (59.1%)	128 (40.9%)	0.67 (0.43–1.07)	
Fatigue	No	141 (60.3%)	93 (39.7%)	Ref.	.570
	Yes	119 (63%)	70 (37%)	1.12 (0.76–1.66)	
PMS	No	94 (58.8%)	66 (41.2%)	Ref.	.371
	Yes	166 (63.1%)	97 (36.9%)	1.2 (0.8–1.8)	

OR = odds ratio (vs. reference category, listed first); CI = confidence interval. *p*-values from Chi-square test (Fisher's exact test used where expected cell count <5). * Indicates *p*<0.05.

On multivariable logistic regression, adjusting for all variables meeting the $p < 0.20$ screening threshold, four factors remained independent predictors of poor menstrual hygiene practice. Girls attending private schools had markedly lower adjusted odds of poor practice than those in government/central schools (adjusted OR 0.17, 95% CI 0.10–0.29, $p < 0.001$) — the strongest predictor identified in this study. Relative to girls from broken/single-parent families, those from three-generation families had significantly higher adjusted odds of poor practice (adjusted OR 4.53, 95% CI 1.52–13.53, $p = 0.007$), while the trend for joint and

nuclear families was in the same direction but did not reach significance. Higher paternal education was independently protective (adjusted OR 0.24, 95% CI 0.07–0.78, $p = 0.017$ for secondary-or-above vs. illiterate/primary), whereas maternal education was not significant after adjustment. Later age at menarche (≥ 12 years) was independently associated with lower odds of poor practice (adjusted OR 0.61, 95% CI 0.38–0.98, $p = 0.041$). Flow duration ≥ 3 days and presence of backache showed a similar trend that approached but did not reach significance ($p = 0.100$ and $p = 0.099$, respectively) (Table 9).

Table 9: Multivariable Logistic Regression: Independent Predictors of Poor Menstrual Hygiene Practice

Variable	Adjusted OR	95% CI	p-value
School type: Private (vs. Government/Central)	0.17	0.1–0.29	<0.001 *
Family type: Broken/Single-parent family	Reference	—	—
Family type: Nuclear (vs. Broken/Single-parent)	1.8	0.73–4.47	0.204
Family type: Joint (vs. Broken/Single-parent)	2.43	0.84–7.04	0.103
Family type: Three-generation (vs. Broken/Single-parent)	4.53	1.52–13.53	0.007 *
Mother's education: Secondary & above (vs. Illiterate/Primary)	1.05	0.57–1.95	0.871
Father's education: Secondary & above (vs. Illiterate/Primary)	0.24	0.07–0.78	0.017 *
SES: Upper/Upper Middle (vs. Lower Middle/Upper Lower/Lower)	0.69	0.41–1.15	0.155
Family size >4 (vs. ≤ 4)	0.77	0.39–1.53	0.456
No private space at home (vs. Yes)	0.92	0.53–1.58	0.751
Age at menarche ≥ 12 years (vs. <12)	0.61	0.38–0.98	0.041 *
Flow duration ≥ 3 days (vs. <3 days)	1.56	0.92–2.65	0.100
Backache present (vs. absent)	1.58	0.92–2.7	0.099

Multivariable model included all variables meeting $p < 0.20$ on bivariate analysis (Tables 7 & 8): school type, family type, mother's education, father's education, SES, family size, private space at home, age at menarche, flow duration, and backache. Family type reference category is Broken/Single-parent family (the alphabetically/numerically last category dropped by the modelling software). Model Pseudo R^2 (McFadden) = 0.214; overall model $p < 0.001$. * indicates $p < 0.05$.

Factors Associated with Psychosocial Impact:

In contrast to menstrual hygiene practice, none of the sociodemographic or menstrual factors examined showed a statistically significant association with high

psychosocial impact on bivariate analysis (all $p > 0.05$; Table 10). Cycle regularity came closest to the pre-specified screening threshold ($p = 0.082$) and was therefore entered into the multivariable model.

Table 10: Association Between Sociodemographic/Menstrual Factors and Psychosocial Impact (High vs. Not High)

Variable	Category	High Impact n (%)	Not High Impact n (%)	Crude OR (95% CI)	- value
Age group	10-13	31 (21.5%)	113 (78.5%)	Ref.	.724
	14-16	32 (18.4%)	142 (81.6%)	—	
	17-19	19 (18.1%)	86 (81.9%)	—	
School type	Government/Central	42 (20.7%)	161 (79.3%)	Ref.	.515
	Private	40 (18.2%)	180 (81.8%)	0.85 (0.53–1.38)	
Family type	Joint/Three-gen/Broken-Single	53 (20.6%)	204 (79.4%)	Ref.	.423
	Nuclear	29 (17.5%)	137 (82.5%)	0.81 (0.49–1.35)	
SES	Lower Middle/Upper Lower/Lower	45 (19.3%)	188 (80.7%)	Ref.	.967
	Upper/Upper Middle	37 (19.5%)	153 (80.5%)	1.01 (0.62–1.64)	
Menarche age	<12	35 (19%)	149 (81%)	Ref.	.868
	≥ 12	47 (19.7%)	192 (80.3%)	1.04 (0.64–1.7)	
Dysmenorrhea	No/Mild	57 (19.3%)	238 (80.7%)	Ref.	.960
	Severe	25 (19.5%)	103 (80.5%)	1.01 (0.6–1.71)	

Cycle regularity	Irregular/Not sure	35 (16.1%)	182 (83.9%)	Ref.	.082
	Regular	47 (22.8%)	159 (77.2%)	1.54 (0.94–2.5)	
Flow amount	Heavy	30 (17%)	146 (83%)	Ref.	.304
	Scanty/Normal	52 (21.1%)	195 (78.9%)	1.3 (0.79–2.14)	

OR = odds ratio (vs. reference category, listed first); CI = confidence interval. *p*-values from Chi-square test (Fisher's exact test used where expected cell count <5). * indicates *p*<0.05.

On adjusted analysis, having a regular menstrual cycle was not an independent predictor of high psychosocial impact (adjusted OR 1.54, 95% CI 0.94–

2.50, *p*=0.083) (Table 11). No sociodemographic or menstrual factor was independently associated with psychosocial impact in this sample.

Table 11: Multivariable Logistic Regression: Independent Predictors of High Psychosocial Impact

Variable	Adjusted OR	95% CI	p-value
Regular menstrual cycle (Regular vs. Irregular/Not sure)	1.54	0.94–2.5	0.083

Only variable meeting *p*<0.20 inclusion criterion on bivariate analysis (Table 10); model reduces to a single-predictor logistic regression. No variable reached statistical significance (*p*<0.05) as an independent predictor of high psychosocial impact in this sample.

DISCUSSION

This cross-sectional study assessed menstrual hygiene practices and the psychosocial impact of menstruation among 423 school-going adolescent girls aged 10–19 years in Indore, Madhya Pradesh. The mean menstrual hygiene practice score was 6.39 ± 1.99 out of 11, with 61.5% classified as having good practice and 38.5% as having poor practice. The mean psychosocial impact score was 28.70 ± 5.12 out of 48, with 19.4% classified as experiencing a high psychosocial impact. Unlike a purely descriptive picture, this dataset revealed several statistically significant predictors of menstrual hygiene practice on both bivariate and multivariable analysis, discussed below alongside comparable Indian evidence.

Menstrual Hygiene Practice: The prevalence of good menstrual hygiene practice found here (61.5%) sits between the more favourable figures reported in some urban Indian cohorts and the poorer figures reported in rural and tribal settings, and is closer to the 48.98% poor-practice figure from Yalew *et al.*'s Ethiopian meta-analysis that was used to power this study's sample size [4]. This places the present sample in a middle position — meaningfully better than tribal Central India [8] and rural West Bengal [7], but with real room for improvement compared to the best-resourced urban cohorts.

The strongest and most consistent finding in this study was the association between school type and menstrual hygiene practice: girls attending private schools had markedly lower odds of poor practice than those in government/central schools, both on bivariate analysis (*p*<0.001) and after adjustment for the other sociodemographic and menstrual factors (adjusted OR 0.17, 95% CI 0.10–0.29, *p*<0.001). This finding is strongly corroborated by the wider Indian literature. Singh *et al.*, in their study of rural Patna adolescents, found an almost identical pattern, with girls in government schools having markedly lower adjusted

odds of good practice than their private-school counterparts (adjusted OR 0.05, 95% CI 0.02–0.12) [13]. A mixed-methods WASH study from Gujarat similarly found that students in non-government schools had substantially higher adjusted odds of better menstrual hygiene practice than those in government schools [14]. Taken together, these three independently conducted studies — spanning Bihar, Gujarat, and now Madhya Pradesh — point toward a structural, not merely incidental, disparity between government and private school infrastructure, sanitation facilities, and health education delivery in India.

Family type was also independently associated with practice in this study, though the direction of effect is worth examining carefully: relative to girls from broken/single-parent families (who had the highest observed prevalence of good practice at 77.8%), girls from three-generation families had substantially higher adjusted odds of poor practice (adjusted OR 4.53, 95% CI 1.52–13.53, *p*=0.007). This contrasts with Singh *et al.*'s finding in rural Bihar, where girls from joint families had significantly better practice than those from nuclear families, a pattern the authors attributed to greater opportunity for open discussion of menstruation among the larger number of female relatives in a joint household [13]. The opposite ordering observed here may reflect different underlying mechanisms: in a single-parent or separated-parent household, the responsible parent may take a more direct, less diffused role in a daughter's menstrual education and provisioning, whereas in larger multi-generational households, communication about menstruation may still be governed by older, more conservative generational attitudes toward menstrual restriction and secrecy. This divergence underscores that 'family type' is not a uniform construct across Indian settings.

Father's education showed a strong protective association with practice (adjusted OR 0.24, 95% CI 0.07–0.78, *p*=0.017 for secondary-or-above vs

illiterate/primary), independent of mother's education, which was not significant in the adjusted model. This pattern — paternal rather than maternal education driving the association — differs from the broader literature, where maternal education is more commonly cited as the dominant influence. A plausible explanation is that a more educated father may be associated with greater household purchasing power for hygienic absorbents and sanitation infrastructure, and with more permissive attitudes toward his daughter's activities during menstruation.

Later age at menarche (≥ 12 years) was independently associated with lower odds of poor practice (adjusted OR 0.61, 95% CI 0.38–0.98, $p=0.041$) — a biologically plausible finding, since girls who reach menarche somewhat later may do so with greater physical and cognitive maturity and more time for parents and schools to have delivered menstrual health education before their first period. Flow duration of three or more days and presence of backache both showed a trend toward higher odds of poor practice that approached but did not reach conventional significance ($p=0.100$ and $p=0.099$, respectively).

Psychosocial Impact of Menstruation: Nearly one in five participants (19.4%) experienced a high psychosocial impact of menstruation in this sample. Unlike menstrual hygiene practice, no sociodemographic or menstrual factor was independently associated with psychosocial impact; cycle regularity came closest to the pre-specified screening threshold ($p=0.082$ on bivariate analysis) but was not significant on adjusted analysis (adjusted OR 1.54, 95% CI 0.94–2.50, $p=0.083$). This is broadly consistent with the qualitative meta synthesis by Hennegan *et al.*, which found that embarrassment, shame, and restriction were widespread across sociodemographic strata rather than confined to any particular disadvantaged subgroup [1], and with Sundari *et al.*'s descriptive findings among adolescent girls in Chennai [6]. Taken together with the practice findings, this suggests that psychosocial impact and physical hygiene practice are driven by different sets of factors in this population: practice responds strongly to structural factors like school type and family education, while psychosocial impact appears more evenly distributed across the sample. This study benefited from a calculated sample size derived from a published meta-analysis [4], a stratified systematic random sampling technique across both government and private schools, and questionnaire items adapted from internationally validated tools, including the UNICEF MHM-in-Ten toolkit [3] and the Menstrual Practice Needs Scale (MPNS-36) [11]. Unlike some comparable studies, this analysis achieved a wide enough spread between Good and Poor practice (61.5% vs 38.5%) to permit meaningful multivariable modelling, avoiding the ceiling-effect limitation that can arise when practice is very heavily skewed toward one category.

Limitations: As a cross-sectional study, causal relationships between sociodemographic or menstrual factors and either outcome cannot be established; for example, it is equally plausible that families who prioritize private schooling also prioritize menstrual hygiene resources at home, rather than school type itself causally improving practice. Findings are based on self-reported data collected in a classroom setting and may be subject to recall and social desirability bias, despite efforts to mitigate these through anonymous, private, teacher-free administration. The study was restricted to school-going adolescent girls in urban Indore and therefore may not be generalizable to out-of-school adolescent girls or to rural and tribal populations in the surrounding region, where poorer practice has been documented [7,8]. The multivariable model for psychosocial impact was limited by the small number of variables meeting the $p<0.20$ screening threshold, and a larger sample or additional candidate variables may be needed to identify meaningful predictors of psychosocial impact in this population.

Public Health Implications: The strong, consistent association between government-school attendance and poorer menstrual hygiene practice — replicated across this study and comparable work from Bihar and Gujarat [13,14] — suggests that government schools in particular should be prioritised for menstrual health infrastructure investment and structured hygiene education. The independent protective association of paternal education suggests that menstrual health education campaigns could usefully engage fathers directly, not solely mothers. Because psychosocial impact did not track with the same sociodemographic factors as physical practice, interventions addressing embarrassment, stigma, and school discomfort around menstruation should be delivered universally across all schools and family structures, rather than being targeted only at the sociodemographic groups identified as high-risk for poor physical practice.

CONCLUSION

Among school-going adolescent girls aged 10–19 years in urban Indore, more than a third demonstrated poor menstrual hygiene practice, and school type, family structure, father's education, and age at menarche emerged as independent predictors — findings that align closely with recent comparable studies from Bihar and Gujarat [13,14]. By contrast, psychosocial impact of menstruation, experienced by nearly one in five participants, was not explained by any of the sociodemographic or menstrual factors examined, suggesting it may require a different, more universal intervention approach than the structurally-targeted approach suggested for hygiene practice itself. School-based interventions addressing both the structural determinants of hygiene practice and the psychosocial dimensions of menstruation — particularly in government schools — are warranted.

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Ananya Julka is a Class XII science student with a strong interest in health sciences, biomedical research, and public health. She is the founder of Nari Nitya, a youth-led initiative dedicated to promoting menstrual hygiene awareness and reducing stigma surrounding menstruation among adolescents. Through this initiative, she has helped spread menstrual health awareness to more than 1,000 adolescent girls in and around Indore, India. Her academic interests include women's health and preventive medicine; she aspires to pursue a career in medicine and biomedical research.

REFERENCES

- Hennegan J, Shannon AK, Rubli J, Schwab KJ, Melendez-Torres GJ. Women's and girls' experiences of menstruation in low-and middle-income countries: A systematic review and qualitative metasynthesis. *PLoS Medicine*. 2019 May 16;16(5): e1002803.
- World Health Organization. Adolescent Health. Geneva: World Health Organization; 2024.
- UNICEF. Guidance on menstrual health and hygiene. New York: UNICEF; 2019.
- Yalew M, Adane B, Arefaynie M, Kefale B, Damtie Y, Mitiku K, Agmas A, Biset G, Alene TD, Adane M, Addisu E. Menstrual hygiene practice among female adolescents and its association with knowledge in Ethiopia: A systematic review and meta-analysis. *PloS One*. 2021 Aug 4;16(8): e0254092.
- Van Eijk AM, Sivakami M, Thakkar MB, Bauman A, Laserson KF, Coates S, Phillips-Howard PA. Menstrual hygiene management among adolescent girls in India: a systematic review and meta-analysis. *BMJ Open*. 2016 Mar 1;6(3): e010290.
- Sundari T, George AJ, Sinu E. Psychosocial problems of adolescent girls during menstruation. *Journal of Mental Health Education*. 2022 Apr;3(2):47–63.
- Ganguly M, Jana S, Ganguly A, Chattaraj M, Midya DK. Menstrual hygiene management among the rural school-going adolescent girls with special emphasis to the Kora tribe in West Bengal, India. *Discover Public Health*. 2025 May 16;22(1):265.
- Borkar SK, Borkar A, Shaikh MK, Mendhe H, Ambad R, Joshi A. Study of menstrual hygiene practices among adolescent girls in a tribal area of central India. *Cureus*. 2022 Oct 13;14(10): e30247.
- Dean AG. OpenEpi: open-source epidemiologic statistics for public health, version 2.3.1. <http://www.openepi.com>. 2010.
- Lwanga SK, Lemeshow S, World Health Organization. Sample size determination in health studies: a practical manual. World Health Organization; 1991.
- Hennegan J, Brooks DJ, Schwab KJ, Melendez-Torres GJ. Measurement in the study of menstrual health and hygiene: A systematic review and audit. *PloS One*. 2020 Jun 4;15(6): e0232935.
- Nabwera HM, Shah V, Neville R, Sosseh F, Saidykhan M, Faal F, Sonko B, Keita O, Schmidt WP, Torondel B. Menstrual hygiene management practices and associated health outcomes among school-going adolescents in rural Gambia. *PLoS One*. 2021;16(2): e0247554.
- Singh G, Gupta A, Anand N, Kumar R. Determinants of menstrual hygiene among adolescent school girls in a rural area of Patna, Bihar, India: A cross-sectional study. *Journal of Family Medicine and Primary Care*. 2023 Dec 1;12(12):3271–8.
- Patel M, Gupta EK, Yogesh M. Assessing and comparing knowledge, attitude, and practices related to water, sanitation and hygiene among government and non-government school students in Gujarat: a mixed method study. *BMC Public Health*. 2025 May 14;25(1):1768.