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Male engagement in menstrual care: evidence from boys and young men in urban slums in Mumbai

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ABSTRACT

Menstrual health and rights are increasingly recognised as not solely women's issues, yet in patriarchal settings, boys and men remain excluded from menstruation-related matters. Evidence on their supportive roles, particularly in resource-poor settings, remains limited. We examined the support provided by boys and young men to mothers and sisters during menstruation in a disadvantaged urban context in India and identified factors associated with supportiveness. Data came from a menstrual health management study in the slums of Mumbai. Analysis was based on quantitative data from 447 unmarried boys and young men aged 15–24 years that assessed menstruation-related knowledge, adherence to traditional norms, agency in everyday life, and supportive behaviours. In-depth interviews with 20 parents provided context relating to family interaction. Overall, 56% of respondents supported their mothers or sisters by performing household chores, bringing food or medicines, or purchasing menstrual products. Greater awareness was associated with increased odds of support (AOR: 1.34), as were rejecting menstrual impurity norms (AOR: 2.02) and more modestly, displaying agency (AOR: 1.33). Findings underscore the need for comprehensive sexuality education for boys that builds awareness, challenges prevailing norms and stigma, and promotes supportive practices.

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Introduction

Menstrual health and rights are not solely a 'women's issue.' They extend beyond the use of safe menstrual products to include health-promoting knowledge, supportive norms and attitudes, access to water, sanitation and hygiene (WaSH), freedom from discomfort and the right to manage menstruation with dignity (Babbar et al. 2022; Chandra-Mouli and Patel 2017; Hennegan et al. 2021; UNICEF 2019). Among strategies to improve menstrual health, many emphasise the need to engage boys and men, including, most recently, the Supreme Court of India (*Dr. Jaya Thakur v. Government of India* 2026). UNICEF's theory of change for menstrual health and hygiene highlights the need to foster boys' and men's awareness and attitudes and create supportive, stigma-free menstrual environments in order to advance gender equity (UNICEF 2019). These perspectives underscore the importance of actively including boys and men in menstrual health discourse and encouraging them to support a less stigmatising environment (Phillips-Howard et al. 2016).

Research has tended to overlook the role of boys and men (Mason et al. 2017). As a result, limited evidence exists on boys' and young men's awareness, beliefs and attitudes about menstruation-related topics, their role in supporting safe and dignified menstruation within households, and the extent to which their practices reinforce or challenge hegemonic masculinity. Available studies from both high- and low- and middle-income countries (LMIC) suggest that boys are rarely exposed to education about menstrual health; their knowledge is often fragmented and rudimentary, and in consequence their

perceptions of menstruating women tend to reflect traditional, stigmatising norms (Erchull 2020; Morrill et al. 2025; Peranovic and Bentley 2017).

Gender relations in India continue to be characterised by what Connell has described as hegemonic masculinity, understood as ‘the pattern of practice (i.e. things done, not just a set of role expectations or an identity) that [has] allowed men’s dominance over women to continue’ (Connell and Messerschmidt 2005). This translates into the denial of agency, defined in Kabeer’s conceptualisation as the ability to identify and act upon goals, make life choices, express voice and self-confidence, control money and resources, and so on (Kabeer 1999). In menstruation-related matters, unequal age- and gender-based power relations reinforce taboos that restrict women’s and girls’ participation in everyday activities during menstruation (van Eijk et al. 2016). Women and girls often lack decision-making power, mobility and resources to seek care and supplies and manage menstruation safely (House, Mahon, and Cavill 2012; Routray et al. 2017).

Hegemonic masculinity reinforces stereotypes and gendered expectations that discourage boys and men from associating with domains considered as ‘feminine’, even ‘punishing’ those who fail to conform to the rigid societal norms (Dochania and Dochania 2025). However, hegemonic masculinity is not static. Exposure to new ideas or social action can enable men and boys, over time and across generations, to move away from hegemonic masculinity towards a belief in gender equality (Connell and Messerschmidt 2005). Agency in everyday life may enable boys and young men to challenge hegemonic masculinity and patriarchal beliefs and practices that sustain gender inequality (Frosh, Phoenix, and Pattman 2003).

In India, laws and policies have addressed menstrual health unevenly. While the National Education Policy 2020 is silent about menstrual health (Babbar 2020), both the Adolescence Education Programme (AEP) and the National Adolescent Health Programme (Rashtriya Kishor Swasthya Karyakram, RKSK) include components addressing adolescents’ menstrual health needs (Ministry of Human Resource Development [MHRD] 2019; Ministry of Health and Family Welfare Government of India 2020). Delivered through schools and the health system respectively, these programmes aim to raise awareness, reduce taboos, promote communication, and, particularly under RKSK, support access to menstrual products, safe disposal and health services (Ministry of Health and Family Welfare Government of India 2020; MHRD 2019). However, neither programme explicitly targets boys. The Supreme Court of India’s recognition of menstrual health as a fundamental right (*Dr. Jaya Thakur v. Government of India* 2026) has the potential to strengthen menstrual rights discourse, notably acknowledging for the first time the role of boys and male teachers in addressing stigma and supporting menstrual health.

Opportunities for boys to learn about reproduction remain limited in India, as comprehensive sexuality education is inconsistently delivered in schools (Gundi and Subramanyam 2020). Boys’ knowledge is limited, comprising for many a vague recognition that menstruation involves bleeding or that it is a disease (Jayamohan and Tomar 2024; Mason et al. 2017). In the absence of adequate guidance from teachers or parents, boys (girls) rely largely on peers and social media for information and internalise the norms prevalent within their families and communities (Hales, Das, and Barrington 2019).

Excluding boys from menstrual discourse and reinforcing stigmatising norms within households have serious consequences. Boys may internalise and legitimise practices that label menstruating girls as impure and promote their social isolation (Mason et al. 2017). Such stigma also fuels menstruation-related teasing, widely reported by girls, which adversely affects school participation and wellbeing (Chinyama et al. 2019). Evidence shows that boys exposed to period stigma at home are more likely than others to engage in teasing at school (Benshaul-Tolonen et al. 2020). In some settings, the onset of menstruation marked girls as sexually available and at risk of unwanted sexual advances and early pregnancy, as documented among schoolgirls in Tanzania, Uganda and South Sudan (Tamiru et al. 2015).

There is a clear need for boys and men to play a proactive role in menstruation-related matters and in efforts to challenge restrictive norms. Evidence is required to document the awareness, attitudes, and adherence to traditional norms among boys and men, as well as the factors that foster their empathy and support for menstruating women and girls. This study examines the role of boys and young men (hereafter, boys) in urban slums of India in supporting female family members during menstruation and identifies factors associated with greater supportiveness.

The study draws on the conceptual framework proposed by van Eijk et al. (2016), in which menstrual hygiene management among girls is seen as shaped by knowledge, a supportive social environment and

healthy WaSH conditions (van Eijk et al. 2016). We adapted this framework to focus on boys' supportive roles within households. Supportive roles are conceptualised as influenced by three main sets of factors: (a) awareness of menstruation; (b) the social environment, including health-promoting attitudes and rejection of norms and taboos; and a third, (c) boys' agency, reflected in decision-making autonomy and control over financial resources. We justify this inclusion on the hypothesis that greater agency may encourage behaviours that challenge hegemonic masculinity.

We thus examined how these domains were associated with empathy and support towards family members during menstruation.

Methods

Study location

Mumbai, India's financial capital, is one of the most urbanised and densely populated cities in the world, with the city proper containing a population of around 12 million in 2011 (Office of the Registrar General and Census Commissioner, India 2011), exemplifying both economic dynamism and urban inequality. More than 40% of Mumbai's residents live in slums (Office of the Registrar General and Census Commissioner, India 2011), which are located on public land belonging to the local municipal corporation, the railways, the port authority or the airport authority (Ren 2020). Residents comprise in general a mix of long-time and recent migrants, with varying awareness and attitudes about health-promoting practices. Poverty is widespread, residences are cramped and amenities generally of poor quality (Bag, Seth, and Gupta 2016). Many households lack water and sanitation facilities within the home, rely on erratic public water supplies and face poor garbage collection and drainage. While sanitary pads are widely available in medical stores, the supply of subsidised government-provided pads remains irregular.

The broader study – components and sampling

This analysis draws on data from a larger mixed-methods study entitled Menstrual Health Management of Adolescents in Mumbai Slums, which aimed to understand the menstrual health situation and needs of disadvantaged adolescent girls (International Institute for Population Sciences (IIPS) and Centre of Demography of Gender (CDG) 2024). While the primary component of the work was quantitative, namely, a cross-sectional survey of girls aged 12–24 years, complementary components included a survey of boys aged 15–24 and a qualitative phase comprising key informant interviews with service providers and in-depth interviews with parents of adolescent girls and boys. Both quantitative and qualitative components were conducted concurrently. The present analysis focuses on the survey of boys, drawing insights also from interviews with parents (details of the sample selection pathway are provided in online supplemental File 1).

The sample size for the survey of adolescent girls and young women aged 12–24 years was estimated using prevalence-based methods. The prevalence of sanitary napkin use among women aged 15–19 years (59.5%) in slum areas of Mumbai and Mumbai Suburban districts, as reported in the National Family Health Survey-4 (International Institute for Population Sciences (IIPS) and ICF 2017 International 2017), was used as the reference parameter for the entire age range 12–24. Sample size was calculated using the formula

$$n = \frac{Z^2 \times P \times Q}{(r \times P)^2},$$

where $Z=1.96$ corresponds to a 95% confidence level, P is the assumed prevalence of sanitary napkin use (0.595), $Q=1-P$, and r denotes the relative precision (assumed to be 5%). A design effect of 1.2 was applied. Based on these assumptions, the minimum required sample size was estimated to be approximately 1,256. For boys, in the absence of established prevalence parameters for menstruation-related knowledge and attitudes, and given their secondary role in the analysis, a pragmatic sample size of 600 (approximately half the girls' sample) was adopted to ensure adequate representation while remaining

mindful of financial constraints. The final achieved sample included 1,275 girls aged 12–24 years and 584 boys aged 15–24 years.

Wards were selected using Census 2011 slum population data. Mumbai's 24 municipal wards were stratified into three zones, each comprising approximately one-third of the city's slum population, to ensure proportional representation across areas with differing slum density. From each zone, two non-adjacent wards were purposively selected to ensure geographic diversity, yielding six wards in total. Using the 2015 slum list, cross-validated through Google Maps, 18 slum areas were randomly selected, three from each ward. Population enumeration of the selected slums was not conducted prior to fieldwork. Within each of the 18 selected slums, households were selected using systematic random sampling. In each slum, the first household was chosen at random along a predefined route, after which the sampling interval was determined using a random number generator, and every k th household was approached.

The qualitative component comprised 17 key informant interviews with healthcare providers identified through snowball sampling. In addition, 20 in-depth interviews were conducted with parents, recruited through purposive quota sampling to ensure geographic representation across the three study zones. In total, 10 mothers and 10 fathers of girls aged 12–24 years who had participated in the quantitative survey were interviewed individually; parents were not recruited as pairs. Although thematic saturation was sometimes achieved earlier, interviews continued in order to ensure possible geographic variability was addressed. Fieldwork was conducted between June and September 2024.

All survey instruments and qualitative guides were developed by the project team based on existing literature, pre-tested and refined accordingly. Interviews were conducted by male and female researchers who underwent week-long training led by the principal investigators, including mock and practice field interviews, also emphasising rapport building, privacy, informed consent/assent and minimising social desirability bias. To enhance comfort, girls were interviewed by female interviewers and boys by male interviewers, usually in private spaces at home; boys were occasionally interviewed outdoors or in nearby public spaces. To ensure confidentiality, for example, interviewers called in colleagues to distract attention from the main survey. To counter any potential reluctance to provide honest responses, interviewers aimed to build camaraderie and rapport with the respondent, often sharing their own early experiences. At the end of each interview, respondents were invited to ask questions.

This study uses data from 447 unmarried boys aged 15–24 who reported awareness of menstruation, defined as knowing that women and girls experience periodic bleeding from their private parts. Insights from in-depth interviews with parents were used to supplement and contextualise findings from the survey.

Each interview with boys lasted approximately 45 minutes and covered background characteristics, participation in household and personal decision-making, control over money, knowledge and attitudes related to menstruation and support provided to mothers and sisters during menstruation. In-depth interviews with parents which lasted approximately an hour, allowed us to probe parental perceptions about their sons' knowledge about menstruation, and parent-child communication on matters relating to menstruation.

Variables

Background variables

Our analysis controlled for several background variables. Family and parent level factors included religion (Hindu and others, including Muslims, Christians and Buddhists), social groups (known as scheduled castes and tribes, other 'backward' classes and others), parental education (completion of secondary education by neither, one or both), ownership of assets (land, motorcycle/scooter/auto, television, cooler, property) and household type (nuclear, joint). At the individual level, background variables included age and the age at which the boys first heard about menstruation (less than 15, 15 or older). We also included sources of menstruation related information (assigning 1 to formal/institutional sources, largely the school or teacher and 0 if only other sources, largely friends, media, parents, were cited), years of schooling (less than 10, 10 or more), work status (whether the respondent worked or not) and ownership of and control over a smartphone.

Independent variables

The key independent variables used in the analysis were awareness about menstruation; attitudes and beliefs about menstruation, that is, notions about purity and do's and do not's during menstruation; their

overall agency to exercise voice in matters related to their own lives, notably with regard to decision-making in everyday matters and ownership and control of money or a bank account. Where a construct comprised three or more components, additive indexes were created. A brief description of each of the variables is given in [Table 1](#).

Table 1. Key independent variables used in the analysis: domains, descriptions and measures.

Domain	Description	Measure
Awareness about menstruation	Basic awareness includes responses to four items: awareness that the cycle is 28 d or 1 month, that blood is released through the private parts, that bleeding usually lasts less than 10 d per month, and that period blood is no different from blood running through the body. More detailed awareness about menstruation sums responses to another four items: recognition that period blood is not dirty; there is a link between menstruation and pregnancy; chances of pregnancy are high midcycle, and there exists a government scheme which distributes sanitary napkins to adolescent girls and women.	An additive index was created summing the responses of the eight items (for each item, a score of '1' was assigned if the respondent possessed correct knowledge, else 0) with continuous scores ranging from 0 to 8.
Attitude towards menstruating women	Rejection of traditional attitudes about purity: belief that menstruating individuals are impure. Rejection of traditional norms regarding specific do's and do not's surrounding menstruating women and girls namely that (a) it is unacceptable during menstruation to visit religious places, attend auspicious ceremonies, or (b) it is unacceptable during menstruation to cook/enter the kitchen or touch certain items like pickle/papad	A dichotomous variable was created that was set to equal to 1 if the respondent rejected the norm and 0 if he upheld it Each question elicited a Yes/No response, and we summed these responses so that the final score ranges from 0 to 2.
Agency to exercise voice in matters related to their own lives <i>Decision making</i>	Boys were probed about whether they participated in decisions – either on their own or jointly with a parent – with regard to their education and purchase of household gadgets.	Decision-making on just one item was coded 1, and on both, 2; ownership and control over money or bank account was coded 1. We summed responses, creating an additive index with continuous scores ranging from 0 to 3.
<i>Owns and controls money or bank account</i>	Boys and men who own and control money or bank account	

Note: Fewer than 3% missing responses were recorded for all relevant variables, and these were conservatively coded as '0' to avoid upward bias; overall item non-response was negligible (for example: there were 4 missing cases with regard to knowledge, 3 with regard to attitudes and 9 with regard to all items falling under agency to exercise voice).

Outcome variable

Support to mother and/or sister(s) during menstruation was assessed through three indicators: helping with household chores, bringing food or medicines, and buying pads. A binary variable was constructed, coded 1 if support was provided in at least two of the three activities, and 0 otherwise. The scale demonstrated good internal reliability (Cronbach's alpha = 0.80). Exploratory factor analysis indicated a single dominant factor (eigenvalue = 1.91), with all items loading substantially (0.43–0.93), supporting aggregation.

Data analysis

Univariate, bivariate, and multivariable analyses were conducted. We first present the prevalence of outcome, independent and background variables, including index scores, followed by bivariate associations between boys' awareness of and attitudes towards menstruation, agency and support to mothers and sisters during menstruation. Multivariable logistic regression models (Stata version 16; StataCorp LLC, College Station, TX) were estimated using maximum likelihood to assess these associations, adjusting for socio-demographic characteristics. Model diagnostics included tests of overall fit and checks for multicollinearity, and conventional standard errors were used as the analysis focused on associations rather than population-level inference. To assess the relative importance of predictors, dominance analysis was

conducted as a post-estimation procedure. This approach quantifies each predictor's contribution to explained variance using changes in pseudo- R^2 across all subset models, accounting for overlap among predictors. Results are presented as standardised dominance statistics, enabling ranking of predictors by relative importance (Budescu 1993). Unlike standardised regression coefficients, dominance analysis compares the incremental contribution of each predictor to model fit across all possible subset models, using changes in pseudo- R^2 as the criterion (Budescu 1993).

Ethical approval and confidentiality

Ethical approval to conduct the study was received from the International Institute for Population Sciences' Institutional Review Board (Reference: IIPS/PSC-54/IRB/532/2024). Parental consent and adolescent assent were obtained for participants under 18 years of age; interviews were not conducted if either one refused. Participants aged 18–24 and parents provided written informed consent. To ensure confidentiality, names were not recorded, consent forms were securely stored and digital data and recordings were password-protected.

Results

Socio-demographic profile and parental perspectives

Household characteristics revealed that most respondents belonged to Hindu households (70%), and about half were from 'other' castes (neither Scheduled Caste/Tribe nor Other Backward Class). Nearly three in five

Table 2. Selected background characteristics of unmarried boys aged 15–24 years, Mumbai slums, 2024^a.

Background characteristics	<i>n</i>	%
Household and parent-level characteristics		
Religion		
Hindu	312	69.8
Others	135	30.2
Social group		
Scheduled Castes (SC)/Scheduled Tribes (ST)	115	25.7
Other Backward Classes (OBC)	107	23.9
Others	225	50.3
Parents' education		
Neither parent completed 10 years of schooling	194	43.4
Only one parent completed 10 years of schooling	145	32.4
Both parents completed 10 years of schooling	108	24.2
Household ownership of assets		
Less than 3 of the 5 selected assets	165	36.9
At least 3 of the 5 selected assets	282	63.1
Type of household		
Nuclear	378	84.6
Joint	69	15.4
Individual-level characteristics		
Age (in years) [#]		
15–19	297	66.4
20–24	150	33.6
Age at which first heard about menstruation (age in years)		
<15	178	39.8
15 or older	269	60.2
Source of menstruation-related information		
Informal or non-institutional sources only	137	30.7
Formal or institutional sources (teacher/school/health providers/NGO)	310	69.4
Respondents' education		
Less than 10 years of schooling	63	14.1
10 or more years of schooling	384	85.9
Respondents' work status		
Not working	280	62.6
Working*	167	37.4
Smartphone ownership and control		
Owns and controls a smartphone	378	84.6

Notes: ^aAmong those who knew about menstruation ($N=447$);

*Includes the 2% who reported working and not earning cash;

[#]Mean age of the respondents = 18.7 years ($SD = 2.5$).

boys (57%) had at least one parent who had completed secondary education, and 63% lived in relatively wealthier households owning at least three of five assets. Most households (85%) were nuclear in nature.

Boys were predominantly aged 15–19 years. About three-fifths had first heard about menstruation at age 15 or later, and most (69%) reported formal or institutional sources of information. The majority, 86%, had completed 10 or more years of schooling, 37% were engaged in paid work and 85% owned a smartphone (Table 2).

The analysis is restricted to boys who reported any familiarity with menstruation, an essential inclusion criterion for examining their menstrual support. Excluded boys differed from those included (see online supplemental File 2); they were younger, had less schooling, were less likely to be economically active and had less educated parents). Their exclusion was conceptually justified given that the study's focus on boys' supportiveness during menstruation requires awareness.

Qualitative findings indicate strong parental adherence to norms excluding boys from menstruation-related matters, with most parents reporting no direct communication and assuming that information would be obtained from schools or the internet. For example:

No, my son doesn't know anything about menstruation...! I have never shared anything regarding periods with him (Mother, age 30, homemaker, no formal education).

Yes, they should be told (about periods), but in today's time, people don't... people misunderstand. People think, 'Why is he asking men about a girl's issue?' (Father, age 59, tea stall owner, Class 3).

How can one discuss it with sons, when one can't even discuss it with one's husband (Mother, age 46, house wife, no formal education).

I haven't really talked, ...now there's the internet, so they can learn everything about it (Father, age 50, shoe-maker, Class 5).

These narratives suggest that parents may be unwilling to relinquish notions of hegemonic masculinity, and may not play a direct role in influencing the practices of their sons or socialising them to display support and empathy to their mothers or sisters during menstruation.

Support to mothers and sisters during menstruation

Despite the limited role played by parents, more than half the boys (56%) were engaged in at least two of the three tasks reflecting support to mothers and sisters during menstruation (Table 3). Just 30% were engaged, however, in all three tasks. The most common forms of support offered were serving them food or giving them medicines while they were menstruating (56–58%).

Table 3. Percentage of unmarried boys aged 15–24 years reporting giving menstruation-related support to mothers/sisters, Mumbai slums, 2024.

Menstruation-related support	(%)
Helps mother/sister in household chores while they are menstruating	55.7
Helps mother/sister by bringing food or giving medicines while they are menstruating	58.2
Helps mother/sister in buying pads	38.0
<i>Summary measure: Support in at least two of the above activities</i>	56.2
<i>N</i>	447

Note: Overall, 9 boys failed to respond to one or other of these items; they were coded as offering no support.

Awareness, attitudes and agency

While over 90% of boys knew that menstruation occurs monthly and involves bleeding, only about three-fifths knew it typically lasts fewer than 10 days, and just over half knew menstrual blood is the same as other blood. Knowledge of specific aspects was limited: 54% knew the link with pregnancy, fewer than 10% knew that menstrual blood is not dirty (9%) or that pregnancy risk is highest mid-cycle

(8%) and only 36% were aware of government schemes distributing menstrual products. Overall, boys knew an average of four of the eight aspects assessed.

Adherence to traditional norms remained substantial. Only 35% of boys rejected the belief that menstruating women and girls are impure. In terms of behavioural 'do's and don'ts', while over half rejected food-related restrictions (54%), just 21% rejected restrictions on religious or social participation; only 19% rejected both forms of restriction.

Boys' agency to exercise voice in their own lives was limited. Only 17% reported autonomy across all three domains examined – decision-making related to studies and household purchases, and control over financial resources (Table 4).

Table 4. Percentage of boys aged 15–24 years reporting awareness, attitudes and agency towards menstruation in daily life matters, Mumbai slums, 2024.

Awareness, attitudes and agency	%
(a) Awareness about menstruation-related matters	
Basic awareness about menstruation-related matters	
The usual gap between two menstrual cycles is 28 days/1 month	91.30
Menstruation means blood flows from the private parts	97.32
Not normal to menstruate for over 10 d	63.76
Period blood is the same as the blood that runs in the body	53.24
More detailed awareness about menstruation-related matters	
There is a link between menstruation and pregnancy	53.70
Menstrual blood is not dirty	9.17
Pregnancy is most likely to occur mid-cycle	7.80
There is a government scheme distributing sanitary napkins to girls and women	36.20
<i>Mean number of items about which boys were aware (of 8)</i>	<i>4.12</i>
(b) Rejection of traditional norms about menstruation	
Purity	
Girls are not impure during their periods	34.90
Menstruation-related practices	
Acceptable to cook, enter the kitchen, or touch/ eat pickle/papad	53.50
Acceptable to visit a religious place or attend auspicious ceremonies	21.30
<i>Reject both traditional norms</i>	<i>18.57</i>
(c) Agency to exercise voice in matters related to their own lives	
Decision-making on studies and household purchases and control over money/bank account	
No participation in even one activity	13.20
Participation in just one activity	46.98
Participation in decisions on both activities	39.82
Ownership and control of money or bank account	33.78
<i>Having agency in both the aspects</i>	<i>17.40</i>
<i>N</i>	<i>447</i>

Associations between support to mothers and sisters during menstruation and selected characteristics

Boys who supported their mothers and sisters during menstruation differed markedly from those who offered little or no support. Bivariate analysis using unadjusted odds ratios (ORs) showed that awareness of menstruation, rejection of traditional attitudes and agency to exercise voice in their own lives were all strongly associated with supportive behaviour (Table 5, column 1).

Most of these associations remained significant after adjusting for household and individual socio-demographic characteristics (Table 5, column 5). Each unit increase in the awareness score was associated with a 34% higher likelihood of providing support (odds ratio (OR) = 1.34), and boys who rejected purity-related taboos were twice as likely as others to offer support (OR = 2.02). Agency also emerged as a significant predictor, with a one-unit increase in the agency score associated with a 33% increase in the odds of support (OR = 1.33).

Among socio-demographic factors, boys from wealthier households were more likely to provide support than others, as were those from excluded castes and tribes compared to other backward castes. Other characteristics, including parental and boys' educational attainment, were not significantly associated with supportive behaviour.

Table 5. Odds ratios (and 95% confidence intervals) from logistic regression analyses assessing the relationship between selected indicators and support to mothers and sisters during menstruation, for boys aged 15–24 years, Mumbai slums, 2024^a.

	Explanatory variables	Unadjusted odds ratio	95% CI	Adjusted odds ratio	95% CI
Awareness about menstruation	Awareness about menstruation (0–8)	1.36***	[1.19,1.56]	1.34***	[1.14,1.56]
Attitudes towards menstruation	Attitude regarding impurity				
	Girls are impure during periods	Ref.		Ref.	
	Girls are not impure during periods	2.13***	[1.42,3.20]	2.02***	[1.23,3.32]
Agency	Attitude regarding restrictions on participation in food or religious/social activities (0–2)	1.29*	[1.00,1.66]	0.97	[0.71,1.32]
	Decision-making (regarding studies and gadgets) and control over money or having a bank account (0–3)	1.29*	[1.04,1.59]	1.33*	[1.00,1.77]
Household and parent-level characteristics	Religion				
	Hindu	Ref.		Ref.	
	Others	0.69	[0.46,1.03]	0.68	[0.43,1.09]
	Social group				
	Scheduled Castes (SC)/Scheduled Tribes (ST)	Ref.		Ref.	
	Other Backward Classes (OBC)	0.54*	[0.32,0.93]	0.51***	[0.29,0.91]
	Others	0.73	[0.46,1.16]	0.83	[0.50,1.37]
	Parents' education				
	Neither had completed 10 years of schooling	Ref.		Ref.	
	Only one had completed 10 years of schooling	0.91	[0.59,1.41]	0.74	[0.46,1.19]
Both had completed 10 years of schooling	1.47	[0.91,2.38]	1.27	[0.72,2.24]	
Household ownership of assets	Less than 3 of the 5 selected assets	Ref.		Ref.	
	At least 3 of the 5 selected assets	1.77**	[1.20,2.61]	1.56***	[1.02,2.40]
Type of household	Nuclear	Ref.		Ref.	
	Joint	1.02	[0.61,1.71]	0.94	[0.53,1.67]
Individual-level characteristics	Age (in years)				
	15–19	Ref.		Ref.	
	20–24	1.12	[0.75,1.66]	0.95	[0.58,1.58]
	First heard about menstruation (age in years)				
	<15	Ref.		Ref.	
	15 or older	1.00	[0.68,1.46]	0.91	[0.59,1.40]
	Source of menstruation-related information				
	Informal or non-institutional sources	Ref.		Ref.	
	Formal or institutional sources (teacher/school/health providers/NGO)	1.53*	[1.02,2.29]	1.27	[0.80,2.00]
	Respondents' education				
6 or fewer years of schooling	Ref.		Ref.		
7–9 years of schooling	0.85	[0.50,14.19]	1.86	[0.09,37.43]	
10 or more years of schooling	1.37	[0.09,22.07]	2.16	[0.11,41.31]	
Respondents' work status					
Not working	Ref.		Ref.		
Working	0.97	[0.66,1.43]	0.75	[0.44,1.28]	
Smartphone ownership and control					
Does not own or control a smartphone	Ref.		Ref.		
Owens and controls a smartphone	0.98	[0.59,1.65]	0.64	[0.35,1.18]	

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, Ref. refers to the reference category.

^aAmong those who know about menstruation ($N = 447$). Model diagnostics – (LR $\chi^2(21) = 57.97$, $p < 0.001$), pseudo- $R^2 = 0.10$ and log likelihood = -277.46.

Relative importance of predictors of support provided by boys to mothers and sisters during menstruation

Dominance analysis was conducted to assess the relative contribution of boys' awareness, attitudes, agency and socio-economic factors to support provided to mothers and sisters during menstruation. Awareness about menstruation emerged as the most influential predictor, accounting for about 35% of the explained variance (standardised dominance, 0.345). This was followed by attitudes regarding menstrual impurity, which explained about 20% of the variance (standardised dominance, 0.198). Household asset ownership, reflecting socio-economic status, accounted for 12% of the explained variance (standardised dominance, 0.124). Boys' agency to exercise voice in their own lives also contributed meaningfully, explaining 10% of the variance (standardised dominance, 0.095). Other household and individual-level factors, including sources of menstruation-related information, religion and education, contributed only marginally to the support provided to mothers and sisters during menstruation (Table 6).

Table 6. Dominance analysis of predictors for support provided by boys aged 15–24 to mothers and sisters during menstruation, Mumbai slums, 2024^a.

	Explanatory variables	Dominance statistic	Standardised dominance	Rank
Awareness about menstruation	Awareness about menstruation (basic as well as detailed)	0.036	0.345	1
Attitudes towards menstruation	Attitude regarding impurity	0.021	0.198	2
	Attitude regarding restrictions on participation in food or religious/social activities	0.003	0.032	7
Agency	Decision-making (regarding studies and gadgets) and control over money or having a bank account	0.010	0.095	4
Household and parent-level characteristics	Religion	0.005	0.049	6
	Social group	0.001	0.012	12
	Parents' education	0.002	0.017	11
	Household ownership of assets	0.013	0.124	3
	Type of household	0.000	0.000	15
Individual-level characteristics	Age (in years)	0.001	0.005	13
	First heard about menstruation (age in years)	0.000	0.004	14
	Source of menstruation-related information	0.006	0.053	5
	Respondents' education	0.003	0.029	8
	Respondents' work status	0.002	0.018	10
	Smartphone ownership and control	0.002	0.019	9

^aAmong those who know about menstruation ($N=447$).

Discussion

This study adds to the limited evidence on boys' roles in menstruation-related matters. Conducted in the slums of a major Indian metropolitan city, it provides insights from urban poor settings. While most prior research has relied solely on qualitative methods, this study, like just a few others, used primary survey data (Gundi and Subramanyam 2020; Varsha, Vasudevan, and Palanisamy 2025). Moreover, it examined possible shifts from hegemonic to more egalitarian masculinities in a patriarchal urban context, assessing how boys' awareness, attitudes and agency shape their support for women and girls.

The findings indicated that boys in Mumbai's slums remain largely excluded from menstrual health matters, with inadequate awareness and continued adherence to traditional norms of purity and behavioural restrictions. These patterns are consistent with earlier studies from India, which highlight boys' limited roles due to poor or incorrect knowledge, reliance on peers and media and nonverbal cues, and persistence of menstrual taboos (Abraham and Saliha 2025; Jayamohan and Tomar 2024; Mason et al. 2017; Vashisht et al. 2026). They are also consistent with our own qualitative findings in which parents affirmed perceptions about their sons' limited awareness and their own reluctance to communicate on menstruation-related matters with their sons.

Several studies have explored the factors shaping boys knowledge and attitudes about menstruation. Drawing on a mixed-method study in Nashik district, Gundi and Subramanyam (2020) show that social determinants, such as private schooling, parental education, household wealth and urban residence shape boys' knowledge and rejection of hegemonic norms of masculinity (Gundi and Subramanyam 2020). Our analysis probed a related but underexplored question: what discourages boys from engaging with menstruation and from offering supporting to women and girls during menstruation?

Our findings concur with others suggesting that in India, rigid gender boundaries often deter boys from associating with anything perceived as feminine (Dochania and Dochania 2025), demanding a culture of silence around menstruation and encouraging boys to remain detached from female-related matters (Jayamohan and Tomar 2024). Menstruation continues to be treated as taboo, avoided in public discourse and dealt with in a traditionally hegemonic manner even among educated groups (Ghosh and Jamir 2023; Varsha, Vasudevan, and Palanisamy 2025). Where boys do acquire knowledge, it is often through informal sources, with limited policy or programme-based opportunities for learning (Hales, Das, and Barrington 2019; Mason et al. 2017), contributing to persistent negative attitudes and lack of empathy (Abraham and Saliha 2025).

There is also evidence from India that more boys are expressing interest in learning about menstruation, and deviating from parental beliefs and traditional notions of masculinity (Shah et al. 2019; Vashisht et al. 2026). Our findings extend this literature by showing that empathy and support during menstruation

are not uncommon in urban slums and are fostered by greater awareness, exposure to formal information sources, rejection of taboos and, to a lesser extent, boys' agency. These findings suggest that boys are willing to question hegemonic norms that frame menstruation as an exclusively feminine domain.

Pilot initiatives in LMICs challenging hegemonic masculinity have shown promise in fostering boys' empathy and support for menstruation and other sexual and reproductive health issues. In Nepal, for example, masculinity-focused training that promoted shared domestic responsibilities strengthened men's caregiving roles, reduced partner violence and encouraged challenges to harmful menstrual taboos (Water for Women 2023). In Uttar Pradesh, India, a teacher-led initiative sensitised groups of boys about menstruation, resulting in greater comfort discussing the topic and supporting women and girls across household, school and community settings (Sahin et al. 2015). In India, regular exposure to a gender-transformative life-skills education and sports coaching programme for boys promoted gender equitable attitudes and notions of positive masculinity and a reduction in perpetration of intimate partner violence, with effects persisting five years after completion (Santhya and Francis Xavier 2022). Our findings provide empirical support for greater investment in such approaches to address menstruation health management and rights.

India's AEP acknowledges the importance of imparting education on physical maturation, healthy relationships, and gender-based discrimination, but actions remain unevenly implemented and have largely overlooked boys (Ministry of Health and Family Welfare Government of India 2020). The recent Supreme Court ruling, which recognised the urgency of initiatives that educate and sensitise boys and male teachers, may boost initiatives to deliver the AEP more consistently across schools and encourage the implementation of other evidence-based programmes for boys.

Limitations

Several study limitations should be noted. The research was conducted in a single city and cannot claim to be representative of the urban poor more broadly. The study's cross-sectional design limits causal inference. Despite extensive interviewer training about developing rapport with respondents, ensuring privacy and creating a non-judgemental interview situation, the sensitive nature of questions and the cramped spaces in slum settings may have led to socially desirable responses. Finally, we failed to capture relevant influences such as school environments or parenting practices, and measures of support may not be sufficiently nuanced. Nonetheless, given the exploratory nature of the study and the limited evidence on boys' supportive practices, these findings offer valuable insights and directions for future research and programme design.

Conclusion

Findings of this study offer evidence to support the recommendations of both the recent Supreme Court order and UNICEF's theory of change for menstrual health and hygiene, emphasising the need to include boys and men in actions aimed at shaping a supportive and stigma-free environment around menstruation. Future actions must foster the active participation of boys in menstruation-related matters. What is needed is comprehensive sexuality education at school and community levels that focuses on increasing boys' (and girls') awareness, dispelling regressive attitudes and boosting their confidence about engaging with family and others on menstruation-related and other sensitive matters. Stigma and taboos about menstruation can only be broken when men and boys become the allies of women and girls and for this to happen, they must be included in menstruation health and rights work.

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AI statement

The authors used ChatGPT (GPT-5.2, OpenAI) to assist with language refinement. AI was not used for data analysis, data interpretation or generation of results. All substantive intellectual contributions, interpretation of findings and final editorial decisions are those of the authors, who take full responsibility for the content of the article as published.

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The authors state that they have no competing interests to declare.

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Data availability statement

Data for the study are available from the corresponding author on reasonable request. A project factsheet is available at <https://www.iipsindia.ac.in/content/menstrual-health-management-mhm-adolescents-mumbai-slums-identifying-gender-norms-and-gaps>

References

- Abraham, D. M., and F. B. Saliha. 2025. "Awareness and Perception of Adolescent Boys about Menstruation: An Exploratory Study from Rural India." *Discover Public Health* 22 (1): 205. <https://doi.org/10.1186/s12982-025-00600-y>.
- Babbar, K. 2020. "Absence Of Menstrual Hygiene Management In NEP 2020." *Feminism in India*. <https://feminisminindia.com/2020/08/10/nep-2020-menstrual-hygiene-girls-in-schools/>.
- Babbar, K., J. Martin, J. Ruiz, A. A. Parray, and M. Sommer. 2022. "Menstrual Health Is a Public Health and Human Rights Issue." *The Lancet Public Health* 7 (1): E 10–e11. [https://doi.org/10.1016/S2468-2667\(21\)00212-7](https://doi.org/10.1016/S2468-2667(21)00212-7).
- Bag, S.; S. Seth, and A. Gupta. 2016. *A Comparative Study of Living Conditions in Slums of Three Metro Cities in India*. Working paper No. 253. New Delhi, India. <https://doi.org/10.2139/ssrn.2727005>
- Benshaul-Tolonen, A., S. Aguilar-Gomez, N. Heller Batzer, R. Cai, and E. C. Nyanza. 2020. "Period teasing, stigma and knowledge: A survey of adolescent boys and girls in Northern Tanzania." *PLoS One*. 15 (10): e0239914. <https://doi.org/10.1371/journal.pone.0239914>.
- Budescu, D. V. 1993. "Dominance Analysis: A New Approach to the Problem of Relative Importance of Predictors in Multiple Regression." *Psychological Bulletin* 114 (3): 542–551. <https://doi.org/10.1037/0033-2909.114.3.542>.
- Chandra-Mouli, V., and S. V. Patel. 2017. "Mapping the Knowledge and Understanding of Menarche, Menstrual Hygiene and Menstrual Health among Adolescent Girls in Low- and Middle-Income Countries." *Reproductive Health* 14 (1): 30. <https://doi.org/10.1186/s12978-017-0293-6>.
- Chinyama, J., J. Chipungu, C. Rudd, M. Mwale, L. Verstraete, C. Sikamo, W. Mutale, R. Chilengi, and A. Sharma. 2019. "Menstrual Hygiene Management in Rural Schools of Zambia: A Descriptive Study of Knowledge, Experiences and Challenges Faced by Schoolgirls." *BMC Public Health* 19 (1): 16. <https://doi.org/10.1186/s12889-018-6360-2>.
- Connell, R. W., and J. W. Messerschmidt. 2005. "Hegemonic Masculinity." *Gender & Society* 19 (6): 829–859. <https://doi.org/10.1177/0891243205278639>.
- Dochania, R., and A. Dochania. 2025. "Burdened by Masculinity: Exploring Men's Discrimination in India Through the Lens of Hegemonic Masculinity." *Journal of Psychosexual Health* 7 (4): 392–397. <https://doi.org/10.1177/26318318251334872>.
- Dr. Jaya Thakur v. Government of India. 2026. "Writ Petition (C) No. 1000 of 2022." Supreme Court of India. https://api.sci.gov.in/supremecourt/2022/35023/35023_2022_7_1502_68117_Judgement_30-Jan-2026.pdf
- Erchull, M. J. 2020. "You Will Find Out When the Time Is Right": Boys, Men, and Menstruation." In *The Palgrave Handbook of Critical Menstruation Studies*, 395–407. Singapore: Springer. https://doi.org/10.1007/978-981-15-0614-7_31.
- Frosh, S., A. Phoenix, and R. Pattman. 2003. "Taking a Stand: Using Psychoanalysis to Explore the Positioning of Subjects in Discourse." *The British Journal of Social Psychology* 42 (Pt 1): 39–53. <https://doi.org/10.1348/014466603763276117>.
- Ghosh, N., and L. Jamir. 2023. "Men and Menstruation in India: Time for Frank Discussions." *Indian Journal of Medical Ethics* VIII (4): 341–342. <https://doi.org/10.20529/IJME.2023.047>.
- Gundi, M., and M. A. Subramanyam. 2020. "Curious Eyes and Awkward Smiles: Menstruation and Adolescent Boys in India." *Journal of Adolescence* 85 (1): 80–95. <https://doi.org/10.1016/j.adolescence.2020.09.013>.
- Hales, G., P. Das, and D. Barrington. 2019. "Investigating the Policies and Practices of Teaching Menstrual Hygiene Education to Schoolboys in India." *Quarterly Publication of the Rcues of AILSG* 11 (3): 1–9. <https://www.aillsg.org/pdf/The-Urban-World-July-September-2018.pdf>
- Hennegan, J., I. T. Winkler, C. Bobel, D. Keiser, J. Hampton, G. Larsson, V. Chandra-Mouli, M. Plesons, and T. Mahon. 2021. "Menstrual Health: A Definition for Policy, Practice, and Research." *Sexual and Reproductive Health Matters* 29 (1): 1911618–1911638. <https://doi.org/10.1080/26410397.2021.1911618>.
- House, S., T. Mahon, and S. Cavill. 2012. "Menstrual Hygiene Matters: A Resource for Improving Menstrual Hygiene around the World." <https://washmatters.wateraid.org/sites/g/files/jkxoof256/files/Menstrual%20hygiene%20matters%20low%20resolution.pdf>.

- International Institute for Population Sciences (IIPS), and ICF. 2017. National Family Health Survey (NFHS-4), 2015-16. Mumbai, India. <https://www.nfhsiips.in/nfhsuser/nfhs4.php>.
- International Institute for Population Sciences (IIPS) and Centre of Demography of Gender (CDG). 2024. Menstrual Health Management (MHM) of Adolescents in Mumbai Slums, 2024 Fact Sheet. Mumbai, India. https://www.iipsindia.ac.in/sites/default/files/MHM_Fact_sheet.pdf.
- Jayamohan, A., and S. P. Tomar. 2024. "Menstruation and Masculinity: Exploring the Relationship between Boys and Menstruation." *Journal of Family Medicine and Primary Care* 13 (10): 4331–4335. https://doi.org/10.4103/jfmpc.jfmpc_297_24.
- Kabeer, N. 1999. "Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment." *Development and Change* 30 (3): 435–464. <https://doi.org/10.1111/1467-7660.00125>.
- Mason, L., M. Sivakami, H. Thakur, N. Kakade, A. Beaman, K. T. Alexander, A. Maria van Eijke, K. F. Laserson, M. B. Thakkar, and P. A. Phillips-Howard. 2017. "We Do Not Know": A Qualitative Study Exploring Boys Perceptions of Menstruation in India." *Reproductive Health* 14 (1): 174. <https://doi.org/10.1186/s12978-017-0435-x>.
- Ministry of Health and Family Welfare, Government of India. 2020. 'Rashtriya Kishor Swasthya Karyakram'. Press Information Bureau, 17 March 2020. <https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=200319>.
- Ministry of Human Resource Development (MHRD). 2019. "Adolescence Education Programme." NCERT. Preprint, https://ncert.nic.in/pdf/announcement/Training_Resource_Material_english.pdf.
- Morrill, A., E. A. Balmuth, A. Diarra, A.-M. Nguyen, N. Wyss, S. O. Master, D. L. Bell, and M. Sommer. 2025. "Young Men's Perspectives on Menstruation in New York City: A Qualitative Assessment." *Sex Roles* 91 (7): 47. <https://doi.org/10.1007/s11199-025-01599-x>.
- Office of the Registrar General & Census Commissioner, India. 2011. *Census of India 2011*. New Delhi: Government of India. <https://censusindia.gov.in/>
- Peranovic, T., and B. Bentley. 2017. "Men and Menstruation: A Qualitative Exploration of Beliefs, Attitudes and Experiences." *Sex Roles* 77 (1–2): 113–124. <https://doi.org/10.1007/s11199-016-0701-3>.
- Phillips-Howard, P. A., B. Caruso, B. Torondel, G. Zulaika, M. Sahin, and M. Sommer. 2016. "Menstrual Hygiene Management among Adolescent Schoolgirls in Low- and Middle-Income Countries: Research Priorities." *Global Health Action* 9 (1): 33032. <https://doi.org/10.3402/gha.v9.33032>.
- Ren, X. 2020. "Urban Redevelopment in Guangzhou and Mumbai." In *Governing the Urban in China and India*, 56–90. Princeton, NJ: Princeton University Press. <https://doi.org/10.23943/princeton/9780691203393.003.0004>.
- Routray, P., B. Torondel, T. Clasen, and W.-P. Schmidt. 2017. "Women's Role in Sanitation Decision Making in Rural Coastal Odisha, India." *PLoS One* 12 (5): e0178042. <https://doi.org/10.1371/journal.pone.0178042>.
- Sahin, M., T. Mahon, A. Tripathy, and N. Singh. 2015. "Putting the Men into Menstruation: The Role of Men and Boys in Community Menstrual Hygiene Management." *Waterlines* 34 (1): 7–14. <https://doi.org/10.3362/1756-3488.2015.002>.
- Santhya, K. G., and A. J. Francis Xavier. 2022. "Long-Term Impact of Exposure to a Gender-Transformative Program Among Young Men: Findings From a Longitudinal Study in Bihar, India." *The Journal of Adolescent Health* 70 (4): 634–642. <https://doi.org/10.1016/j.jadohealth.2021.10.041>.
- Shah, V., H. M. Nabwera, F. Sosseh, Y. Jallow, E. Comma, O. Keita, and B. Torondel. 2019. "A Rite of Passage: A Mixed Methodology Study about Knowledge, Perceptions and Practices of Menstrual Hygiene Management in Rural Gambia." *BMC Public Health* 19 (1): 277. <https://doi.org/10.1186/s12889-019-6599-2>.
- Tamiru, S., K. Mamo, P. Acidria, R. Mushi, C. Satya Ali, and L. Ndebele. 2015. "Towards a Sustainable Solution for School Menstrual Hygiene Management: Cases of Ethiopia, Uganda, South-Sudan, Tanzania, and Zimbabwe." *Waterlines* 34 (1): 92–102. <https://doi.org/10.3362/1756-3488.2015.009>.
- UNICEF. 2019. 'Guidance on Menstrual Health and Hygiene'. <https://www.unicef.org/media/91341/file/UNICEF-Guidance-menstrual-health-hygiene-2019.pdf>.
- van Eijk, A. M., M. Sivakami, M. B. Thakkar, A. Bauman, K. F. Laserson, S. Coates, and P. A. Phillips-Howard. 2016. "Menstrual Hygiene Management among Adolescent Girls in India: A Systematic Review and Meta-Analysis." *BMJ Open* 6 (3): e010290. <https://doi.org/10.1136/bmjopen-2015-010290>.
- Varsha, S., P. Vasudevan, and K. Palanisamy. 2025. "Men's Perspective Toward Menstruation: A Cross-Sectional Study." *Cureus* 17 (8): e90701. <https://doi.org/10.7759/cureus.90701>.
- Vashisht, S., A. Vashisht, S. Sharma, and A. S. Kalra. 2026. "Unveiling Adolescent Boys' Perceptions of Menstruation: A Qualitative Study." *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine* 78 (2): 302–307. <https://doi.org/10.1016/j.jadohealth.2025.10.008>.
- Water for Women. 2023. "We Are Committed: Making Menstrual Health and Hygiene Everybody's Business." 29 May 2023. <https://www.waterforwomenfund.org/en/news/we-are-committed-making-menstrual-health-and-hygiene-everybody-s-business.aspx>.