Shailendra Kumar Mishra*, Doyel Dasgupta and Subha Ray

A study on the relationship of sociocultural characteristics, menstrual hygiene practices and gynaecological problems among adolescent girls in Eastern India

DOI 10.1515/ijamh-2015-0111
Received November 17, 2015; accepted January 14, 2016

Abstract

Objective: The present study aims to understand the relationship of socioeconomic characteristics, menstrual hygiene practices and gynaecological problems among adolescent girls residing in rural and urban areas in the state of West Bengal, India.

Methods: The study was based on a sample of 715 adolescent girls from rural (325) and urban (390) areas of West Bengal, a state in Eastern India. These girls belong to the Bengali-speaking Hindu community. Data on socioeconomic characteristics, menstrual hygiene practices (such as type of absorbents used and mode of cleaning of genitals during days of menstrual discharge) and gynaecological problems were collected using pretested questionnaires.

Results: Rural and urban girls differ ($p<0.01$) for age at menarche, menstrual hygiene practices and prevalence of gynaecological problems. Urban girls have better menstrual hygiene practices ($\beta=0.343$, $p<0.01$) than rural girls. A similar trend is noted for gynaecological problems ($\beta=0.080$, $p<0.01$) among the study participants. Apart from socioeconomic characteristics, menstrual hygiene ($\beta=-0.121$, $p<0.01$) remains a significant predictor of gynaecological problems. The results of path analysis also indicate that girls of higher socioeconomic status have better menstrual hygiene practices which subsequently reduce the prevalence of gynaecological problems among them.

Conclusion: A concerted effort from parents, educational institutions and existing healthcare institutions along with media may ensure safe and secure reproductive health prospects for adolescents in the region.

Keywords: adolescent girls; gynaecological problems; India; menstrual hygiene; rural-urban; socioeconomic characteristics.

Introduction

Adolescence heralds several physiological events in human life. Onset of menarche is one such event among girls and calls for behavioural adjustments including maintenance of menstrual hygiene. Yet many of them remain oblivious or misinformed owing to cognitive immaturity and poor awareness (1–4). Maintenance of menstrual hygiene during adolescence has been acknowledged by researchers as a critical concern for overall reproductive health among girls (1, 5). Poor menstrual hygiene makes them susceptible to several gynaecological problems.

In traditional societies like India, menstruation is considered a taboo topic for discussion, further increasing the burden of ignorance and misconception among adolescents (1, 6). Lack of communication with elders in the family increases ignorance among girls regarding sexual and reproductive health issues including menstruation till the attainment of menarche (7). Further, menstruation is often considered as a polluting event and therefore, several behavioural restrictions are imposed on women. These restrictions reflect social beliefs that a woman during menstruation should refrain from cooking food, touching plants and worshiping gods and goddesses (6, 8).

Findings of the research suggest that menstrual hygiene and menstrual health are closely linked with women's fecundity as well as with other reproductive health risks (9, 11). Existing literature on adolescent girls clearly indicates a definite role of socioeconomic factors in normal reproductive maturation and functioning which

***Corresponding author: Shailendra Kumar Mishra,** Department of Anthropology, University of Allahabad, Allahabad 211002, India, Phone: +91-8052513613, E-mail: shailendra17@gmail.com
Doyel Dasgupta and Subha Ray: Department of Anthropology, University of Calcutta, Kolkata, India

includes maintenance of menstrual hygiene and its consequences as well (12).

In India, efforts have been made to understand concomitants of menstrual hygiene among girls (13, 14). Mounting evidence of the relationship between poor menstrual hygiene and inadequate access to available sanitary options to maintain proper hygiene during menstruation led the government to include new components in healthcare provisions to ensure menstrual hygiene among adolescents. For instance, in certain areas of the country, provisions are being made to provide sanitary pads to girls of lower socioeconomic groups (1). However, Eastern India, including West Bengal, has not been included in this scheme so far. Literature on menstrual hygiene practices, its correlates and consequences are scarce in eastern Indian States. Thus, the present study aims to understand the relationship of socioeconomic characteristics, menstrual hygiene practices and gynaecological problems among adolescent girls residing in rural and urban areas in West Bengal, India.

Methods

Participants and procedure

The rural and urban areas of West Bengal were selected to conduct the present study. The city of Kolkata (the state capital) was selected as the urban centre whereas rural areas were selected from two different districts of the state. The study locales (villages in the rural areas and municipal wards in the urban area) were selected by using multistage sampling technique (Figure 1). The city of Kolkata is under the jurisdiction of Kolkata Municipal Corporation (KMC), having 16 boroughs and a total of 141 KMC wards. We randomly selected five boroughs and two municipal wards from each selected borough in two different stages. Thus, a total number of 10 wards were selected in urban area (Figure 1). From the selected wards, a total number of 515 unmarried and nulliparous girls aged between 10 and 19 years were identified by local volunteers through door-to-door surveys. From this list, only 390 girls were finally selected fulfilling the criteria of selection for the present study, i.e. have attained menarche at least 2 years before the date of interview. Among the rest (125), 49 did not fulfil the criteria of this study and 76 girls were either unwilling to participate or unavailable during the study period. The state of West Bengal comprises of 19 districts. In four different stages, we randomly selected two districts, one subdivision from each selected district, two community development blocks from each selected subdivisions and five villages from each of the selected community development block. Thus, a total number of 20 villages were finally selected in rural area (Figure 1). A total number of 415 unmarried and nulliparous adolescent girls were identified from the selected villages by engaging local volunteers, of which only 325 fulfilled the selection criteria. The rest (90) of the adolescent girls from rural areas either did not fulfil the study criteria (62) or were unwilling to participate or remained unavailable (28) during the study period. The participation rates in urban and rural areas were 83.66% and 92.06%, respectively. The participants were interviewed in person by a female interviewer using a pretested questionnaire. Interviews were conducted in private rooms to avoid possible hesitation and reluctance in answering the questions. After preparation, the questionnaire was extensively reviewed and pretested on 30 urban and rural girls to assess the level of comprehension of the items and the cultural appropriateness of contents. Based on the feedback of pretesting, few questions were

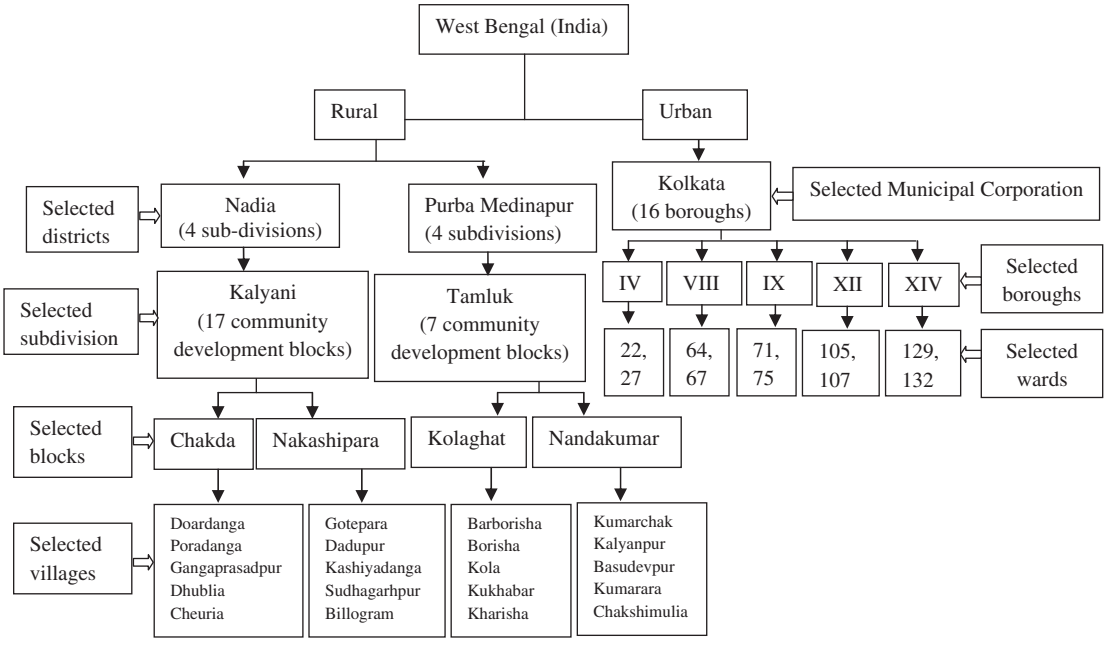

Figure 1: Flow chart showing process of selection of rural and urban study locales.

revised before finally applying in the field. Each interview lasted for approximately 60 min.

Ethical approval

Prior to the collection of data, the nature of the study was explained to the participants and their parents. A written consent for participation was sought both from the participants and their parents (mostly mothers were available). A priori, the participants and their parents were informed that the study has no direct benefits to them. The institution had no Ethical Review Board at the time of study from which the approval could have been obtained.

Measures

The data types include socioeconomic variables (participant's age at the time of interview, participant's level of education, parents' level of education, their occupation and monthly household income), menstrual characteristics (age at menarche, duration of menstrual discharge and number of days of peak discharge), hygiene practices (types of sanitary protection used during menstrual discharge and hygienic care during days of discharge such as frequency and mode of cleaning of genital organs) and gynaecological symptoms. Age at menarche was ascertained by asking the participants to recall the actual date of the incident, and if not, then the nearest month. A few of the participants could recall their age at menarche by referring to some landmark event or other memorable personal moment (e.g. her own birthday), which occurred around the time of menarche.

To minimise recall bias, the participants were asked to report their practices and experienced gynaecological problems during the last 3 months prior to the date of survey. The following are the definitions adopted to delineate menstrual characteristics, hygienic practices and gynaecological problems: menstrual years of the participant – difference between present age and age at menarche; peak days of discharge (self-assessed) – number of days during which maximum amount of menstrual blood is discharged (flow); duration of discharge – number of days during which menstrual blood is discharged; gynaecological problems – burning sensation during urination, increased frequency of urination, difficulty in controlling urine, leakage of urine and itching around genitalia. Responses for each of the gynaecological problems was recorded as 'present (coded as one)' or 'absent (coded as zero)'. The number of gynaecological problems reported by a participant was added to calculate a gynaecological problem score for further analysis. Menstrual hygiene practices among participants were assessed by using a list of items such as type of absorbent used; cleaning and drying practices of the absorbent (cloth/rags) if it is reused; and frequency of change of absorbents and cleaning practices of genitals during menstruation. Practices such as use of sanitary pads, use of detergent for cleaning of clothes/rags if reused, regular cleaning of genitals and use of pipe water for cleaning genitals were considered more hygienic than the use of clothes/rags, washing clothes/rags only by water for reuse, irregular cleaning of genitals and use of pond water for cleaning of genitals, respectively. A practice considered more hygienic is given a score 'one' while a less hygienic practice is given 'zero'. By adding these scores together, a menstrual hygiene practice score has been calculated for each participant. The participants had also been asked about restrictions imposed on them during menstruation (such as to refrain from touching males, participating in worship and staying outside home, etc.) by parents and other family members. They listed down the restrictions experienced by them during the days of menstrual discharge. The number of restrictions experienced by a participant was added to calculate a score for restrictions imposed on them during menstrual days.

Statistical analyses

Descriptive statistics was used to understand the trend in the socioeconomic profile and variation in menstrual characteristics between rural and urban participants. A χ^2-test was used to assess the association between categorical variables and a t-test was carried out to compare mean values of variables for the place of residence. A path analysis was carried out to estimate the direction and strength of the relationship between sociodemographic variables, menstrual hygiene and reported gynaecological problems. Furthermore, a stepwise linear regression was fitted to predict (a) the restriction imposed during menstruation, using socioeconomic variables; (b) menstrual hygiene, using socioeconomic variables and restrictions during menstruation as independent variables; and (c) prevalence of gynaecological problems, using menstrual hygiene and restrictions imposed during menstruation along with socioeconomic variables.

The analyses of the data were done using the Statistical Package for Social Sciences version 11.0.1 (SPSS Inc., Chicago, IL, USA) and R 3.0.2 software.

Results

Table 1 shows that a maximum percentage of participants had attained 5–8 years of formal education. However, a section of rural participants (6.77%) were non-literate. A noticeable difference remained for the educational levels of parents of the participants between rural and urban areas. The parents of rural and urban participants also differed significantly in educational attainment and occupation types. Mothers of rural participants were engaged as agricultural labourers, small-scale industrial workers and vegetable vendors compared to mothers of urban participants, who were mostly engaged as teachers and office workers. Fathers of rural participants were mostly engaged as skilled (carpenter, blacksmith, weaver) and unskilled labourers (agriculture). Skilled and unskilled labourers were clubbed together owing to a meagre proportion of unskilled labourers (3.98%) and almost similar nature of work. Some of them were also engaged in business and service of different kinds. In contrast, fathers of most of the urban participants served in various public and private sector establishments. A considerable section of these urban people were also engaged in medium- to large-scale businesses.

Table 1: Distribution of participants for socioeconomic characteristics.

Variable	Rural (n=325)	Urban (n=390)	Total (n=715)
Participant's formal educational attainment			
Non-literate	22 (6.77)	–	22 (3.08)
1–4 years	28 (8.62)	12 (3.08)	40 (5.59)
5–6 years	100 (30.77)	136 (34.87)	236 (33.01)
7– 8 years	157 (48.31)	195 (50.00)	352 (49.23)
>8 years	18 (5.53)	47 (12.05)	65 (9.09)
Father's level of education			
Non-literate and below primary	270 (83.08)	57 (14.62)	327 (45.73)
Secondary and below	43 (13.23)	42 (10.77)	85 (11.89)
Higher secondary and below	8 (2.46)	45 (11.54)	53 (7.41)
Graduate and below	4 (1.23)	227 (58.21)	231 (32.31)
Postgraduate and below	–	19 (4.86)	19 (2.66)
Mother's level of education			
Non-literate and below primary	292 (89.85)	61 (15.64)	353 (49.37)
Secondary and below	25 (7.69)	85 (21.79)	110 (15.38)
Higher secondary and below	4 (1.23)	43 (11.03)	47 (6.57)
Graduate and below	4 (1.23)	201 (51.54)	205 (28.68)
Father's occupation			
Skilled and unskilled work	234 (72.00)	31 (7.95)	265 (37.06)
Business	74 (22.77)	169 (43.33)	243 (33.99)
Services	17 (5.23)	190 (48.72)	207 (28.95)
Mother's occupation			
Homemakers	230 (70.77)	277 (71.03)	507 (70.91)
Working	95 (29.23)	113 (28.97)	208 (29.09)

Values in parentheses are percentages.

Table 2 shows that in spite of age similarities, urban and rural girls differed in mean age at menarche, menstrual years, mean duration of menstrual discharge, days of peak discharge and score of gynaecological problems. Urban participants attained menarche at significantly lower age compared to their rural counterparts. On the contrary, the mean duration of discharge, number of peak days of discharge and number of absorbents used in a cycle remained higher among urban participants compared to rural ones. However, the prevalence of gynaecological problems was higher among rural participants compared to urban participants. The frequency of reporting gynaecological problems by the participants varied from four to zero.

In general, rural and urban participants differed significantly in menstrual hygiene practices (Table 3). For example, a significantly higher proportion of urban girls used sanitary pads as an absorbent during menstrual discharge compared to rural ones. None of the participants reported using tampons or menstrual cups as an

Table 2: Distribution of participants for reported menstrual characteristics and gynaecological problems.

Variable	Rural (n=325)	Urban (n=390)	t-Values	Total (n=715)
Mean age of the participant (years)	14.27±1.96	14.12±1.21	1.25	14.19±1.51
Mean age at menarche (years)	12.10±1.15	11.42±1.03	8.34[b]	11.90±1.14
Menstrual years	2.37±0.20	2.67±0.19	20.53[b]	2.57±0.21
Mean duration of menstrual discharge (days)	4.18±1.34	4.92±1.25	7.63[b]	4.58±1.34
Mean number of days for peak discharge	2.19±0.93	3.57±1.25	16.46[b]	2.94±1.34
Mean number of absorbent used in a cycle	7.99±4.78	11.33±5.56	3.51[b]	11.0±5.57
Sanitary pads	7.99±4.78	11.33±5.56	3.54[b]	3.19±2.08
Cloth	3.24±2.12	3.12±1.98	0.59	
Mean score of gynaecological problems	0.42±0.64	0.35±0.69	−1.96[a]	0.39±0.67

[a]$p \leq 0.05$, [b]$p \leq 0.01$.

Table 3: Distribution of participants for menstrual hygiene practices.

Variable	Rural n (%)	Urban n (%)	χ^2	Total n (%)
Absorbent type				
Sanitary pad	33 (10.15)	324 (83.08)	37.08[a]	357 (49.93)
Clothes	292 (89.85)	66 (16.92)		358 (50.07)
Tampon/menstrual cup	NIL	NIL		NIL
Cleans genitals during menstruation				
No	100 (30.77)	4 (1.03)	12.17[a]	104 (14.55)
Yes	225 (69.23)	386 (98.97)		611 (85.45)
Frequency of genital cleaning				
Not applicable	100 (30.77)	4 (1.03)	21.29[a]	104 (14.55)
Once	93 (28.92)	40 (10.26)		133 (18.60)
More than once	132 (40.62)	346 (88.72)		478 (66.85)
Mode cleaning of genital				
Not applicable	100 (30.77)	4 (1.03)	26.39[a]	104 (14.55)
Soap and normal/warm water	3 (0.92)	128 (32.82)		131 (18.32)
Only normal/warm water	222 (68.31)	258 (66.15)		480 (67.13)
Source of cleaning water				
Not applicable	100 (30.77)	4 (1.03)	59.09[a]	104 (14.55)
Piped water	216 (66.46)	371 (95.13)		587 (82.10)
Pond water	9 (2.77)	15 (3.85)		24 (3.36)

[a]$p \leq 0.01$.

absorbent. The frequency of cleaning genitals and using soap and normal/warm water for cleaning genitals during days of menstrual discharge remained higher among urban participants compared to their rural counterparts. About one-third of the rural participants (30.77%) reported not cleaning their genitals during menstruation compared to 1.03% of urban ones.

Table 4 shows that prior to attainment of menarche, a significantly higher percentage of urban participants had information pertaining to menstruation compared to rural participants. A majority of the participants (59.49% in rural and 83.25% in urban) obtained this information from their mothers. For most of the participants, experience of the first menstruation had been a shock and surprise, irrespective of their place of residence. More than 90% of the participants in both rural and urban areas had experienced one or the other kinds of restrictions during menstruation imposed by their parents and/or their family members.

Results of path analysis showed a significantly positive relationship between socioeconomic characteristics and menstrual hygiene practices among the study participants (Figure 2). For instance, participants with a higher level of education and age group had better menstrual hygiene practices. However, an inverse relationship was noted between menstrual hygiene practices and the prevalence of gynaecological problems. The individual effect of each independent variable on the outcome variable and direction of their relationships were manifested in this analysis.

Table 5 shows that participant's age, mother's education and monthly household income were significant predictors of restrictions imposed during menstruation. It was found that the probability of imposing restrictions reduces with increase in age, mother's level of education and monthly income of household. Apart from these predictors, the participant's education, her urban living and restrictions imposed on her during menstruation were found to have a significant positive relationship with menstrual hygiene practices among them. Similarly, urban place of residence, mother's education and menstrual hygiene practices showed a positive relationship with the prevalence of gynaecological problems among participants; however, a negative relation was found with restrictions imposed during menstruation and gynaecological problems among them.

Discussion

The results of our study indicate rural-urban differences for several menstrual characteristics such as age at menarche, duration of menstrual discharge, number of days for peak discharge among the study participants. Like many studies among Indian populations, participants in urban areas attain menarche at a lower age compared to rural ones (22, 23). Health status and health behaviours are found to vary between rural-urban areas in other studies as well (18–21). The latest report of the National

Table 4: Awareness on menstruation and restrictions imposed during menstruation.

Variable	Rural n (%)	Urban n (%)	χ^2	Total n (%)
Had prior information about menstruation				
No	130 (40.00)	193 (49.49)	6.44[a]	323 (45.17)
Yes	195 (60.00)	197 (50.51)		392 (54.83)
Sources of prior information				
Mother	116 (59.49)	164 (83.25)	55.95[a]	280 (71.43)
Peer groups	72 (36.92)	17 (8.63)		89 (22.70)
Book	3 (1.54)	6 (3.05)		9 (2.30)
School	2 (1.03)	6 (3.05)		8 (2.04)
[b]Other	2 (1.03)	4 (2.03)		6 (1.53)
Type of reaction after first menstruation				
Shock and surprise	149 (45.85)	262 (67.18)	63.51[a]	411 (57.48)
No reaction	27 (8.31)	72 (18.40)		99 (13.85)
Pleasure	144 (44.31)	46 (11.79)		190 (26.57)
[c]Other	5 (1.54)	10 (2.56)		15 (2.10)
Experienced restrictions during menstruation				
No	46 (14.15)	121 (31.03)	28.19[a]	167 (23.36)
Yes	279 (85.85)	269 (68.97)		548 (76.64)
Restrictions imposed by				
Parents	267 (96.12)	256 (95.17)	24.99[a]	523 (95.44)
Other members	12 (3.88)	13 (4.83)		25 (4.56)
Types of restrictions imposed				
Not to run	46 (14.15)	97 (24.87)		143 (20.00)
Not to touch gods	137 (42.15)	53 (13.59)		190 (26.57)
Refrain from touching males	254 (78.15)	186 (47.69)		440 (61.54)
Not to go outside home alone	11 (3.38)	141 (36.15)		152 (26.15)
Take proper rest	1 (0.31)	2 (0.51)		3 (0.42)
Wear separate clothes	3 (0.92)	1 (0.26)		4 (0.56)

[a]$p \leq 0.0$; [b]Other: bill/posters, healthcare workers; [c]Other: feared, disgusting.

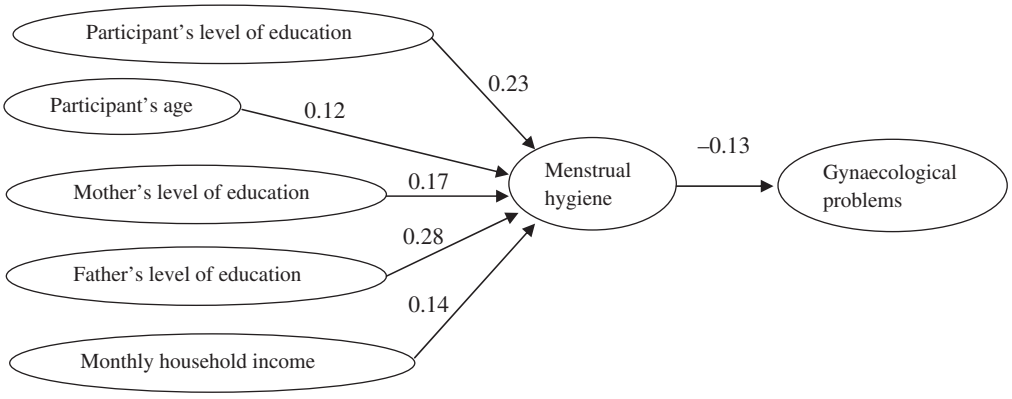

Figure 2: Path analysis showing the relationship of socioeconomic characteristics, menstrual hygiene and reported gynaecological problems.

Family and Health Survey (NFHS)-3 shows a wide difference between rural and urban populations in India pertaining to their general and reproductive conditions (15).

Menstrual hygiene practices of the participants vary according to their place of residence. Rural participants mostly use pieces of old clothes or rags as an absorbent for menstrual flow. Added to that, one-third of them do not clean their genitals during days of discharge. Lack of basic hygiene facilities such as access to sanitary pads, toilets and supply of pipe water as well as traditional sociocultural environment could be the major reasons for participants' poor menstrual hygiene. According to government sources, only 58.80% of households in the state of West Bengal have toilets (GOI, 2013). The traditional outlook

Table 5: Results of stepwise multiple linear regression for certain menstrual practices and gynaecological problems.

Dependent variable	Significant predictor(s)	β	SE	p-Value	R^2
Restrictions imposed during menstruation	Participant's age	−0.139	0.12	0.02	0.055
	Mother's level of education	−0.181	0.04	0.01	
	Monthly income of household	−0.148	0.01	0.02	
Menstrual hygiene	Participant's age	0.123	0.03	0.02	0.124
	Participant's level of education	0.223	0.21	0.01	
	Place of residence	0.343	0.03	0.01	
	Mother's level of education	0.132	0.06	0.01	
	Restrictions imposed during menstruation	0.099	0.02	0.02	
	Monthly income of household	0.119	0.01	0.01	
Prevalence of gynaecological problems	Place of residence	−0.080	0.05	0.04	0.034
	Mother's level of education	−0.076	0.06	0.03	
	Restrictions imposed during menstruation	0.089	0.02	0.02	
	Menstrual hygiene	−0.121	0.03	0.01	

of the society is explicitly manifested in the restrictions imposed by their family members on a large section of the participants during menstruation. The results of the present study conform to the findings of the studies carried out elsewhere (26, 27). In order to inculcate proper hygiene practices during menstruation among rural participants, awareness programmes at community level are warranted.

When controlled for all the sociodemographic variables together, rural-urban difference is significantly discernible for predicting menstrual hygiene and the prevalence of gynaecological problems; however, the difference does not remain significant in predicting restrictions imposed during menstruation. The findings affirm that the outlook of the society remains unchanged in both rural and urban settings for imposing restrictions during menstruation. Among socioeconomic attributes of parents, mother's education is found to determine menstrual hygiene practices and the prevalence of gynaecological problems among participants. Similar results are reported from the studies among adolescents in different areas (28, 29). Adolescents are considered as a healthy group free from diseases and infirmities. Hence, health facilities are generally designed to serve either children or adults (15). The development and maturation of the reproductive system among adolescents introduces a new set of reproductive health risks, especially among girls. They remain susceptible to several health ailments, having adverse consequences both at the individual and societal level (21).

Path analysis shows that the direction and strength of the relationship between socioeconomic variables and menstrual hygiene underlines a significantly positive role of the participants' own education, parents' education and their economic status in maintaining proper hygiene during menstruation. A negative relationship between menstrual hygiene and the prevalence of gynaecological problems is also discernible in this analysis. By increasing knowledge and awareness on biological changes encountered by adolescents during this phase of the life, they can be enabled to remain prepared for health challenges which they may face (24, 25). Yet many of the participants, both in rural and urban areas, remain ignorant about menstruation till they attain menarche.

In a country like India, menstrual health and related practices among adolescents has never been an issue of priority in public health policies, baring a few initiatives taken during the last decade (1, 16). Furthermore, the problems of illiteracy, lack of health education, gender disparity, 'culture of silence' and the absence of governmental initiatives to address this group have resulted in poor menstrual health awareness and practices among adolescent females in the past (17). This complex situation results in ignorance and misconceptions about menstrual health as well as low access and utilisation of available health and hygiene facilities.

Limitations and strength

In spite of the modest sample size and an adequate representation from both rural and urban areas and the community level survey, the findings of the present study retains certain limitations. The study is only focused on menstrual behaviour and its socioeconomic concomitants. It does not address the role of media, educational and healthcare institutions in generating awareness on menstrual practices and its management. Owing to the cross-sectional nature of the study, no claim can be made about causality.

Conclusion

The present study clearly demonstrates that despite rural-urban differences, the role of parents remains imperative in educating and supporting girls to adopt healthy hygienic practices during menstruation. A girl's own education as well as her mother's level of education significantly influences her hygiene behaviour. The findings of the present study can be used by healthcare professionals and health policy planners in understanding the dimensions, magnitude and nature of problems pertaining to menstrual practices and management among adolescents in the region (30, 31). Thereby, it may also help bridging the gap in the menstrual health situation between rural and urban adolescents. The results also suggest that society should make an effort to improve living conditions in such a way that rural girls from a poorer social background have the same opportunity to have good menstrual hygiene practices as the urban ones.

Acknowledgments: The authors are most thankful to the study participants. Financial support for the study was provided by the University Grants Commission (Under DSA Phase III Programme) to the Department of Anthropology, University of Calcutta.

Conflict of interest statement: There remains no conflict of interest among the authors.

References

1. Garg R, Goyal S, Gupta S. India moves towards menstrual hygiene: subsidized sanitary napkins for rural adolescent girls – issues and challenges. Matern Child Health J 2012;16:767–74.
2. Kumar A, Srivastava K. Cultural and social practices regarding menstruation among adolescent girls. Soc Work Public Health 2011;26:594–604.
3. Juyal R, Kandpal SD, Semwal J, Negi KS. Practices of menstrual hygiene among adolescent girls in a district of Uttrakhand. Ind J Community Health 2012;24:124–8.
4. Chothe V, Khubchandani J, Seabert D, Asalkar M, Rakshe S, et al. Student's perceptions and doubts about menstruation in developing countries: a case study from India. Health Promot Pract 2014;15:319–26.
5. El-Gilany AH, Badawi K, El-Fedawy S. Menstrual hygiene among adolescent school girls in Mansoura, Egypt. Reprod Health Matters 2005;13:147–52.
6. Jogdand K, Yerpude P. A community based study on menstrual hygiene among adolescent girls. Indian J Maternal Child Health 2011;13:1–6.
7. Kaur M. Mainstreaming gender in health. Indian J Community Med 2005;30:75–7.
8. Veigas I, Vaswani V. A study on mother's perception and practices of menstruation in Mangalore-Southern Karnataka. Res J Soc Sci Manag 2013;3:76–81.
9. Gardener J. Adolescent menstrual characteristics as predictors of gynaecological health. Ann Hum Biol 1983;10:31–40.
10. Sachan B, Idris MZ, Jain S, Kumari R, Singh A. Age at menarche and menstrual problems among school going adolescent girls of a north Indian district. J Basic Clinic Reprod Sci 2012;1:56–9.
11. Lee JC, Yu BK, Byeon JH, Lee KH, Min JH, et al. A study of the menstruation of Korean adolescent girls in Seoul. Korean J Paediatr 2011;54:201–6.
12. Jejeebhoy SJ. Adolescent reproductive behaviour: a review of the evidence from India. In: Ramasubban R, Jejeebhoy SJ, editors. Women's Reproductive Health in India. New Delhi: Rawat Publication, 2000:40–101.
13. Yasmin S, Manna N, Mallik S, Ahmed, Paria B. Menstrual hygiene among adolescent school students: An in depth cross-sectional study in an urban community of West Bengal, India. J Dent Med Sci 2013;5:22–6.
14. Ade A, Patil R. Menstrual hygiene practices of rural adolescent girls of Richur. Int J Biol Med Res 2013;4:3014–7.
15. Thakre SB, Thakre SS, Reddy M, Rathi N, Pathak K, et al. Menstrual hygiene: Knowledge and practice among adolescent school girls of Saoner, Nagpur district. J Clin Diagn Res 2011;5:1027–33.
16. Dambhare DG, Wagh SV, Dudhe JY. Age at menarche and menstrual cycle pattern among school adolescent girls in central India. Glob J Health Sci 2012;4:105–11.
17. Verheij RA, van de Mheen HD, de Bakker DH, Groenewegen PP, Mackenbach JP. Urban-rural variations in health in The Netherlands: Does selective migration play a part? J Epidemiol Community Health 1998;52:487–93.
18. Kabir ZN, Tishelman C, Aguero-Torres H, Chowdhury AM, Winblad B, et al. Gender and rural–urban differences in reported health status by older people in Bangladesh. Arch Gerontol Geriatr 2003;37:77–91.
19. Thakre SB, Thakre SS, Ughade S, Thakre AD. Urban-rural differences in menstrual problems and practices of girl students in Nagpur, India. Indian Pediatr 2012;49:733–6.
20. Ray S, Mishra SK, Roy AG, Das BM. Menstrual characteristics: A study of adolescents of rural and urban West Bengal, India. Ann Hum Biol 2010;37:668–81.
21. IIPS (International Institute for Population Sciences), ORC Macro. National Family Health Survey (NFHS-3), 2005-06, India, 2007; IIPS, Mumbai.
22. Government of India. 2013. Available at: https://data.gov.in/catalog/state-wise-percentage-distribution-rural-and-urban-households-having-toilet-facilities#web_catalog_tabs_block_10. Accessed on 12th March 2015.
23. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. Reprod Health Matters 2001;9:16–25.
24. Liu HL, Chen KH, Peng NH. Cultural practices relating to menarche and menstruation among adolescent girls in Taiwan-qualitative investigation. J Paediatr Adolesc Gynaecol 2012;25:43–7.
25. Iliyasu Z, Aliyu MH, Abubakar IS, Galadanci HS. Sexual and reproductive health communication between mothers and their adolescent daughters in northern Nigeria. Health Care for Women Int 2012;33:138–52.

26. Nair MK, Thankachi Y, Leena ML, George B, Russell PS. ARSH4: Parental understanding of adolescent issues: parents-adolescent dyad agreement. Indian J Pediatr 2013;80:S209–13.
27. Jarrah SS, Kamel AA. Attitudes and practices of school-aged girls towards menstruation. Int J Nurs Pract 2012;18:308–15.
28. Shah SP, Nair R, Shah PP, Modi DK, Desai L. Imposing quality of life with new menstrual hygiene practices among adolescent tribal girls in rural Gujarat, India. Reprod Health Matters 2013;21:205–13.
29. Dasgupta A, Sarkar M. Menstrual Hygiene: How Hygienic is the Adolescent Girl? Indian J Community Med 2008;33:77–80.
30. Jejeebhoy SJ, Sebastian MP. Actions that protect: Promoting sexual and reproductive health and choice among young people in India. New Delhi, India: Population Council. South and East Asia 2003. Available at: http://www.popline.org/node/250879.
31. Mason L, Nyothach E, Alexander K, Odhiambo FO, Eleveld A, et al. 'We keep it secret so one should know' – A qualitative study to explore young school girls attitudes and experiences with menstruation in rural western Kenya. PLoS ONE 2013;8:e79132.