Menstrual Hygiene Management Practice among Adolescent Girls: An Urban-Rural Comparative Study in Rajshahi Division, Bangladesh

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Research Article

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Abstract

Introduction:

Adolescence is a critical period characterized by significant physical, emotional, cognitive and social changes, and monthly occurrence of menstruation of adolescent girls. Despite being an inevitable natural event, most of the societies consider menstruation and menstrual blood as taboo and impure that prevents many adolescent girls from proper education and information which force them to develop their ways of managing the event. In this study, we attempted to explore the pattern of menstrual hygiene management practice, the urban-rural differences of the practice, and the determinants of the practice among adolescent girls in Rajshahi division, Bangladesh.

Methodology:

Using a cross-sectional study design with systematic random sampling, we collected data from 589 adolescent girls (aged 14–19 years) from Rajshahi division of Bangladesh. We employed bivariate and multinomial logistic regression analysis.

Findings:

We found significant differences in menstrual hygiene management practice among adolescent girls between urban and rural areas. Only 37.9% continuously used sanitary pad. Among the cloth users, nearly two-third reused cloths and about 56% of them used water and soap to wash these cloths. About 49% changed menstrual absorbent and 44% washed their genitalia three times a day. About 41% used water only to wash genitalia, and 55% buried sanitary materials under soil after using. Around 22% of the girls practiced terrible, 63.3% fair, and 14.7% proper menstrual management. Multinomial logistic regression found that the place of residence, family size, wealth quintile, parents’ education, and social connectivity was the significant determinant of menstrual hygiene management practice.

Conclusion:

Although there are some cases of sanitary pad use, still menstrual hygiene management is unhealthy in most cases. The continuous flow of sanitary pads at affordable cost, change in existing social norms about menstruation and proper education, information and services are essential for achieving health-related SDG goals.

Introduction

Adolescence is a critical period of women life characterized by the occurrence of first menstruation, a natural and beneficial biological event, and associated significant physical, emotional, cognitive and social changes[1, 2]. Although the onset of menstruation depends on biological and nutritional status, in 2014, more than 250 million girls aged 10–14 lived in less developed countries who were exposed to experience the occurrence of menstruation[3]. Despite being an inevitable and natural process, most of
the societies consider menstruation as a taboo [1, 2, 4–7]. Many of the norms and stigmas associated
with the event are based on discriminatory gender role and cultural restrictions which makes it a silent
and invisible issue [1, 2, 4–7]. As a result, it prevents many adolescent girls from proper menstrual
information and education. Furthermore, it also exposes them to challenges to manage menstruation and
menstrual blood properly and force them to develop their way of managing it depending on existing
traditional and cultural belief, level of knowledge on menstruation and personal preferences [1, 2, 4–7].

Studies show that more than 50% of the adolescent girls are deprived of menstrual knowledge before
reaching menarche and they have a misconception about the process of menstruation [8, 9]. Although
mother and female relatives are the primary sources of information about menstruation in most of the
developing countries, they can transfer very little and often transfer misconceptions which may affect
adolescent girls’ response to menstrual management[8–12]. In countries like India and Bangladesh,
menstrual hygiene management status is poor among adolescent girls. Although the unmet need for
quality sanitary materials is high, very few, use sanitary pads. The determinants of using sanitary pads
are including family members suggestion on what to use, high cost of sanitary pads, income and
economic status, parental education, place of residence, religion, presence of sanitary latrine at home,
mobility, feeling of shyness to collect sanitary materials, unawareness, difficulty with disposal of sanitary
materials and personal choices etcetera[1, 6, 8, 10, 13–18].

Along with the low prevalence of sanitary pad, high rate of cloth use, reuse of the same cloth and other
associated unhealthy practices are also considerable. In Bangladesh, although more than 80% of
adolescent girls use cloths to manage menstrual blood, more than 50% do not wash and dry these cloths
properly before reuse. The frequency of changing sanitary materials, cleaning of genitalia, materials used
for cleaning genitalia and disposal of sanitary materials are also not appropriate[1, 8, 9, 13, 19].

Poor menstrual management affects girls’ school attendance and academic progress through
psychological and physical factors [2, 20]. At the same time, it affects their maternal and reproductive
health. Poor menstrual management may increase the risk of reproductive tract infections (RTI) which is
considered as a significant public health problem [1–3]. It may also lead to an increase in the risk of
sexually transmitted disease (STD) and Human Papillomavirus (HPV) infection and adverse pregnancy
outcomes[1–3].

Menstruation related hygiene practice is a severe problem in low and middle-income countries[13]. To our
best knowledge, few studies addressing menstrual management practice have been conducted in
Bangladesh [1, 9, 10, 12, 19]. Nevertheless, none of the studies has addressed the broader dimensions of
socioeconomic determinants of the process with barriers. Identifying and addressing critical
socioeconomic issues related to menstrual management is essential to attain some of the sustainable
development goals (Goal-3, 4, 5, and 6) since these goals are influenced either directly or indirectly by
menstrual management practice[13].

Data And Methods
Data Source and Data Collection Process

Firstly, we randomly selected the study area, Rajshahi division from eight divisions of Bangladesh. One of the administrative districts named Chapainawabganaj was selected randomly out of the eight districts of Rajshahi division. Then four administrative sub-districts (Upazila in Bangladesh) out of the five were selected randomly. Finally, a total of eight secondary schools were selected with the help of key informants from the selected area. With 95% confidence interval, 5% non-response rate, and 1.5 design effect, the total sample size was 589 based on 10% prevalence of sanitary pad use among school-going adolescent girls (found in Bangladesh National Hygiene Baseline Survey-2014). Using a cross-sectional study design and a pre-tested, well-structured questionnaire, we collected data from adolescent girls studying in nine and ten standard during 17–25 November, 2018. Before going to data collection, informed consent was taken from the head of the institution of each school over the phone. As permission received, one of the female teachers from each school was appropriately trained on the data collection process. On the scheduled day, girls from standard nine and ten were gathered in a classroom and were seated in-class environment. Finally, after delivering a short description of the research objectives, a questionnaire was delivered to each of the students. After completing the required responses, the questionnaire was collected by the responsible female teacher.

Variables of the Study

The dependent variable of this study is “Menstrual Hygiene Management Practice” which has three weight-adjusted categories namely bad, fair, and good. For measuring menstrual hygiene management practice, a total of 13 indicators were used. For measurement purpose, healthy practices for each indicator were valued one and unhealthy practices were valued zero. As five indicators, taken from existing literature (reuse of cloth, washing of cloths before reusing, washing materials, place of drying of washed cloths, and place of storing dried cloths) [19, 21–23] were associated with non-pad users only, they were summed up into a single variable. Other indicators were also taken from existing literature including absorbent used, frequency of changing absorbent, genitalia washing during menstruation, genitalia washing frequency, genitalia washing material, taking a bath during menstruation, frequency of bathing during menstruation, and ways of disposal of sanitary materials [9, 15, 19, 21, 23–26] and were applicable for all participants. Then, the total number of indicators reduced to nine and values for all indicators were summed up. The highest attainable value for a respondent was nine and the lowest attainable value was zero. Finally, respondents attaining value from zero to five were defined as a bad practitioner, from six to seven as a fair practitioner, and eight to nine as a good practitioner, with the Cronbach alpha value of reliability analysis of the scale was 0.71.

Socioeconomic and demographic variables were used as the independent variables including age, family size, religion, wealth quantile, fathers’ and mothers’ education, fathers’ and mothers’ income, age of first menstruation, social connectivity, and information before reaching menstruation taken from the existing literature [1, 12, 30–33, 17, 19, 22–24, 27–29].

Analytical Approach
We used both bivariate and multiple variables analysis. For the bivariate analysis, we used a cross-tabulation and chi-square test (if it is possible) to explore the pattern of menstrual hygiene management practice and their urban-rural differences. Multiple multinomial logistic regression analysis was applied to assess the effect of socioeconomic factors on menstrual hygiene management.

**Findings**

**Socio-Demographic Characteristics of Respondents**

Table 1 represents the socio-demographic characteristics of respondents. Data show that the mean age of the respondent in this study was 15.5 (standard deviation is 0.71) years. Out of 589 girls, 254 (43.1%) lived in urban areas, and the rest lived in rural areas. Most of the respondents (71.8%) used to live in small families (highest five members) both in urban and rural areas. We used a total of ten indicators to measure wealth quintile and found that 47.9% of respondents belonged to middle and 18.4% belonged to the upper class. A significant urban-rural difference was found in term of wealth quintile ($p = 0.000$) among respondents. Data regarding parents’ education indicated that 7.8% of fathers and 5.1% of mothers did not have any formal education. An urban-rural difference was found in term of fathers’ income ($p = 0.001$) although mothers’ income does not vary significantly. More than one-fourth (30.1%) of the adolescent girls reported that they did not have a social connection and only 10.4% reported having a high social connection and the scenario varies significantly between urban and rural areas.
Table 1
Background Characteristics of Respondents

| Background Characteristics | Urban n (%) | Rural n (%) | Total n (%) | P-value of $X^2$ |
|----------------------------|-------------|-------------|-------------|------------------|
| Age                       |             |             |             | 0.005            |
| $\geq 15$                 | 117 (46.1)  | 192 (57.8)  | 312 (53.0)  |                  |
| $\leq 16$                 | 137 (53.9)  | 140 (42.2)  | 277 (47.0)  |                  |
| Family Size               |             |             |             | 0.944            |
| Small                     | 181 (71.3)  | 240 (72.3)  | 423 (71.8)  |                  |
| Large                     | 73 (28.7)   | 92 (27.7)   | 166 (28.2)  |                  |
| Religion                  |             |             |             | 0.000            |
| Islam                     | 237 (93.7)  | 306 (92.4)  | 544 (92.7)  |                  |
| Hindu                     | 16 (6.3)    | 25 (7.6)    | 43 (7.3)    |                  |
| Wealth Quintile           |             |             |             | 0.000            |
| Lower Class               | 58 (24.7)   | 122 (41.2)  | 180 (33.7)  |                  |
| Middle Class              | 135 (57.4)  | 118 (39.9)  | 256 (47.9)  |                  |
| Upper Class               | 42 (17.9)   | 56 (18.9)   | 98 (18.4)   |                  |
| Father's Education        |             |             |             | 0.000            |
| Illiterate                | 6 (2.4)     | 40 (12.0)   | 46 (7.8)    |                  |
| Primary                   | 111 (43.7)  | 103 (31.0)  | 215 (36.5)  |                  |
| Secondary                 | 69 (27.2)   | 121 (36.4)  | 190 (32.3)  |                  |
| Higher Secondary and above| 68 (26.8)   | 68 (20.5)   | 138 (23.4)  |                  |
| Mother's Education        |             |             |             | 0.009            |
| Illiterate                | 7 (2.8)     | 23 (6.9)    | 30 (5.1)    |                  |
| Primary                   | 76 (29.9)   | 89 (26.8)   | 165 (28.0)  |                  |
| Secondary                 | 147 (57.9)  | 190 (57.2)  | 338 (57.4)  |                  |
| Higher Secondary and above| 24 (9.4)    | 30 (9.0)    | 56 (9.5)    |                  |
| Father's Income           |             |             |             | 0.001            |
| Low income                | 92 (36.9)   | 152 (52.4)  | 244 (45.1)  |                  |
| Middle Income             | 116 (46.6)  | 115 (39.7)  | 233 (43.1)  |                  |
### Menstrual Knowledge of Respondents

Findings regarding menstrual knowledge are presented in Table 2. According to data, the mean age of first menstruation of respondents was 12.8 (standard deviation is 0.97) years. The first age of menstruation varied significantly ($p = 0.008$) between urban and rural areas, and it revealed that the mean age of first menstruation was slightly higher in rural areas (12.9 years) compared to urban (12.6 years) areas. About two-thirds (75.2%) of respondents reported that they had received information about menstruation before reaching menarche while rest did not receive any information before first menstruation. Sources of information about menstruation identified in this study were mother (42.3%), female friend (22.8%), female teacher (18.4%), sister (13.3) and others (3.2).

Respondents’ perception towards pad use was measured using a set of four statements. Later they were summed up to obtain overall perception. The result shows that 63.7% of girls had a positive perception of sanitary pad use and rest had negative. Notably, all three variables mentioned above (information availability, source of information and perception towards pad use) vary significantly between urban and rural areas.
Table 2
Knowledge and Perception of Menstruation

| Background Characteristics                  | Urban n (%) | Rural n (%) | Total n (%) | P-value of $X^2$ |
|---------------------------------------------|-------------|-------------|-------------|-----------------|
| **Age of first menstruation**               |             |             |             | 0.008           |
| $\geq 12$                                   | 104 (40.9)  | 98 (29.5)   | 204 (34.6)  |                 |
| $\leq 13$                                   | 150 (59.1)  | 234 (70.5)  | 385 (65.4)  |                 |
| **Information Availability Before Reaching Menarche** |             |             |             | 0.024           |
| Yes                                         | 203 (80.2)  | 236 (71.1)  | 442 (75.2)  |                 |
| No                                          | 50 (19.8)   | 96 (28.9)   | 146 (24.8)  |                 |
| **Source of Information**                   |             |             |             | 0.000           |
| Mother                                      | 77 (38.3)   | 105 (45.5)  | 184 (42.3)  |                 |
| Female Friend                                | 38 (18.9)   | 61 (26.4)   | 99 (22.8)   |                 |
| Sister                                      | 21 (10.4)   | 36 (15.6)   | 58 (13.3)   |                 |
| Teacher                                     | 59 (29.4)   | 21 (9.1)    | 80 (18.4)   |                 |
| Others                                      | 6 (3.0)     | 8 (3.5)     | 14 (3.2)    |                 |
| **Perception of sanitary pad use**          |             |             |             | 0.000           |
| Positive                                    | 206 (81.1)  | 167 (50.3)  | 375 (63.7)  |                 |
| Negative                                    | 48 (18.9)   | 165 (49.7)  | 214 (36.3)  |                 |

**Menstrual Hygiene Management Practice of Adolescent Girls**

In this study, a total of 13 indicators were used to measure the menstrual hygiene management practice of adolescent girls. Table 3 presents the findings and shows that the highest 37.9% of adolescent girls used sanitary pads and 27% used old/new cloth only to manage their menstrual blood. Use of absorbent does not vary statistically ($p = 0.47$) between urban and rural areas. Among the cloth users ($n = 364$, including occasionally cloth users), nearly two thirds (70.9%) re-used the same cloth and almost all (97.7%) washed these cloths before re-using. Water and soap were used as the main ingredient (56.8%) in both urban and rural areas. In 51.6% cases, the washed cloth was dried in open sunny places and after drying, nearly two-thirds (74.7%) of them were stored in hidden places in the room. Around 49% of girls changed menstrual materials three times a day, and only 0.3% changed it four or more times. These practices did not vary based on place of residence. Almost all (98.8%) washed their genitalia during menstruation although the frequency varied. Data show that 44% of girls washed their genitalia three times, 34% four or more times and 8.3% single time in a day. For washing genitalia, 40.9% of girls used water only and the rate was higher in urban areas. Both washing frequency and materials varied.
significantly between the two areas. During menstruation, more than two-thirds of the girls (77.6%) took a bath regularly. After use, 55.4% of the girls buried their sanitary materials under the soil and 20.3% threw it in pond or river and the practice of disposing of sanitary materials varied between the two areas.
Table 3
Menstrual Hygiene Management Process of Adolescent Girls

| Indicators of MHM Practice | Urban n (%) | Rural n (%) | Total n (%) | P-value of $X^2$ |
|---------------------------|------------|------------|-------------|------------------|
| Absorbent Used            |            |            |             | 0.470            |
| Sanitary Pad              | 106 (41.7) | 114 (34.7) | 222 (37.9)  |                  |
| Sometimes Pad sometimes cloth | 87 (34.3) | 118 (35.9) | 206 (35.2)  |                  |
| Old Cloth                 | 40 (15.7)  | 69 (21.0)  | 109 (18.6)  |                  |
| New Cloth                 | 21 (8.3)   | 28 (8.5)   | 49 (8.4)    |                  |
| Reuse of cloth            |            |            |             | 0.033            |
| No                        | 51 (34.9)  | 53 (24.4)  | 105 (29.1)  |                  |
| Yes                       | 95 (65.1)  | 161 (75.2) | 256 (70.9)  |                  |
| Washing of Cloth before Reuse |         |            |             | a                |
| Yes                       | 92 (93.9)  | 163 (100.0)| 255 (97.7)  |                  |
| No                        | 6 (6.1)    | 0 (0.0)    | 6 (2.3)     |                  |
| Washing Materials         |            |            |             | 0.057            |
| Water and Soap            | 46 (47.9)  | 100 (62.1) | 146 (56.8)  |                  |
| Water and Antiseptic      | 12 (12.5)  | 21 (13.1)  | 33 (12.8)   |                  |
| Water Soap and Antiseptic | 31 (32.3)  | 27 (16.8)  | 58 (22.6)   |                  |
| Water Only                | 7 (7.3)    | 12 (7.5)   | 19 (7.4)    |                  |
| Place of drying washed cloth before re-use |         |            |             | a                |
| By keeping in bed or other cloths | 3 (3.1)  | 9 (5.7)    | 12 (4.7)    |                  |
| In shaded and closed place | 23 (23.7) | 45 (28.3)  | 68 (26.6)   |                  |
| In shaded but open place  | 13 (13.4)  | 31 (19.5)  | 44 (17.2)   |                  |
| In open sunny place       | 58 (59.8)  | 74 (46.5)  | 132 (51.6)  |                  |
| Place of storing dried cloth |         |            |             | 0.157            |
| Indicators of MHM Practice          | Urban n (%) | Rural n (%) | Total n (%) | P-value of $\chi^2$ |
|------------------------------------|-------------|-------------|-------------|---------------------|
| Hidden place within the room       | 78 (81.3)   | 111 (70.7)  | 189 (74.7)  |                     |
| With other cloths                  | 9 (9.4)     | 26 (16.6)   | 35 (13.8)   |                     |
| Within the bathroom                | 9 (9.4)     | 20 (12.7)   | 29 (11.5)   |                     |
| **Frequency of changing absorbent**|             |             |             | a                   |
| Less than one time a day           | 00 (0.0)    | 12 (3.7)    | 12 (2.1)    |                     |
| One time per day                   | 23 (9.3)    | 33 (10.2)   | 56 (9.8)    |                     |
| Two times per day                  | 96 (38.9)   | 128 (39.5)  | 224 (39.0)  |                     |
| Three times per day                | 126 (51.0)  | 151 (44.6)  | 277 (48.8)  |                     |
| Four or more times per day         | 2 (.8)      | 00 (0.0)    | 2 (.3)      |                     |
| **Genitalia washing during menstruation**|             |             |             | a                   |
| Yes                                | 246 (99.6)  | 314 (98.1)  | 560 (98.8)  |                     |
| No                                 | 1 (0.4)     | 6 (1.9)     | 1 (1.2)     |                     |
| **Genitalia washing frequency**    |             |             |             | 0.000              |
| One time per day                   | 18 (7.3)    | 29 (9.2)    | 47 (8.3)    |                     |
| Two times per day                  | 20 (8.1)    | 57 (18.8)   | 77 (13.7)   |                     |
| Three times per day                | 107 (43.3)  | 141 (44.9)  | 248 (44.0)  |                     |
| Four or more times per day         | 102 (41.3)  | 87 (27.7)   | 192 (34.0)  |                     |
| **Genitalia washing material**     |             |             |             | a                   |
| Water only                         | 117 (47.4)  | 112 (35.3)  | 232 (40.9)  |                     |
| Water and soap                     | 67 (27.1)   | 151 (47.6)  | 218 (38.4)  |                     |
| Water soap and antiseptic          | 62 (25.1)   | 54 (17.0)   | 116 (20.5)  |                     |
| Others                             | 1 (0.4)     | 00 (0.0)    | 1 (0.2)     |                     |
| **Taking a bath during menstruation**|             |             |             | a                   |
### Indicators of MHM Practice

|                              | Urban n (%) | Rural n (%) | Total n (%) | P-value of $X^2$ |
|------------------------------|-------------|-------------|-------------|-----------------|
| Yes                          | 250 (98.4)  | 324 (98.2)  | 577 (98.3)  |                 |
| No                           | 00 (0.0)    | 2 (0.6)     | 2 (0.3)     |                 |

#### Frequency of bathing during menstruation

|                                              |             |
|----------------------------------------------|-------------|
| Less than one time a day                     | 60 (24.6)   |
| One time per day                             | 181 (74.2)  |
| Two or more time per day                     | 2 (0.8)     |

#### Ways of disposing of sanitary materials

|                                               |             |
|-----------------------------------------------|-------------|
| Throwing into pond or river                   | 10 (4.0)    |
| Throwing in open places                       | 1 (0.4)     |
| Burying under soil                            | 192 (77.4)  |
| Throwing into the dustbin with other wastage  | 37 (14.9)   |
| Throwing into the commode and pouring water   | 4 (1.6)     |
| Others                                        | 4 (4.6)     |

Note: ‘a’ refers that the assumption of chi-square test was not fulfilled for this variable

### Barriers to continuous use of sanitary pad

Table 4 presents barriers of continues use of sanitary pads. Findings show that, among the sanitary pad users, including sometimes cloth and sometimes pad users, respondents herself (45.2%) and their parents are the primary buyers of sanitary pads although these sources vary based on place of residence. In both urban and rural areas, a large number of girls feel shy to buy sanitary materials from male shopkeepers (36.1%) and in the presence of a male in the shop other than the shopkeeper (58.8%). About two-thirds (75.8%) of adolescent girls cannot use sanitary pads continuously due to the absence of sanitary pads at home during their menstruation. To manage this, they either use old/new cloths (66.3%) or borrow sanitary pads (28.3%) or take other measures. Among all-time cloth users (27%), including old and new cloth, 71.8% wished to use sanitary pads but could not because of high cost (35.6%), feeling of embarrassment to buy (37.5%), unavailability of sanitary pads at nearby shops (10.6%) and other (16.3)
causes. Adolescent Girls unwilling to use sanitary pads mentioned relaxation to use cloths (60%), unnecessary money expending (27.5%), rashes (10%), and other (2.5%) causes as a reason.
### Table 4
Barriers to continuous sanitary pad use

| Selected Barriers to Continuous Sanitary Pad Use | Urban n (%) | Rural n (%) | Total n (%) | P-value of $X^2$ |
|-------------------------------------------------|------------|------------|-------------|------------------|
| Sanitary pad buyer                              |            |            |             | 0.000            |
| Respondent herself                              | 81 (40.5)  | 115 (49.8) | 196 (45.2)  |                  |
| Mother                                          | 53 (56.5)  | 55 (23.8)  | 108 (24.9)  |                  |
| Father                                          | 58 (29.0)  | 31 (13.4)  | 91 (21.0)   |                  |
| Sister                                          | 6 (3.0)    | 20 (8.7)   | 26 (6.0)    |                  |
| Brother and or friends and or others            | 2 (1.0)    | 10 (4.3)   | 13 (3.0)    |                  |
| Feeling of Shyness to buy sanitary materials from a male shopkeeper |            |            |             | 0.010            |
| Yes                                             | 21 (24.7)  | 53 (44.2)  | 74 (36.1)   |                  |
| No                                              | 64 (75.3)  | 67 (55.8)  | 131 (63.9)  |                  |
| Feeling of Shyness to Buy Sanitary Pad in the presence of Male/s other Than the Shopkeeper |            |            |             | 0.000            |
| Yes                                             | 39 (43.8)  | 81 (70.4)  | 120 (58.8)  |                  |
| No                                              | 51 (56.2)  | 34 (29.6)  | 84 (41.2)   |                  |
| Full Reserve of Sanitary Pad at home during Menstruation |            |            |             | 0.141            |
| No                                              | 155 (78.3) | 164 (74.2) | 320 (75.8)  |                  |
| Yes                                             | 43 (21.7)  | 57 (25.8)  | 102 (24.2)  |                  |
| Measures Taken in the absence of Sanitary Pad During Menstruation |            |            |             | 0.047            |
| Uses old cloth                                  | 32 (20.6)  | 59 (36.4)  | 92 (28.9)   |                  |
| Uses new cloth                                  | 67 (43.2)  | 52 (32.1)  | 119 (37.4)  |                  |
| Borrows sanitary pad from other                 | 46 (29.7)  | 44 (27.2)  | 90 (28.3)   |                  |
| Others                                          | 10 (6.5)   | 7 (4.3)    | 17 (5.3)    |                  |
| Non-pad users Desire for Using Sanitary Pad during Menstruation |            |            |             | 0.203            |
| Yes                                             | 37 (78.7)  | 70 (68.6)  | 107 (71.8)  |                  |
### Association between Socioeconomic Factors and Menstrual Hygiene Management Practice

We constructed the scale of menstrual hygiene management practice by nine indicators with the Cronbach Alpha value of 0.71. Weight adjusted classification of menstrual hygiene management practice indicates that 22% of respondents follow bad, 63.3%, and 14.7% follow fair and good practice, respectively. Table 5 presents the association of these practices with socioeconomic and demographic factors. Urban adolescent girls are more likely to practice both good and fair practices \( (p \leq 0.001) \) than rural girls.

Similarly, Hindu girls and girls from small families are more likely to practice good management than their counterparts \( (p = 0.021 \) and 0.025, respectively). Wealth quintile, fathers’ education and income are also statistically significant, but mothers’ education does not have a statistical association with menstrual hygiene management practice. Both the perceived socioeconomic class and social connectivity are significantly associated with menstrual hygiene management practice. Girls perceived belongingess to middle socioeconomic class have a higher likelihood of practicing good management than that of others \( (p = 0.043) \).

Moreover, girls with high social connection are least likely to practice bad management. Data indicate that, although the current age of the respondent is not associated with menstrual hygiene management, age at first menstruation has a statistical association with the practice. Girls who experienced first menstruation at or after thirteen years old are more likely to practice good and fair management than
their counterpart. Information availability before reaching menarche is also associated with management practice (p = 0.03) and the prevalence of good practice is higher among girls who received menstrual information before reaching menarche.
Table 5
Association between Socioeconomic Factors and Menstrual Hygiene Management

| Variable                | Bad (n = 129) | Fair (n = 373) | Good (n = 87) | χ²  | P-value |
|-------------------------|---------------|----------------|---------------|-----|---------|
| Age                     |               |                |               | 0.75| 0.688   |
| ≥ 15                    | 64 (20.5)     | 201 (64.4)     | 47 (15.1)     |     |         |
| ≤ 16                    | 65 (23.5)     | 172 (62.2)     | 40 (14.4)     |     |         |
| Place of Residence      |               |                |               | 26.57| 0.000  |
| Urban                   | 33 (13.0)     | 171 (67.3)     | 50 (19.7)     |     |         |
| Rural                   | 96 (28.9)     | 199 (59.9)     | 37 (11.1)     |     |         |
| Religion                |               |                |               | 7.75| 0.021   |
| Islam                   | 117 (21.5)    | 352 (64.7)     | 75 (13.8)     |     |         |
| Hindu                   | 11 (25.6)     | 20 (46.5)      | 12 (27.9)     |     |         |
| Family Size             |               |                |               | 7.74| 0.025   |
| Small                   | 90 (21.3)     | 260 (61.5)     | 73 (17.3)     |     |         |
| Large                   | 39 (23.5)     | 113 (68.1)     | 14 (8.4)      |     |         |
| Wealth Quintile         |               |                |               | 13.94| 0.008  |
| Lower                   | 37 (20.6)     | 117 (65.0)     | 26 (14.4)     |     |         |
| Middle                  | 56 (21.8)     | 171 (66.8)     | 29 (11.3)     |     |         |
| Upper                   | 22 (22.4)     | 50 (51.0)      | 26 (26.5)     |     |         |
| Father's Education      |               |                |               | 21.47| 0.002  |
| Illiterate              | 17 (37.0)     | 24 (52.2)      | 5 (10.9)      |     |         |
| Primary                 | 51 (23.7)     | 137 (63.7)     | 27 (12.6)     |     |         |
| Secondary               | 43 (22.6)     | 125 (65.8)     | 22 (11.6)     |     |         |
| HSC and/or Above        | 18 (13.0)     | 87 (63.0)      | 33 (23.9)     |     |         |
| Mother's Education      |               |                |               | 5.92 | 0.432  |
| Illiterate              | 9 (30.0)      | 17 (56.7)      | 4 (13.3)      |     |         |
| Primary                 | 35 (21.2)     | 110 (66.7)     | 20 (12.1)     |     |         |
| Secondary               | 72 (21.3)     | 216 (63.9)     | 50 (14.8)     |     |         |
| HSC and/or Above        | 13 (23.2)     | 30 (53.6)      | 13 (23.2)     |     |         |
| Variable                              | Bad (n = 129) | Fair (n = 373) | Good (n = 87) | x^2  | P-value |
|--------------------------------------|--------------|---------------|---------------|------|---------|
| **Father's Income**                  |              |               |               | 10.57 | 0.032   |
| Low Income                           | 57 (23.4)    | 162 (66.4)    | 25 (10.2)     |      |         |
| Middle Income                        | 39 (16.7)    | 148 (63.5)    | 46 (19.7)     |      |         |
| High Income                          | 15 (23.4)    | 38 (59.4)     | 11 (17.2)     |      |         |
| **Perceived Socioeconomic Class**    |              |               |               | 9.83 | 0.043   |
| Low SEC                              | 11 (21.6)    | 37 (72.5)     | 3 (5.9)       |      |         |
| Middle SEC                           | 97 (20.4)    | 302 (63.4)    | 77 (16.2)     |      |         |
| High SEC                             | 21 (33.9)    | 34 (54.8)     | 7 (11.3)      |      |         |
| **Social Connectivity**              |              |               |               | 21.20 | 0.000   |
| No Connection                        | 54 (32.7)    | 85 (51.5)     | 26 (15.8)     |      |         |
| Moderate Connection                  | 63 (19.3)    | 222 (67.9)    | 42 (12.8)     |      |         |
| High Connection                      | 5 (8.8)      | 41 (71.9)     | 11 (19.3)     |      |         |
| **Age of First Menstruation**        |              |               |               | 12.70 | 0.002   |
| ≥ 12                                 | 61 (29.9)    | 120 (58.8)    | 23 (11.3)     |      |         |
| ≤ 13                                 | 68 (17.7)    | 253 (65.7)    | 64 (16.6)     |      |         |
| **Information Availability before menstruation** |           |               |               | 7.01 | 0.030   |
| No                                   | 32 (21.9)    | 102 (69.9)    | 12 (8.2)      |      |         |
| Yes                                  | 97 (21.9)    | 270 (61.1)    | 75 (17.0)     |      |         |
| **Perceptions towards Pad use**      |              |               |               | 2.64 | 0.267   |
| Negative                             | 50 (23.4)    | 139 (65.0)    | 25 (11.7)     |      |         |
| Positive                             | 79 (21.1)    | 234 (62.4)    | 62 (16.5)     |      |         |

Only significant variables (p-value of 0.05 or less) of the bivariate level were entered into multiple analysis. Findings of multinominal logistics regression analysis in Table 6 suggest that small family size had lower but significant statistical association (having an adjusted odds ratio (AOR) of 0.44) for both bad and fair practice compared to good practice. Wealth quintile, an important socioeconomic variable shows that girls from lower quintile are more likely to practice fair management compared to good management with an AOR of 2.34. Both fair and bad practice have higher likelihood among girls from middle quintile compared to upper quintile. Findings also indicate that girls whose fathers have no formal education are 6.23 times more likely to practice bad management than girls whose fathers have higher secondary and/or above level education. However, social connectivity, age at first menstruation, and
information availability before reaching menarche show the statistical relationship with menstrual hygiene management practice.
### Table 6
Effects of Socioeconomic Factors on Menstrual Hygiene Management Practice

| Variable Name (Ref = Good) | Bad               | Fair              |
|---------------------------|-------------------|-------------------|
|                           | AOR (95% C.I.)    | Sig.              | AOR (95% C.I.) | Sig. |
| **Place of Residence (Ref = rural)** |                   |                   |                 |      |
| Urban                     | 0.445 (0.29, 0.70) | 0.999             | 8.44 (5.27, 1.33) | 0.000 |
| **Family Size (Ref = Large)** |                   |                   |                 |      |
| Small                     | 0.44 (0.22, 0.88)  | 0.020             | 0.44 (0.24, 0.82) | 0.009 |
| **Religion (Ref = Hindu)** |                   |                   |                 |      |
| Islam                     | 1.70 (0.71, 4.05)  | 0.230             | 2.82 (1.32, 6.01) | 0.007 |
| **Wealth Quintile (Ref = Upper)** |                   |                   |                 |      |
| Lower                     | 1.63 (0.79, 3.59)  | 0.179             | 2.34 (1.24, 4.42) | 0.003 |
| Middle                    | 2.28 (1.11, 4.71)  | 0.025             | 3.01 (1.66, 5.68) | 0.000 |
| **Fathers’ Education (Ref = HSC and/or Above)** |                   |                   |                 |      |
| Illiterate                | 6.23, (1.97, 19.7) | 0.002             | 1.82 (0.64, 5.17) | 0.260 |
| Primary                   | 3.46 (1.65, 7.26)  | 0.001             | 1.93 (1.08, 3.42) | 0.026 |
| Secondary                 | 3.58 (1.66, 7.74)  | 0.001             | 2.16 (1.18, 3.95) | 0.013 |
| **Fathers’ Income (Ref = High Income)** |                   |                   |                 |      |
| Low Income                | 1.67 (0.67, 4.15)  | 0.268             | 1.88 (0.85, 4.14) | 0.120 |
| Middle Income             | 0.62 (0.26, 1.51)  | 0.294             | 0.93 (0.44, 1.97) | 0.852 |
| **Mothers’ Income (Ref = High Income)** |                   |                   |                 |      |
| Low Income                | 0.83 (0.43, 1.61)  | 0.590             | 0.78 (0.44, 1.37) | 0.390 |
| Middle Income             | 1.31 (0.45, 3.80)  | 0.615             | 0.71 (0.27, 1.88) | 0.493 |
| **Perceived Socioeconomic Class (Ref = High Class)** |                   |                   |                 |      |
| Low Class                 | 1.22 (0.26, 5.65)  | 0.798             | 2.54 (0.61, 10.62) | 0.202 |
| Middle Class              | 0.42 (0.17, 1.04)  | 0.061             | 0.81 (0.35, 1.89) | 0.807 |
| **Social Connectivity (Ref = High Connection)** |                   |                   |                 |      |
| No Connection             | 4.57 (1.44, 14.52) | 0.010             | 0.88 (0.40, 1.95) | 0.747 |
| Moderate Connection       | 3.3 (1.07, 10.18)  | 0.038             | 1.42 (0.68, 2.98) | 0.357 |
| **Age of First Menstruation (Ref = ≤ 13)** |                   |                   |                 |      |
| Variable Name (Ref = Good) | Bad          | Fair         |  |
|---------------------------|--------------|--------------|---|
| ≥ 12                      | 2.50 (1.39, 4.50) | 0.002        | 1.32 (0.78, 2.23) | 0.299 |
| Information Availability (Ref = Yes) | | | |
| No                        | 2.06 (1.00, 4.27) | 0.052        | 2.36 (1.23, 4.53) | 0.010 |
| Constant                  | 0.06         | ≤ 0.001      | 0.03         | 0.000 |

**Discussions**

The main objectives of our study were to explore the menstrual hygiene management practice, the urban-rural difference in the practice and the determinants of such practice. Our findings indicate that the mean age of respondents in the study was 15.5 years and the mean age of menstruation was 12.8 years. It has also found that the mean age at first menstruation is slightly higher in rural (12.9) areas than urban areas (12.6). These findings are consistent with other studies [8, 9, 12, 23, 34, 35]. Proper education and information before reaching menarche are crucial for healthy menstrual management. A cross-sectional study conducted by Alam et al., (2017) shows that 64% of girls did not have any knowledge of menstruation before reaching menarche[12]. The preliminary report of Bangladesh National Hygiene Baseline Survey, 2014 also reported that among the students, only 36% were informed about menstruation before reaching menarche[9]. However, our study indicates that about 75% of the respondents received information about menstruation before reaching menarche which indicates an increase in getting information. Like other studies, this study also found that mothers and sister together are to be the two main sources of menstrual information[9, 12, 23, 36, 37].

The prevalence of using sanitary pads found in this study is significantly higher and, on the other hand, the use of cloths is significantly lower than previous studies conducted in Bangladesh[9, 10, 12, 14, 19]. Observed difference may arise from the research setting (school) and the time of the survey. Among the cloth users, including sometimes sanitary pad and sometimes cloth users, 71% reuse cloths for absorbing menstrual blood and 97.7% washes those materials before reusing. Among them, 56.8% use water and soap and 7.4% use water only, consistent with similar studies. However, drying of sanitary materials for reusing in open and sunny places (53.2%) is significantly higher in our study[1, 9, 12, 16, 17, 23, 24]. According to the current study, 76% of the respondent stored their sanitary cloths in hidden place within the room and 13% with other cloths for re-use and these findings differ from other studies[9, 19, 24].

This study suggests that about 49% of the respondents change sanitary materials three times a day during menstruation, and this finding is consistent with existing studies[9, 12]. Findings show that 34% of respondents washed their genitalia four or more times and another 44% washed it three times per day, 58.9% used soap and water for washing and 55.4% disposed of used sanitary materials under the soil. Another 20.3% thrown these in ponds/river. These findings have similarities and dissimilarities with other related studies and it may be due to controlled and single cultural context. Among the non-pad users, nearly two-third wish to use pad although they cannot because of the high cost of sanitary pads and
feeling of embarrassment to buy pads and these findings are consistent with other studies as well[1, 10, 16]. Finally, the study shows that religion, family size, wealth quintile, father’s education, social connectivity, age at first menstruation, and availability of information before reaching menarche have the statistical association with menstrual hygiene management practice are also similar with other studies[10, 16–18].

Limitations of the Study

The current study has produced some important knowledge on the area of menstrual hygiene management of adolescent girls in Bangladesh. Although the highest possible effort was given, still the study has some limitations. This study has conducted in a particular area and on a particular group of adolescents. Although the study setting was selected randomly, the schools were selected based on key informants’ suggestion. Thus, this study should not dare to represent the whole adolescent girls in the country. Although the female teachers, who supervised respondents’ responses during data collection, were trained properly, it has observed that some respondents failed to capture the response system of a closed-ended questionnaire. Participating respondents were seated in a class environment where at least two or more respondents seated on a single bench. It is suspected that some of them have either influenced by the fellow respondent or copied responses from other.

Conclusion

The primary objective of our study was to assess the menstrual hygiene management practice of adolescent girls, the urban-rural differences, if any, of the practice and the determinants of such practice. Although the research findings show that a good number of adolescent girls have information before reaching menarche about menstrual hygiene management, it should be considered that still, nearly one-fourth of respondents reach at menarche without any prior information about this. The study suggests that girls reaching menarche without prior information have a higher chance to experience the event negatively. Measures must be taken to ensure the information available for all before reaching menarche. As mother and sister/s are the two significant sources of menstrual information and they often translate their misconception and attitude to adolescent girls, steps should be taken to change adult females’ attitudes and knowledge towards menstruation. Findings show that still, more than one-fourth adolescent girl use cloth and another 35.2% use sometimes pad and sometimes cloth; therefore, measures must be taken to ensure continues flow of pads available for all. Although nearly two-thirds of non-pad users wish to use sanitary pads, more than one-third of them cannot use because of the high cost of sanitary pads. Among cloths users, more than one-fourth do not even want to use pad because, to them, it causes unnecessary money expending. Thus, it is essential to made pads available to all at an affordable cost. As a feeling of shyness to buy pads and unavailability of pads at nearby places prevent many adolescent girls from pad use, and existing social norms regarding menstrual management must be changed. Measures are essential to ensure that adolescent girls can healthily manage their menstruation with privacy and dignity to meet the SDG goals of good health and well-being, quality education, gender equality and clean water and sanitation.
List Of Abbreviations

HPV: Human Papillomavirus; RTI: Reproductive tract infections; STD: Sexually transmitted disease; SDG: Sustainable Development Goal.

Declarations

Ethics Approval and Consent to Participate

This manuscript is a part of a research monograph submitted to the Department of Population Sciences, the University of Dhaka, for partial fulfillment of the bachelor (undergraduate) degree. The Academic Committee (AC) of the Department of Population Sciences, University of Dhaka approved the topic and study protocol. The AC is the responsible body that handles all aspect of the research monograph. The present study was carried out in accordance with the Declaration of Helsinki. Moreover, the research evaluation committee of the Department of Population Sciences, University of Dhaka approved the study and provided the written permission before the field visit. Most of the respondents were below the age of 18 years. As a result, verbal consent was taken from parents. The objectives of the study were clearly stated to each parent (in some cases, the questionnaire was provided) and asked permission whether we can interview their children. We also took informed consent of the respondents and the headteachers of the selected schools after reading out the research objectives to them. We only interviewed the respondents after getting approval from parents, respondents, and the institutional head.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used during the current study available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

MATH conceptualized the study. With the consultation of MZA, MATH completed the analysis. MATH and MZA drafted the manuscript. Both authors reviewed the draft manuscripts. After reading thoroughly and carefully, both authors approved the final manuscript.

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References

1. Salim F, Begum N. Hygienic practices during menstruation among adolescent school girls. North Int Med Coll J. 2016;7:139–42.
2. Sumpter C, Torondel B. A Systematic Review of the Health and Social Effects of Menstrual Hygiene Management. PLoS One. 2013;8.
3. Sommer M, Caruso BA, Sahin M, Calderon T, Cavill S, Mahon T, et al. A Time for Global Action: Addressing Girls’ Menstrual Hygiene Management Needs in Schools. PLoS Med. 2016;13:1–9.
4. Rights C. Celebrating Womanhood: 2013;:1–4.
5. Bay SA. Moving Toward a Holistic Menstrual Hygiene Management: An Anthropological Analysis of Menstruation and Practices in Western and Non-Western Societies. Grad Student Theses, Diss Prof Pap. 2017. https://scholarworks.umt.edu/etd/11091.
6. Kumar A, Srivastava K. Cultural and social practices regarding menstruation among adolescent girls. Soc Work Public Health. 2011;26:594–604.
7. Kaiser S. Menstrual Hygiene Management | SSWM - Find tools for sustainable sanitation and water management! 2019. https://sswm.info/humanitarian-crises/urban-settings/hygiene-promotion-community-mobilisation/important/menstrual-hygiene-management. Accessed 1 Sep 2019.
8. Dasgupta A, Sarkar M. Menstrual hygiene: How hygienic is the adolescent girl? Indian J Community Med. 2008;33:77.
9. Bangladesh National Hygiene Baseline Survey Preliminary Report. Minist Local Gov Rural Dev Coop Dhaka, Bangladesh. 2014.
10. Islam MS, Quuddus AHG, Foroushani AR. Mapping the Barriers of Receives Affordable Menstrual Hygiene Products and Healthcare Services At the Rural Setting of Bangladesh. Pakistan J Public Heal. 2018;7:202–5.
11. Chandra-Mouli V, Patel SV. Mapping the knowledge and understanding of menarche, menstrual hygiene and menstrual health among adolescent girls in low- and middle-income countries. Reprod Health. 2017;14:1–16.
12. Alam MU, Luby SP, Halder AK, Islam K, Opel A, Shoab AK, et al. Menstrual hygiene management among Bangladeshi adolescent schoolgirls and risk factors affecting school absence: Results from a cross-sectional survey. BMJ Open. 2017;7:1–10.

13. Mondal B, Ali M, Dewan T, Tasnim T. Practices and effects of menstrual hygiene management in rural Bangladesh. 40th WEDC Int Conf. 2017; all.

14. Renal O, Hospital G. Accessibility of Low Cost Sanitary Napkin in Rural and Semi-Urban Community of Bangladesh. 2018;3:133–7.

15. Van Eijk AM, Sivakami M, Thakkar MB, Bauman A, Laserson KF, Coates S, et al. Menstrual hygiene management among adolescent girls in India: A Systematic review and meta-analysis. BMJ Open. 2016;6.

16. Sharma S, Mehra D, Kohli C, Singh MM. Menstrual hygiene practices among adolescent girls in a resettlement colony of Delhi: a cross-sectional study. Int J Reprod Contraception, Obstet Gynecol. 2017;6:1945.

17. Sudeshna R, Aparajita D. Determinants of Menstrual Hygiene among Adolescent Girls: A Multivariate Analysis. Natl J Community Med. 2012;3:294–301. doi:10.1109/RFIC.2006.1651102.

18. Pugalenthi T, Senthil J, Jayakumar KK, Pandiammal C. Determinants of menstrual hygiene practice among unmarried women in India. Sch Res Libr Arch Appl Sci Res. 2013;5:137–45.

19. Haque SE, Rahman M, Itsuko K, Mutahara M, Sakisaka K. The effect of a school-based educational intervention on menstrual health: An intervention study among adolescent girls in Bangladesh. BMJ Open. 2014;4:1–9.

20. Sommer M, Sahin M. Advancing the global agenda for menstrual hygiene management for schoolgirls. Am J Public Health. 2013;103:1556–9.

21. Udayar SE, Kruthika K, Devi P V. Menstrual Hygiene Practices Among Adolescent Girls Residing In Tribal And Social Welfare Hostel In Andhra Pradesh: A Community Based Study. 2016;7.

22. Shanbhag D, Shilpa R, D’souza, Josephine P, Singh J, Br G. Perceptions regarding menstruation and Practices during menstrual cycles among high school going adolescent girls in resource limited settings around Bangalore city, Karnataka, India. Int J Collab Res Intern Med Public Heal. 2012;4:1353. http://internalmedicine.imedpub.com/perceptions-regarding-menstruation-and-practices-during-menstrual-cycles-among-high-school-going-adolescent-girls-in-resource-limited-settings-around-bangalore-city-karnataka-india.pdf.

23. Thakre SB, Thakre SS, Reddy M, Rathi N, Pathak K, Ughade S. Menstrual hyiene: Knowledge and practice among adolescent school girls of Saoner, Nagpur District. J Clin Diagnostic Res. 2011;5:1027–33.

24. Ali TS, Rizvi SN. Menstrual knowledge and practices of female adolescents in urban Karachi, Pakistan. J Adolesc. 2010;33:531–41. doi:10.1016/j.adolescence.2009.05.013.

25. Budhathoki SS, Bhattachan M, Castro-Sánchez E, Sagtani RA, Rayamajhi RB, Rai P, et al. Menstrual hygiene management among women and adolescent girls in the aftermath of the earthquake in Nepal. BMC Womens Health. 2018;18:1–8.
26. Raina D, Balodi G. Menstrual Hygiene: Knowledge, Practise and Restrictions Amongst Girls of Dehradun, Uttarakhand, India. Glob J Interdiscip Soc Sci. 2014;3:156–62.

27. Hakim A, Shaheen R, M, Tak H. A cross sectional study on the knowledge, attitudes and practices towards menstrual cycle and its problems: a comparative study of government and non-government adolescent school girls. Int J Community Med Public Heal. 2017;4:973.

28. Sarkar I, Dobe M, Dasgupta A, Basu R, Shahbabu B. Determinants of menstrual hygiene among school going adolescent girls in a rural area of West Bengal. J Fam Med Prim Care. 2017;6:583.

29. Lahme AM, Stern R, Cooper D. Factors impacting on menstrual hygiene and their implications for health promotion. Glob Health Promot. 2018;25:54–62.

30. Santina T, Wehbe N, Ziade FM, Nehme M. Assessment of Beliefs and Practices Relating to Menstrual Hygiene of Adolescent Girls in Lebanon. Int J Heal Sci Res. 2013;3:75–88.

31. Patil V, Udgiri R. Menstrual hygienic practices among adolescent girls of rural North Karnataka region, India. Int J Community Med Public Heal. 2016;3:1872–6.

32. Alam MZ, Sultan S. Knowledge and Practice of Menstrual Regulation (MR) in Bangladesh: Patterns and Determinants. J Popul Soc Stud. 2019;27:220–31. doi:10.25133/JPSSv27n3.0014.

33. Alam, Zakiul M, Islam MS, Sultan S. Knowledge and practice of emergency contraception among currently-married women in Bangladesh: Evidence from a national cross-sectional survey. J Popul Soc Stud [JPSS]. 2020;28:308–23. doi:10.25133/JPSSv28n4.021.

34. Dr. Varina Tjon A Ten. Menstrual Hygiene: A Neglected Condition for the Achievement of Several Millennium Development Goals. Zoetermeer. 2007.

35. Ray S, Mishra SK, Roy AG, Das BM. Menstrual characteristics: A study of the adolescents of rural and urban West Bengal, India. Ann Hum Biol. 2010;37:668–81.

36. Tiwari H, Oza UN, Tiwari R. Knowledge, attitudes and beliefs about menarche of adolescent girls in Anand district, Gujarat. East Mediterr Heal J. 2006;12:428–33. https://apps.who.int/iris/bitstream/handle/10665/117103/12_3-4_2006_428_433.pdf?sequence=1&isAllowed=y.

37. Singh MM, Devi R, Gupta SS. Awareness and health seeking behaviour of rural adolescent school girls on menstrual and reproductive health problems. Indian J Med Sci. 1999;53:439–443. http://europepmc.org/abstract/MED/10776500.