

# BMJ Open Awareness on menstrual hygiene management in Bangladesh and the possibilities of media interventions: using a nationwide cross-sectional survey

Awan Afiaz ,<sup>1</sup> Raaj Kishore Biswas <sup>2</sup>

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<sup>1</sup>Institute of Statistical Research and Training, University of Dhaka, Dhaka, Bangladesh

<sup>2</sup>Transport and Road Safety (TARS) Research Centre, School of Aviation, University of New South Wales, Sydney, New South Wales, Australia

## Correspondence to

Awan Afiaz; [aafiaz@isrt.ac.bd](mailto:aafiaz@isrt.ac.bd)

## ABSTRACT

**Objectives** Menstrual hygiene management (MHM) has become a growing public health concern in many low-income and middle-income nations for its association with several health risks. This study observed types of menstrual absorbents used among women in Bangladesh and analysed the associated sociodemographic factors with the hypothesis that mass media can increase awareness regarding MHM. The study includes recommendations for possible intervention strategies designed to address this lack of awareness.

**Design and participants** The analysis used the data from the nationally representative Bangladesh Multiple Indicator Cluster Survey 2019 that employed a two-stage, stratified cluster sampling approach, with a study sample of 54 242 women aged between 15 and 49 years. A generalised linear model was fitted to the data adjusting for survey weights and cluster/strata variations along with bivariate analyses and spatial mapping.

**Results** Only a quarter of women (24.3%) used modern absorbents for MHM with most resorting to unhygienic traditional practices. Spatial distribution showed that the use of modern absorbent of MHM was limited to the major cities. The women who had mobile phones and regular access to the media were nearly 43% (adjusted OR (AOR) 1.43 with 95% CI 1.33 to 1.54) and 47% (AOR 1.47 with 95% CI 1.35 to 1.60) more likely to use the modern absorbents of MHM, respectively. Furthermore, educated women living in urban solvent households with educated house heads were also found to use modern absorbents of MHM.

**Conclusions** There appeared to be scope for interventions through a combined national effort to raise awareness using multifaceted media channels regarding MHM among women in order to meet the Sustainable Development Goals 3.7 and 6.2 of addressing women's healthcare and hygiene needs.

## INTRODUCTION

Menstrual hygiene management (MHM) is the process of dealing with menstruation by collecting or absorbing menstrual blood using different materials safely and with dignity. Menstruation and MHM are important health

## Strengths and limitations of this study

- The study covers all 64 districts of Bangladesh with a sample size of 54 242 using a nationally representative sample.
- The study addressed the urgent need regarding the lack of awareness about menstrual hygiene management (MHM) and the associated health risks for women resulting from using unhygienic absorbent materials.
- Spatial mapping was conducted to assess the district-wise distribution of menstrual absorbent materials used by the women
- This study was limited to only one aspect of MHM, the type of menstrual absorbent materials used.
- The extent to which the pieces of cloths and rags used by women were cleaned and reused could not be ascertained from the available data.

issues for females in their reproductive years.<sup>1</sup> Most women and girls often face adversities regarding menstrual hygiene due to a lack of access to accurate information and sufficient knowledge.<sup>2</sup>

The unfettered access to safe and dignified menstruation is a necessity for women of reproductive age. The WHO and the UNICEF Joint Monitoring Programme for drinking water, sanitation and hygiene consider the use of clean menstrual management material to absorb or collect menstrual blood as an integral part of the MHM.<sup>1</sup> There are two methods of menstrual blood collection under MHM. The safer modern method, such as using disposable sanitary pads and the traditional method, such as using reused old cloths or rags.<sup>3</sup> Broader systemic factors such as women's health, well-being, gender equality, education, equity, empowerment and rights are associated with menstruation,<sup>1</sup> which make MHM an important component



in the public health system. Although the concept of MHM is quite broad according to the definition provided by UNICEF, the present analysis will focus its discussion on the materials used for MHM by Bangladeshi women.

The use of unhygienic materials during the menstruation is likely to have adverse effects on women's health. Khanna *et al*<sup>4</sup> found that girls in India who used old cloths or other unsafe materials during menstruation were three times at risk of contracting reproductive tract infections compared with safer materials users, such as sanitary napkins and new cloths. The reuse of cloth has been associated with abnormal vaginal discharge, skin irritations, and urogenital infections.<sup>1</sup> Furthermore, women using reusable absorbent material were more than twice as likely to be diagnosed with at least one or more urogenital infections (bacterial vaginosis (BV) or urinary tract infection) than women who were using disposable sanitary pads.<sup>5</sup> BV due to poor menstrual hygiene could increase pregnancy risk such as delivery of low birthweight (LBW) infants, preterm delivery of LBW infants, and clinical chorioamnionitis.<sup>5-7</sup>

Studies focusing on underdeveloped and developing countries' menstrual hygiene found that most women and girls regularly failed to maintain a healthy menstrual hygiene practice.<sup>8-10</sup> Limited resources, economic hardship, traditional norms and lack of education force women to seek alternative unhygienic methods and materials<sup>11 12</sup>. Even in cases where females had sufficient knowledge regarding MHM, this did not translate to the practice of good menstrual hygiene due to adverse sociocultural views and stigmatisation of menstruation,<sup>13</sup> which demanded the identification of the most vulnerable group of women.

There is a considerable literature gap on the menstrual hygiene practices in Bangladesh. Few studies that had been conducted were mostly on adolescent females.<sup>14-16</sup> Similar to many low-income and middle-income countries (LMICs), discussion on menstruation and menstrual hygiene practices is socially stigmatised.<sup>17</sup> Misconceptions regarding menstruation, insufficient facilities at school and family restrictions were found to be risk factors for school absenteeism among adolescent girls in Bangladesh.<sup>14</sup> A study on adolescent girls in Chittagong, the second-largest city of Bangladesh, observed that girls were not made aware of menstruation until after menarche.<sup>16</sup> The use of old pieces of cloth as absorbent materials during the menstruation was common in both rural and urban areas.<sup>16</sup>

A study on the slums of Dhaka, the capital of Bangladesh, found that about 95% of women and 90% of adolescent girls reused rags during menstruation without adequate cleaning, which resulted in scabies in the vaginal area, urinal infections, and complications during the pregnancy.<sup>17</sup> Furthermore, the use of poor-quality reused cloths which are usually dyed with toxic materials is likely to make women susceptible to various urogenital diseases.<sup>15</sup> Unsurprisingly, only 57% of adolescent girls felt confident dealing with menstrual bleeding while at

home, whereas only 7% of girls felt confident dealing with menstruation while in school.<sup>18</sup> However, no nationally representative study was conducted to assess country-wide MHM practices in Bangladesh.

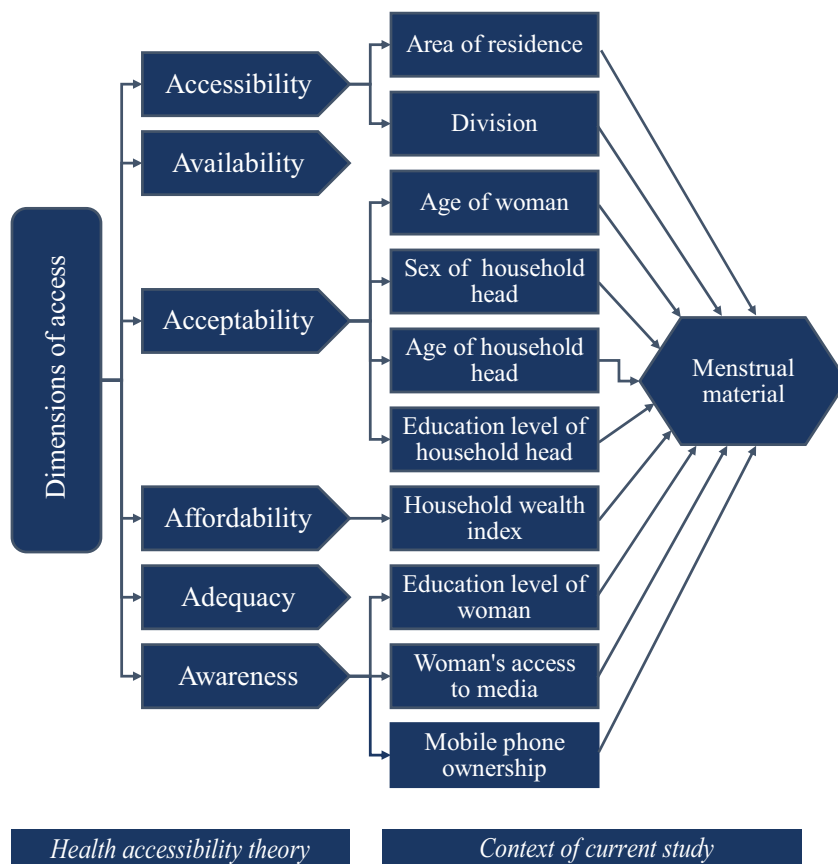
The objective of this study is to assess the current practice of the modern method of menstrual absorbents among women of reproductive age through district-wise distribution in Bangladesh and identify the impact of media in this practice. The spatial distribution of modern menstrual absorbent was conducted to estimate the use of modern methods across the country. For evaluating the safer practices of MHM, this study assessed the impact of access to any general form of media, such as newspapers, televisions, radio and the internet as well as the use of mobile phones. The article proposed an intervention plan based on an awareness campaign that would be suitable for addressing the issue of MHM in LMICs, specifically in Bangladesh. This will provide a feasible pathway to help attain the Sustainable Development Goal (SDG) 3.7 (universal access to sexual and reproductive health-care services) and SDG 6.2 (access to adequate and equitable sanitation and hygiene) proposed by the United Nations.<sup>19</sup>

### Theoretical framework

Healthcare access is the mechanism that identifies health-care needs and enables one to seek relevant services and resources in order to use or obtain these services or products as necessary.<sup>20</sup> In the present study of MHM, this concept of access to health services or products is fundamental to the apprehension of the distribution of menstrual materials. Penchansky and Thomas<sup>21</sup> formally conceptualised the theory of healthcare access, where they discussed five dimensions that optimised access, namely accessibility, availability, acceptability, affordability and accommodation (or adequacy).<sup>22</sup> Later awareness was proposed as the sixth dimension of access by Saurman<sup>23</sup> as it considers effective communication and knowledge about the service to the users.

Few variables in the context of the present study could address the four dimensions namely accessibility, acceptability, affordability and awareness (figure 1). However, due to a lack of relevant information in the data, the dimensions of availability and adequacy (accommodation) could not be addressed on the access of the modern methods of MHM for women in Bangladesh. Also, some important actors who contribute to the accessibility and health promotion such as scholars, health activists, students, non-governmental organisations (NGOs), media, government and corporations<sup>24</sup> are missing in the data used in this study and thus not part of the theoretical framework.

Part of the objective of this study is to discuss the possibility of intervention strategies. Interventions can be classified into two broad categories, hardware and software interventions.<sup>25</sup> Hardware interventions address the issues regarding materials and water, sanitation and hygiene<sup>26</sup> facilities, while the software interventions address the



**Figure 1** Theory of healthcare access in the context of women's access to modern menstrual material.

deficits in knowledge and management regarding menstruation by providing the necessary education.<sup>25</sup> This study would focus on software interventions.

## MATERIALS AND METHODS

### Data overview

The current study used the nationally representative Bangladesh Multiple Indicator Cluster Survey (MICS) 2019.<sup>27</sup> The survey employed a two-stage, stratified cluster sampling approach. The enumeration areas (EAs) were considered the primary sampling units. In the first stage of sampling, a total of 3220 EAs were selected from the sampling strata (64 districts) using a probability proportional to size method. In the second stage, a sample of 20 households was selected from each cluster (EA) using random systematic selection procedures.<sup>28</sup> This resulted in a final sample size of 64 400 households, consisting of approximately 1000 households from each stratum.

The current study considered women, aged 15–49, who menstruated within the last 12 months prior to the survey. Several sociodemographic factors related to the women and their household characteristics were included as well. The study used the complete records analysis approach and after the removal of cases with missing values, the final sample size was 54 242.

### Independent variables

The study considered the variables related to women's frequent access to media, namely, reading newspapers weekly (does not read, reads), listening to radio weekly (does not listen, listens), watching television weekly (does not watch, watches), using internet weekly (does not use, uses) and owning a mobile phone (no, yes). These four variables (newspaper, radio, television and internet) were recoded to a binary variable named 'women's access to media' (with access, without access), where women who responded affirmatively to using at least one of these forms of media at least once a week or everyday were considered in the 'with access' category. This variable corresponds to the dimension of awareness belonging to the healthcare access theory. The Household Wealth Index was precalculated in MICS 2019 data using principal component analysis based on ownership of household assets.<sup>27</sup>

The sociodemographic variables pertaining to women and their household characteristics were explored for association with the use of menstrual material. These variables included age of women (continuous); educational level of women and household head (none or preprimary, primary completed, secondary, higher secondary or above); Household's Wealth Index quintile (poorest, poorer, middle, richer, richest); area of residence (urban, rural); administrative division (Dhaka, Chattogram, Khulna, Sylhet, Barishal, Rajshahi, Mymensingh,



Rangpur); age (continuous) and sex (male, female) of the household head.

### Outcome variable

The type of material used during the last menstruation (which occurred within the last 12 months) was the outcome variable for the study. Two types of materials were considered, the modern sanitary napkins and the traditional cloths.<sup>3</sup> Women who used other types of materials (cotton pads, tissues, others) constituted less than two percent in the MICS 2019 and were excluded from the study. Thus, the model was fitted to the outcome variable 'type of material' with two categories: traditional (n=41 052) and modern (n=13 190).

### Ethical clearance

This study was based on an analysis of secondary survey data from UNICEF, where all the personal identifiable information of participants had been removed. Informed consent was taken from participants before participating in the survey by the national statistical office, Bangladesh Bureau of Statistics and UNICEF.

### Patient and public involvement

No patients and public were involved in any way in this study.

### Statistical analysis

In order to estimate the primary associations of sociodemographic factors by the type of menstrual material used, bivariate analyses<sup>29</sup> including  $\chi^2$  tests were conducted to identify the relevant variables, which would be included in the model. The binary outcome variable was then fitted to these significant variables using a generalised linear model (GLM) to estimate the adjusted ORs (AOR) and their subsequent significance.<sup>30</sup> The cluster and strata-wise variations and survey weights were adjusted to generalise the findings from the model. The analyses were performed in R (V.3.6.0). The bivariate analyses were conducted using the 'gmodels' package (V.2.18.1) and the binary logistic regression model (GLM) was fitted using the 'survey' package (V.3.37).

To assess the spatial pattern of modern menstrual absorbent of MHM in Bangladesh, district-wise mapping of modern material use was conducted. Data from the Natural Earth project<sup>31</sup> was used through the R-package 'maps' (V.3.1.0).<sup>32</sup>

The current study analyses employed a level of significance threshold of 0.005, following the recommendation of Benjamin *et al*<sup>33</sup> to ensure reproducibility in scientific research in cases of new discoveries. Therefore, the associations from the model were considered significant if p values were less than 0.005 in the GLM.

## RESULTS

### Bivariate analyses

The district-wise spatial mapping on the distribution of the proportion of modern menstrual absorbent material

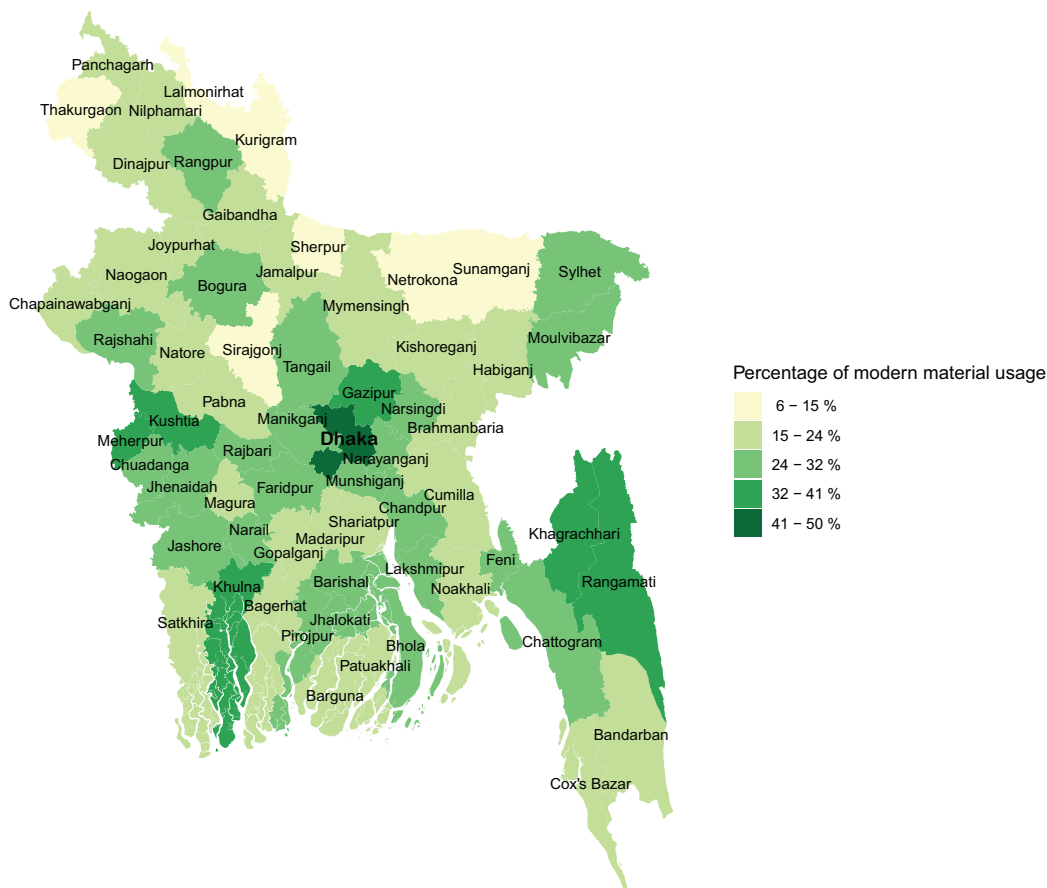
usage among women of reproductive age in figure 2 reveals that traditional absorbents of MHM are common in most districts of Bangladesh. In only a handful of districts, mostly adjacent to the capital city Dhaka, more than one-third of females used sanitary napkins out of the 64 districts. The highest percentage belonged to the Dhaka district, where still half of the women and girls of reproductive ages used pieces of old reused cloth to absorb menstrual blood, with nearly 93% of them reusing these materials.

The descriptive analysis in table 1 shows that, throughout the country, approximately one out of every four females used modern materials (sanitary napkins) during their previous menstrual periods within the past 1 year. Nearly 80% of the women lived in the rural areas and a vast majority (79.8%) of them used traditional material of menstrual hygiene. The Dhaka division had the highest proportion of women using modern materials at 31.2% and Mymensingh having the lowest at 13.4%. About two-thirds of women who had education beyond the secondary level used sanitary napkins compared with 6.4% of women with primary level education. Women belonging to richer households were found more prone to using modern materials than women from poorer households. Just above 10% of households had female heads and a higher proportion of modern material usage was observed in those families compared with families with male heads. Nearly 55% of women from households with highly educated house heads used modern materials for their MHM.

Television was the most popular form of media with approximately two-thirds of women accessed it at least once weekly (table 1). Nearly 10% women had used the internet within the last 3 months prior to the survey and about 30% of women said they owned a mobile phone. A higher percentage of women with access to media, the internet or mobile phones were reported to use modern materials during menstruation. Women who had used any one of these media (newspaper, radio, television and/or internet) reported a higher percentage (30.7%) of using modern materials during menstruation than women who did not (10.5%).

### Generalised linear model

All sociodemographic variables considered in the GLM were significantly associated with the type of absorbent material used during menstruation (table 1). The estimates revealed that older women were less likely (AOR 0.92 with 95% CI 0.91 to 0.92) to use modern methods as the odds of using modern absorbent materials decreased by 8% for each year increase in age. For women living in urban areas, 33% higher odds was associated with women living in the urban areas than women residing in the rural areas (AOR 1.33 with 95% CI: 1.21, 1.46). Women who completed primary (AOR 1.34) or secondary (AOR 3.19) or higher (AOR 8.58) levels of education were more likely to use modern sanitary napkins compared with women who had either pre-primary or no education. Aside



**Figure 2** A district-wise mapping on the distribution of modern menstrual material (sanitary napkins) in Bangladesh.

from Barishal and Khulna, lower odds of using modern menstrual absorbent was associated with women across all other divisions compared with the Dhaka division. The lowest OR was found in the Mymensingh division where the odds of women using modern materials was nearly half as much as Dhaka (AOR 0.52 with 95% CI 0.43 to 0.63).

From the perspective of household characteristics, women who belonged to the middle (AOR 1.79), richer (AOR 2.77) and richest (AOR 6.92) categories of wealth index had higher odds of using modern absorbent materials during menstruation. Having older household heads was also associated with slightly higher odds of using modern materials (AOR 1.01 with 95% CI 1.01 to 1.02) as well as having a female household head (AOR 1.27 with 95% CI 1.15 to 1.40). The higher educational level of the household heads significantly increased the chances of using modern menstrual materials compared to household heads with no or preprimary education.

Ownership of mobile phones by women was associated with 43% higher odds (AOR 1.43 with 95% CI 1.33 to 1.54) of using modern absorbent materials in contrast to women who did not own a mobile phone (table 2).

Most importantly, the awareness indicator media access, which referred to women who had at least weekly or more frequent access to any form of media (newspaper, radio, television and/or internet) had nearly 1.5 times higher odds (AOR 1.47 with 95% CI 1.35 to 1.60) of using modern sanitary napkins compared with women without such access.

Lastly, the presence of multicollinearity in the model was assessed through the squared adjusted generalised variance inflation factor (GVIF) scores. Since the threshold value for the squared adjusted GVIFs for categorical variables is equivalent to the typical VIF threshold for continuous variables and all of such scores from the models were well below 5, this suggested that there was no multicollinearity in the model.<sup>34,35</sup> The detailed results are added in online supplemental table 1.

## DISCUSSION

The current study assessed the role of awareness among women in their reproductive age on their menstrual health and associated hygiene management materials. Women with greater access to media and with higher

**Table 1** The distribution of the usage of menstrual materials (traditional and modern) by sociodemographic variables (categorical and continuous) among women aged 15–49 years from the MICS 2019

Sociodemographic variables	Group	N (%) of all study participants	N (%) of menstrual material used		P value
			Traditional	Modern	
Area of residence	Rural	43 339 (79.9)	34 592 (79.8)	8 711 (20.1)	<0.001
	Urban	10 903 (20.1)	6 460 (59.2)	4 443 (40.8)	
Age of women (mean (SD))		29.0 (9.26)			
Education level of women	No education or pre-primary	7 546 (13.9)	7 361 (97.5)	185 (2.5)	<0.001
	Primary	12 103 (22.3)	11 332 (93.6)	771 (6.4)	
	Secondary	25 312 (46.7)	18 878 (74.6)	6 434 (25.4)	
	Higher secondary or above	9 281 (17.1)	3 481 (37.5)	5 800 (62.5)	
Household Wealth Index	Poorest	10 964 (20.2)	10 193 (93.0)	771 (7.0)	<0.001
	Poorer	11 087 (20.4)	9 909 (89.4)	1 178 (10.6)	
	Middle	11 425 (21.1)	9 254 (81.0)	2 171 (19.0)	
	Richer	11 129 (20.5)	7 631 (68.6)	3 498 (31.4)	
	Richest	9 637 (17.8)	4 065 (42.2)	5 572 (57.8)	
Division	Dhaka	11 147 (20.6)	7 674 (68.8)	3 473 (31.2)	<0.001
	Barishal	4 602 (8.5)	3 522 (76.5)	1 080 (23.5)	
	Chattogram	10 033 (18.5)	7 336 (73.1)	2 697 (26.9)	
	Khulna	8 332 (15.4)	6 022 (72.3)	2 310 (27.7)	
	Mymensingh	2 910 (5.4)	2 519 (86.6)	391 (13.4)	
	Rajshahi	6 349 (11.7)	5 074 (79.9)	1 275 (20.1)	
	Rangpur	6 465 (11.9)	5 435 (84.1)	1 030 (15.9)	
	Sylhet	4 404 (8.1)	3 470 (78.8)	934 (21.2)	
Age of household head (mean (SD))		45.9 (12.91)			
Sex of household head	Male	48 401 (89.2)	36 956 (76.4)	11 445 (23.6)	<0.001
	Female	5 841 (10.8)	4 096 (70.1)	1 745 (29.9)	
Education level of household head	No education or preprimary	17 833 (32.9)	15 400 (86.4)	2 433 (13.6)	<0.001
	Primary	15 258 (28.1)	12 542 (82.2)	2 716 (17.8)	
	Secondary	14 697 (27.1)	10 222 (69.6)	4 475 (30.4)	
	Higher secondary or above	6 454 (11.9)	2 888 (44.7)	3 566 (55.3)	
Reading newspaper (weekly)	Never reads	49 948 (92.1)	39 745 (79.6)	10 203 (20.4)	<0.001
	Reads	4 294 (7.9)	1 307 (30.4)	2 987 (69.6)	
Listening to radio (weekly)	Never listens	53 068 (97.8)	40 576 (76.5)	12 492 (23.5)	<0.001
	Listens	1 174 (2.2)	476 (40.5)	698 (59.5)	
Watching television (weekly)	Never watches	18 529 (34.2)	16 225 (87.6)	2 304 (12.4)	<0.001
	Watches	35 713 (65.8)	24 827 (69.5)	10 886 (30.5)	
Internet Use (within last 3 months)	Did not use	49 206 (90.7)	38 953 (79.2)	10 253 (20.8)	<0.001
	Used	6 398 (9.3)	2 099 (41.7)	2 937 (58.3)	
Ownership of mobile phone	Does not own	16 199 (29.9)	13 452 (83.0)	2 747 (17.0)	<0.001
	Owns	38 043 (70.1)	27 600 (72.5)	10 443 (27.5)	
Women's access to media	Without access	170 206 (31.7)	15 400 (89.5)	1 806 (10.5)	<0.001
	With access	37 036 (68.6)	25 652 (69.3)	11 384 (30.7)	
Total sample size	N	54 242	41 052 (75.7)	13 190 (24.3)	

MICS, Multiple Indicator Cluster Survey.

**Table 2** Generalised linear model fitted to binary outcome variable type of material used (traditional, modern) with sociodemographic variables adjusting for cluster and strata-wise variations and survey weights

Sociodemographic variables	Menstrual material used	
	AOR (95% CI)	P value
Age of women	0.92 (0.91 to 0.92)	<0.001
Area of residence (ref: rural)		
Urban	1.33 (1.21 to 1.46)	<0.001
Education level of women (ref: no education or pre-primary)		
Primary	1.34 (1.10 to 1.64)	0.003
Secondary	3.19 (2.65 to 3.83)	<0.001
Higher secondary or above	8.58 (7.03 to 10.48)	<0.001
Household Wealth Index (ref: poorest)		
Poorer	1.14 (1.00 to 1.30)	0.050
Middle	1.79 (1.57 to 2.04)	<0.001
Richer	2.77 (2.42 to 3.16)	<0.001
Richest	6.92 (5.96 to 8.04)	<0.001
Division (ref: Dhaka)		
Barishal	1.17 (1.03 to 1.33)	0.018
Chattogram	0.64 (0.57 to 0.71)	<0.001
Khulna	1.12 (1.01 to 1.25)	0.039
Mymensingh	0.52 (0.43 to 0.63)	<0.001
Rajshahi	0.78 (0.69 to 0.87)	<0.001
Rangpur	0.71 (0.62 to 0.81)	<0.001
Sylhet	0.59 (0.49 to 0.72)	<0.001
Age of household head	1.01 (1.01 to 1.02)	<0.001
Sex of household head (ref: male)		
Female	1.27 (1.15 to 1.40)	<0.001
Education level of household head (ref: no education or preprimary)		
Primary	1.21 (1.11 to 1.33)	<0.001
Secondary	1.69 (1.54 to 1.85)	<0.001
Higher secondary or above	2.80 (2.49 to 3.15)	<0.001
Mobile phone ownership (ref: does not own)		
Owns	1.43 (1.33 to 1.54)	<0.001
Women's access to media (ref: without access)		
With access	1.47 (1.35 to 1.60)	<0.001

AOR, Adjusted Odds Ratio; CI, Confidence Interval.

education were more likely to use modern menstrual methods for their MHM, as hypothesised in the theoretical section, as higher odds of using modern menstrual absorbents was associated with access to media and higher education levels. Besides, the sociodemographic variables, such as women's age, area of residence, division, financial condition of household, house heads' age, sex and education level were associated with women's MHM,

particularly the use of sanitary napkins during menstruation. A broader understanding of these associations could help in devising and employing intervention strategies regarding MHM in Bangladesh.

Information regarding menstruation and associated hygiene management is not always aptly or timely imparted.<sup>36</sup> This often makes girls start their menstrual life resorting to unhygienic and unsafe practices, which is likely to be continued a lifetime. Inaccurate information leads to severe misconceptions about menstruation. This is evident from multiple studies in LMICs such as Nepal, India, and Uganda, where a large portion of females consider menstruation to be a curse or illness, or a consequence due to sinful deeds.<sup>37–40</sup> In line with these studies, the current study found that women's access to media was associated with higher odds of using modern methods/absorbents for MHM, which could strengthen the argument that the likelihood of using modern methods of MHM would increase with the dissemination of relevant information regarding proper MHM through the media.

The urgent need for appropriate information about MHM is apparent in Bangladesh. There exist several traditional beliefs regarding MHM, such as menstruation being a sign of marriage, or girls needing to refrain from taking nutritious food during the periods.<sup>41</sup> In the rural context, girls are not allowed to consult with qualified doctors and are expected to be treated by traditional healers or uncertified health workers.<sup>41</sup> Breaking this traditional mindset requires a continuous flow of correct information, which could be sourced through media such as newspaper, television, radio and internet.<sup>42</sup> These could be done better through mass media than door-to-door campaigns in a density populated country such as Bangladesh.<sup>43</sup>

Women in slum areas who had poor knowledge regarding MHM and used clothes or rags during menstruation reported several diseases associated with their reproductive organs.<sup>17</sup> The use of cloths as well as the unhygienic sterilisation before reuse ultimately increased the risk of contracting urogenital diseases.<sup>11</sup> All these indicate that inadequate access to appropriate knowledge regarding menstruation resulted in unsafe practices of MHM, which corroborated with the findings from the model.

The ownership of mobile phones, another possible indicator of women's awareness,<sup>44</sup> was also significantly associated with modern material usage of MHM. This further strengthens the argument that access to information is a vital tool in addressing awareness. Access to mobile phones allows the sharing of MHM guidance among peers. Studies have shown that many public health intervention programmes have successfully used mobile phone messaging services to disseminate information leading to increased healthcare access.<sup>45 46</sup>

There is an expectation that higher levels of education are associated with greater awareness regarding MHM, which will result in better hygiene practices during menstruation. A study in India linked the lack of



knowledge, misconceptions and unsafe material usage to an increase in the risk of reproductive and sexual health-related diseases in adolescent girls.<sup>4</sup> A community-based health education intervention in India resulted in increased awareness about menstruation and adequate MHM.<sup>47</sup> However, evidence from multiple studies suggests that formal education about reproductive health is very limited in South Asia.<sup>48</sup> The sixth-grade home-economics textbook in Bangladesh includes some discussion on MHM, which might not be adequate to confront age-old cultural norms. Therefore, part of the effort to raise awareness regarding MHM should prioritise including substantial information on MHM through texts to women from an early age.

Affordability in accessing healthcare services and products is an important dimension in healthcare access theory.<sup>21 23</sup> Women from poorer households are less likely to purchase costly sanitary napkins and settle for reusing clothes and rags.<sup>17 25 49</sup> These vulnerabilities compounded with the females' inadequate access to the media and education in poorer households make them the most vulnerable cohort regarding access to the modern MHM. Multiple population-based studies in LMIC settings in India and Kenya indicate that there exists a strong link between women's education and socioeconomic status in determining the use of the type of material used during menstruation.<sup>50 51</sup>

Spatial characteristics are likely to impact access to healthcare services and products through the dimension of accessibility.<sup>21 23</sup> This idea was corroborated by the fact that women living in urban areas have better access to the modern materials of MHM than rural women. Similarly, most divisions had considerably fewer users of modern materials compared to Dhaka as the socioeconomic and awareness factors are presumably worse in those divisions.<sup>52</sup> Since enormous efforts are required to address these long-standing issues, a favourable and cost-effective way to address the improvement of MHM practices of women in these divisions could be raising awareness through media and associated intervention strategies, which have yielded positive results in past case studies.<sup>45 46</sup>

In order to address the issues discussed around MHM and protect women and girls from the risks of using unhygienic materials and lack of knowledge regarding menstruation, several intervention programmes could be undertaken. Expanding knowledge regarding MHM is likely to result in improved MHM practices,<sup>53</sup> which are part of software interventions as mentioned in the theoretical framework. This expansion could be effectively done by deploying social awareness campaigns using access to mass media, such as newspapers, televisions, and the internet.<sup>54-56</sup> These public health campaigns could prove to be effective in providing information to the underprivileged and vulnerable groups in LMIC countries.<sup>54 57</sup>

Drawing inspiration from previously successful campaigns in Bangladesh,<sup>56 58 59</sup> a nationwide awareness campaign addressing MHM could be developed and deployed effectively using mass media. Such software

intervention could relay a focused message to a wider audience. This would allow the opportunity to direct the same communication in various forms repeatedly, using television or entertainment programmes to induce awareness, as well as paving the way to introduce community interventions.<sup>54 60 61</sup>

While access to different types of media depends on affordability,<sup>62</sup> several studies have shown that media would be a generic awareness tool for health promotion.<sup>62 63</sup> For example, recent studies in Bangladesh has shown that women who have had access to media were more likely to use health services as these campaigns informed them about health benefits, which could work alongside the peer-to-peer contacts.<sup>64 65</sup> Moreover, media campaigns are more cost-effective and no less efficient than door-to-door campaigns, which is more feasible in a densely populated country such as Bangladesh.<sup>43</sup>

In case of MHM awareness, software interventions could be done through text messages regularly on mobile phones, televised programmes designed to raise awareness, radio programmes to discuss about MHM practices and newspaper columns, applications for mobile phones for those with access to the internet, and infographics to impart information regarding the necessities of MHM. For example, 'Meena cartoon', a successful television programme on public health in Bangladesh, delivered messages on gender equity and addressed various social development issues.<sup>66</sup> More recently, a school-based educational intervention on MHM among young girls in Bangladesh also yielded encouraging results.<sup>15</sup> Therefore, intervention programmes using the media platforms could offer new avenues to increase access to appropriate MHM.

The study had a few limitations. First, most of the literature consisted of findings pertaining to adolescent girls. The MHM intervention programmes mostly addressed school-going girls as well, which limited the current study to draw literature gaps from them. Second, this is a cross-sectional study, thus no causal inference could be made from the results. However, the findings indicated future possible intervention strategies. Third, this study was limited to quantitative data. Qualitative information might assist in designing interventions in the future. Fourthly, while the survey collected data on whether women had access to media, it did not detail the content of the programmes women follow in these media. Future studies with more targeted data collection could be more specific in evaluating the level of awareness the respondents show regarding the public health campaigns in media and assess the mobile phone contents for more understanding of the direct impact of media and mobile phone uses. Fifth, the models were limited by a few unmeasured confounders which were not available in the survey data. Finally, the extent to which the cloths used by women were cleaned and reused could not be ascertained from the available data.

## Conclusion

To assess the MHM scenario in Bangladesh, this study utilized the MICS 2019 data to evaluate the spatial distribution of modern menstrual materials used by women and girls of reproductive age in Bangladesh. The role of media and access of mobile phones in MHM for women of reproductive age was further analysed. The results showed that women who frequent media and own mobile phones were less likely to use traditional menstrual methods, which suggests that awareness could play a role in addressing the issue of MHM in Bangladesh.

Software interventions through media, be that newspaper, television, radio, internet, or mobile phone, could be an affordable strategy for LMICs such as Bangladesh. Public health campaigns are part of health policy agendas in Bangladesh; however, a national-level initiative through both public and NGO regarding menstrual management might prove worthwhile, especially given Bangladesh signed to achieve SDGs by 2030.

**Twitter** Raaj Kishore Biswas @BiswasRaaj

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## ORCID iDs

Awan Afiaz <http://orcid.org/0000-0001-5801-9087>

Raaj Kishore Biswas <http://orcid.org/0000-0003-4294-6323>

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