Practices and Predictors of Menstrual Hygiene Management Material Use Among Adolescent and Young Women in Rural Pakistan. A Cross-Sectional Study.

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Research

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Abstract

Background

In low- and middle-income countries, women often use inappropriate materials to manage menstruation, which can pose a hazard to their health. Inappropriate menstrual hygiene management (MHM) can also have important downstream consequences beyond physiologic health, including the restriction of adolescent girls' access to academic pursuits. This impacts one's quality of life and has potential economic consequences for society.

Methods

Among menstruating adolescent and young women 15-23 years of age living in rural Pakistan (n = 25,305), we aimed to describe MHM practices and generate a predictive model of the socioeconomic and demographic factors related to the use of MHM materials. Beliefs and barriers around MHM were also summarized. The outcome variable included: those who practiced appropriate (reported use of a sanitary pad or/and new piece of cloth) and inappropriate MHM (reported use of an old cloth and/or nothing). Logistic regression was used to generate the predictive model, with results presented as odds ratios (OR) and 95% confidence interval (CI).

Results

Inappropriate MHM practices were reported by 75% of participants. The majority (61.9%) reported using old cloths, 12.6% used nothing and 0.5% used old cloth with sanitary pad. One fourth of participants reported appropriate MHM material use, including, 16.2% sanitary pads, 8.6% new cloth and a few reported using sanitary pads with new cloth (0.2%). Inappropriate MHM practices were more common in lowest wealth quintile (OR 4.41; 95% CI = 2.77 to 7.01, P<0.0001), followed by those with no education (OR 3.9; 95% CI = 3.36 to 4.52, P<0.0001). Mothers were the primary source of information about menarche (84.5%). Among school-going girls, 22% reported not going to school while menstruating. The affordability of menstrual hygiene products, awareness of appropriate practices, access to clean supplies, and cultural beliefs were identified as factors contributing to MHM practices.

Conclusions

Findings indicate the need for multi-sectorial efforts to introduce MHM-specific and MHM-sensitive interventions to improve MHM practices, ranging from availability of low-cost MHM materials to the inclusion of MHM education in school curriculums and within community platforms.

Trial Registration

The trial was registered on ClinicalTrials.gov (Identifier: NCT03287882).

Plain English Summary

In resource-limited settings, it is common for menstruating women to use poorly-suited materials to manage menstruation (e.g., pieces of used cloths or rags). This can pose serious health risks. Being unable to access affordable, hygienic sanitary materials can have a negative impact on self-esteem and dignity. Menstruation can also present a barrier to school attendance, which has the potential to affect long-term economic productivity.

We used cross-sectional data from menstruating adolescent girls and women 15-23 years of age (n=25,305) living in rural Pakistan to describe their menstrual hygiene practices and investigate factors associated with the use of different products. Within the analysis, use of a sanitary pad or/and new piece of cloth was considered an appropriate menstrual hygiene material, while the use of an old cloth and/or nothing was an inappropriate material.

Overall, 75% of participants reported using an inappropriate material during menstruation. This was more common among poorer participants and those without formal education. Among those who attended school, 22% did not go to school while menstruating. Barriers to using an appropriate menstrual hygiene product included affordability; limited awareness of appropriate practices; lack of access to clean supplies; and cultural beliefs.

The study findings suggest that there is a need to increase the awareness of adolescent and young women and their families about the importance of safe menstrual hygiene practices. Engaging multiple stakeholders to ensure the availability, accessibility, and affordability of appropriate hygienic sanitary products in this setting will be important to improving practices.

Background

Menarche is a key event in a woman's life, representing a social and physical transition from childhood. (1) If quantified cumulatively, a woman will spend around 6–7 years of her life menstruating. (2) Being able to manage one's menstrual period appropriately is therefore of great importance. The World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) define appropriate menstrual hygiene management (MHM) as the use of a clean material to absorb or collect menstrual blood. This also includes being able to change and dispose of the material at will, in private, and without discrimination. Furthermore, one must have reliable access to appropriate facilities to be able to keep themselves desirably clean. (3) However, low- and middle-income countries (LMICs) globally can lack the necessary materials and facilities for the appropriate management of menstruation. (4)

UNICEF (2019) has emphasized that multiple Sustainable Development Goals (SDGs) related to health, education, gender equality and water sanitation and hygiene (WASH) cannot be fully realized without paying due attention to and investing in menstrual health and hygiene. (3) There are several possible consequences to inappropriate MHM. Physiologically, it can increase one's susceptibility to urinary tract infections. (5–7) Some studies also report an association between secondary infertility and unhygienic MHM practices. (8, 9) There are additionally non-physiological consequences. If a girl has not been adequately informed about menstruation, experiencing menarche for the first time can be traumatic and

cause a feeling of distress. (10) Whether a woman is menstruating can also influence her ability to participate social and religious practices due to cultural norms. (2, 6, 11) For adolescent girls, school absenteeism during menstruation is broadly reported in various LMIC settings, including Pakistan. (10–15) Such schools typically lack gender-sensitive sanitation facilities to manage menstruation, which can have consequences for the safety, dignity and privacy of adolescent girls. (4, 10, 14–17) On personal level, this can affect an adolescent girl's sense of self-esteem and agency. (2, 6) From an economic perspective, there can be reduced per capita earning potential, as monthly absenteeism can lead to poor performance and negatively impacts education success. (3)

Multiple factors contribute to the way menstrual hygiene is managed. Within LMICs, menstrual hygiene products are frequently reported to not be easily available or accessible. (12, 18) Lacking knowledge around how to adequately manage menstruation, such as misinformation based on cultural beliefs, can substantially add to unhygienic MHM practices. (19) Leading causes of inappropriate MHM practices in LMICs include lack of appropriate sanitation facilities, cost and access to MHM products. (4, 11, 20, 21)

The use of old cloths to manage menstruation is a practice widely reported across African and South Asian countries. (2, 11, 14, 20) The re-use of old cloth for many months has been reported in South Asia. (2) This poses an increased risk of infections and other illness (2, 6, 7) A systematic review and meta-analysis of 138 studies of menstruation practices in India found that use of commercial sanitary pads was uncommon among women living in rural locations (Pooled Prevalence (PP): 32%, 95% CI: 25–38%, I^2: 98.6%, n = 56, $p < 0.0001$) compared to urban (PP: 67%, 95% CI: 57–76%, I^2: 99.3%, n = 38). (11) Of the few studies that have been conducted in Pakistan, they have found very limited use of appropriate MHM practices during menstruation. (10, 20)

Among the limited number of published and unpublished research studies assessing MHM, most focus on knowledge and practices. Addressing MHM-related issues has been largely ignored by health managers and policy makers. (20) Collectively, this has led to a call for global action to address the MHM in schools, gaps in understanding, and the development of evidence-based advocacy. (4)

Given the limited data and understanding around MHM practices and beliefs in Pakistan, we aimed to gain a better understanding among adolescent and young women enrolled in an ongoing trial. We aimed to describe MHM practices, barriers towards the use of sanitary napkins and generate a predictive model of factors related to the use of MHM materials. Ideally, findings around MHM practices and determining factors could be utilized by research entities and policy makers to design evidence-based interventions to improve the MHM practices among adolescent and young reproductive age women living in similar settings.

Methods

Data was collected from June 2017 to July 2018 as a part of a baseline assessment of a community-based research trial conducted in a rural district, Matiari. This study was a collaboration between the Aga

Khan University, Pakistan and The Hospital for Sick Children, Canada.

Per district health department data as of June 2020, Matiari is constituted of around 0.8 million population living in around 1800 villages. Nearly half of the population is covered by lady health workers (LHWs), the public sector's primary outreach health care work force.

The ongoing Matiari emPowerment and Preconception Supplementation (MaPPS) Trial primarily aims to determine the impact of life skills building education (LSBE) and multiple micronutrient supplementation on anemia prevalence and low birth weight (LBW) among adolescent and young women. (22, 23) Assessing MHM practices was a secondary outcome of the trial and embedded within the evaluation framework of larger LSBE intervention. LSBE community sessions are used to inform adolescent girls what to expect during menstruation, what is happening, and aim to dissipate stigma. This includes discussion of appropriate ways to manage menstrual hygiene, consequences of inappropriate cleanliness during menstruation and general good personal hygiene management practices. The discussion is delivered in the community using trained lady health workers (LHWs) once a month. However, for this assessment, we have used cross-sectional data on MHM collected upon enrolment in the study (i.e., prior to exposure to the intervention).

The sample was based on the main MaPPS trial sample size requirement, which was powered to observe 25% relative reduction in LBW. (22) In total, 25,447 adolescent and young women consented to participate. However, 142 participants had reportedly not experienced menarche, thus they were excluded from this analysis. Trained female data collectors administrated a structured questionnaire to participants at their homes. This questionnaire included questions consistent with Pakistan demographics and health survey (PDHS) (24) such as demographic data and individual characteristic (e.g. age, marital status and education), as well as additional questions regarding MHM (age at menarche, MHM practices, source of information on menarche and perceived barriers towards use of sanitary napkins). The study was approved by institutional ethics boards at both the Aga Khan University and The Hospital for Sick Children, and the National Bioethics Committee in Pakistan. The trial was registered on ClinicalTrials.gov (Identifier: NCT03287882).

Statistical Analysis

All continuous variables were reported as a mean ± standard deviation (SD), and categorical variables were reported in the form of frequencies and percentages. Between those who practiced appropriate and inappropriate MHM the mean differences were compared using a student's t-test and categorical variables were compared using a Chi-square test.

Univariate analyses between the outcome and predictor variables were first assessed, with results presented as odds ratios (OR), 95% confidence interval (CI) and P-values. From the univariate analyses, all variables for which $P < 0.25$ were considered for inclusion in a multivariate analysis. A step-wise backward elimination method was applied and variables that retained significance ($P < 0.05$) were

maintained in the final multivariate model. Data was analyzed using STATA version 15.0 (Stata Corporation, College Station, TX, USA).

A bivariate categorical variable for MHM practice was generated based on the method participants reported using to manage their period while menstruating. Women who reported the use of sanitary pads (an absorbent item worn by a woman while menstruating to absorb the blood flow from her vagina that is usually disposable and thrown into the garbage after use) and/or new cloth (strips of new fabric, often cotton or flannel, used to absorb the blood flow from a woman's vagina) during menstruation were categorized as practicing "appropriate MHM". Women who used other materials (old cloth (strips of rags), other material and/or nothing) during menstruation were categorized as practicing "inappropriate MHM". To generate a predictive model of MHM practices, we considered predictors identified as important within the literature and that appeared within the MaPPS Trial dataset. Associations between demographic, household, and individual factors and MHM practices were evaluated using logistic regression. These included living location (rural (village)/urban (township)), socioeconomic status (SES), participant age, education level, occupation, marital status, religion, Decision maker about what to use during menstruation and hand-washing index. Based on SES, wealth quintiles (poorest, poorer, middle, richer and richest) were generated using standard household indicators.(25) A cumulative score was calculated for handwashing from the number of times a participant washed her hands at set times, including before preparing food, before eating and after toilet use. Scored ranged from 0–3: "0" meant no handwashing was observed in the three situations, whereas "3" reflected handwashing in all scenarios."

Results

Participants' Characteristics

Participants' reported mean age was 18.2 ± 2.3 years, and on average they experienced menarche at 13.0 ± 0.9 years. Twenty-three percent of participants were married, with a mean age at marriage of 16.9 ± 1.8 years. Around half of study participants (52.5%) were from rural villages. The majority of participants were Muslim (90.6%), and 44.7% reported no formal education (Table 2).

Menstrual Hygiene Management Material Use

Overall, 25% of participants reported the use of an appropriate MHM material, although materials use was variable, including sanitary pads (16.2%), new cloths (8.6%) and sanitary pad with new cloth (0.2%). Majority participants reported an inappropriate use of MHM material, largely, 61.9% participants reported the use of old cloth, some (12.6%) reported using no material to manage their most recent menstrual period and a few reported used old (0.5%) or new cloth (0.2%). There was no reported tampon use.

Table 1
Material used to manage blood flow while menstruating

	Appropriate MHM	Inappropriate MHM	Total	P-value
n	6299	19006	25305	
Sanitary pad	4087 (64.88)	---	4087 (16.15)	< 0.0001
New cloth	2167 (34.40)	---	2167 (8.56)	
Old Cloth	0 (0)	15667 (82.43)	15667 (61.91)	
Sanitary pad + new cloth	45 (0.71)	---	45 (0.18)	
Sanitary pad + old cloth	---	136 (0.72)	136 (0.54)	
Used nothing	---	3191 (16.79)	3191 (12.61)	
Other	---	12 (0.06)	12(0.05)	

There were differences in demographic characteristics between those who practiced appropriate or inappropriate MHM (Table 02), except for age. However, there was no difference in MHM material use between adolescent and young women (P = 0.369).

Table 2
Demographic and individual's characteristics of study participants, disaggregated by MHM practice

	Adequate MHM	Inadequate MHM	Total	P-value
n	6299	19006	25305	
Demographic information				
Location				
Rural	2340 (37.15)	10942 (57.57)	13282 (52.49)	< 0.0001
Urban	3504 (55.63)	6384 (33.59)	9888 (39.08)	
Semi-urban	455 (7.22)	1680 (8.84)	2135 (8.44)	
Socio economic status (SES)				
Poorest	391 (6.21)	4120 (21.68)	4511 (17.83)	< 0.0001
Poor	613 (9.73)	4200 (22.10)	4813 (19.02)	
Middle	879 (13.95)	4229 (22.25)	5108 (20.19)	
Rich	1559 (24.75)	3781 (19.89)	5340 (21.10)	
Richest	2857 (45.36)	2676 (14.08)	5533 (21.87)	
Individual information				
Age (Mean ± sd)	18.25 ± 2.33	18.24 ± 2.34	18.24 ± 2.34	0.870
15–19 years	3613 (57.36)	11024 (58.0)	14637 (57.84)	0.369
19–23 years	2686 (42.64)	7982 (42.0)	10668 (42.16)	
Age at marriage (Mean ± sd, n)	17.17 ± 1.84, 1264	16.81 ± 1.76, 4567	16.89 ± 1.78, 5831	0.031
Education				
None	1383 (21.96)	9922 (52.20)	11305 (44.67)	< 0.0001
Primary	1289 (20.46)	4737 (24.92)	6026 (23.81)	
Secondary	1883 (29.89)	3225 (16.97)	5108 (20.19)	
Higher Secondary/University	1744 (27.69)	1122 (5.90)	2866 (11.33)	
Occupation				

	Adequate MHM	Inadequate MHM	Total	P-value
Within the home	3118 (49.50)	8912 (46.89)	12030 (47.54)	< 0.0001
Unskilled manual labor	415 (6.59)	4010 (21.10)	4425 (17.49)	
Skilled manual labor	875 (13.89)	4240 (22.31)	5115 (20.21)	
Others (professional & unemployed)	149 (2.37)	97 (0.51)	246 (0.97)	
Student	1742 (27.66)	1747 (9.19)	3489 (13.79)	
Marital status				
Never married	5033 (79.90)	14432 (75.93)	19465 (76.92)	< 0.0001
Married	1224 (19.43)	4458 (23.46)	5682 (22.45)	
No longer married	42 (0.67)	116 (0.61)	158 (0.62)	
Religion				
Muslim	5927 (94.09)	16996 (89.42)	22923 (90.59)	< 0.0001
Other	372 (5.91)	2010 (10.58)	2382 (9.41)	
Decision maker about what to use during menstruation				
Participant	5118 (81.25)	16418 (86.38)	21536 (85.11)	< 0.0001
Mother	565 (8.97)	843 (4.44)	1408 (5.56)	
Participants + others	597 (9.48)	1678 (8.83)	2275 (8.99)	
Others	18 (0.29)	47 (0.25)	65 (0.26)	
No response	1 (0.02)	20 (0.11)	21 (0.08)	
Hand washing index[1]				
0	15 (0.24)	282 (1.48)	297 (1.17)	< 0.0001
1	120 (1.91)	756 (3.98)	876 (3.46)	
2	779 (12.37)	2511 (13.21)	3290 (13)	
3	5385 (85.49)	15457 (81.33)	20842 (82.36)	
Data presented as mean ± SD and n (%)				

	Adequate MHM	Inadequate MHM	Total	P-value

[1]Cumulative score of total frequencies for handwashing (i.e. before preparing food, before eating and after using toilet)

Univariate and Multivariate Analysis

As there was no difference in the MHM practices between adolescent and young women (p = 0.369), all participants' data were considered together. Univariate analysis showed that likelihood of inappropriate MHM practices were significantly greater if one belonged to a lower wealth quintile (OR 11.24; 95% CI = 7.17 to 17.79, P < 0.0001), followed by having no education (OR 11.15; 95% CI = 8.80 to 14.12, P < 0.0001). Additional factors that were significantly associated with MHM practices included living area, type of occupation one belonged to, marital status, religion, decision making authority about what to use for MHM and handwashing score (Table 03).

Table 3
Factors associated with inadequate menstrual hygiene management practices

	Univariate model			Multivariate model		
	OR	95% CI	P-value	OR	95% CI	P-value
Demographic information						
Location						
Rural	2.56	1.69, 3.88	< 0.0001	—	—	—
Urban	Ref.					
Semi-urban	2.02	0.92, 4.44	0.078	—	—	—
SES						
Poorest	11.24	7.171 17.79	< 0.0001	4.41	2.77, 7.01	< 0.0001
Poor	7.31	5.24, 10.19	< 0.0001	3.52	2.64, 4.69	< 0.0001
Middle	5.14	3.83, 6.88	< 0.0001	2.96	3.35, 3.74	< 0.0001
Rich	2.59	2.04, 3.28	< 0.0001	1.85	1.53, 2.23	< 0.0001
Richest	Ref.			Ref.		
Individual information						
Education						
None	11.15	8.80, 14.12	< 0.0001	3.9	3.36, 4.52	< 0.0001
Primary	5.71	4.32, 7.54	< 0.0001	2.95	2.46, 3.53	< 0.0001
Secondary	2.66	2.26, 3.12	< 0.0001	1.98	1.76, 2.22	< 0.0001
Higher Secondary/University	Ref.			Ref.		
Occupation						
Within the home	Ref.			Ref.		
Unskilled manual labor	3.38	2.49, 4.57	< 0.0001	1.55	1.07, 2.23	0.018

	Univariate model			Multivariate model		
Skilled manual labor	1.69	1.30, 2.20	< 0.0001	1.37	1.12, 1.67	0.002
Others (professional & unemployed)	0.23	0.17, 0.30	< 0.0001	0.58	0.46, 0.72	< 0.0001
Student	0.35	0.30, 0.40	< 0.0001	0.74	0.68, 0.80	< 0.0001
Marital status						
Never married	0.79	0.68, 0.90	0.001	1.18	1.05, 1.32	0.005
Married	Ref.			Ref.		
No longer married	0.76	0.50, 1.14	0.186	0.69	0.43, 1.13	0.142
Religion						
Muslim	Ref.					
Other	1.88	1.18, 2.99	0.007	—	—	—
Decision maker about what to use during menstruation						
Participant	2.15	1.03, 4.45	0.040	2.56	1.10, 5.96	0.029
Mother	Ref.			Ref.		
Participants + others	1.88	0.92, 3.82	0.080	2.44	1.07, 5.56	0.034
Others/No response	2.36	1.43, 3.90	0.001	2.22	1.18, 4.18	0.014
Hand Washing Index						
0	6.55	3.64, 11.77	< 0.0001	3.12	1.80, 5.42	< 0.0001
1	2.19	1.65, 2.92	< 0.0001	1.89	1.37, 2.61	< 0.0001
2	1.12	0.89, 1.42	0.335	1.37	1.15, 1.64	< 0.0001
3	Ref.			Ref.		
Ref. = Reference category						

	Univariate model	Multivariate model
OR = Odds ratio, CI = Confidence interval		

Within the multivariate model, religion and living rurally did not remain as a significant predictive factor. The largest effects were observed for SES (OR 4.41; 95% CI = 2.77 to 7.01, P < 0.0001) and having no education (OR 3.9; 95% CI = 3.36 to 4.52, P < 0.0001). With progression from lower to higher SES categories, there was a clear gradient exists across quintiles for the practice of appropriate MHM. Improper hand hygiene was also associated with greater inappropriate MHM (OR: 3.12; 95% CI: 1.80, 5.42, P < 0.035) (Table 03)

Barriers to Appropriate MHM

Cost was reported to be one of the biggest barriers towards use of sanitary pads by participants (48.7%). Lack of availability and awareness about appropriate materials with which to manage MHM were reported by 17.4% and 12.1% participants, respectively. Cultural and religious reasons for not using sanitary pads were reported by 21.9% of participants, including shyness to ask someone to bring it from market; participants' lack of comfort with using sanitary pads; and that throwing out a sanitary napkin immersed with blood was perceived to be a sinful act. Some participants also indicated that the lack of sanitation facilities to dispose-off sanitary pads was a barrier. (Table 4)

Table 4
Reasons for not using sanitary pads

	Affordability	Knowledge	Availability	Cultural /Religious Reasons	Total
n (%)	9257 (48.71)	2294 (12.07)	3300 (17.36)	4155 (21.86)	19006
Demographic information					
Location					
Rural	5209 (47.61)	1506 (13.76)	2201 (20.12)	2026 (18.52)	10942
Urban	3211 (50.30)	485 (7.60)	953 (14.93)	1735 (27.18)	6384
Semi-urban	837 (49.82)	303 (18.04)	146 (8.69)	394 (23.45)	1680
SES					
Poorest	2082 (50.53)	1062 (25.78)	495 (12.01)	481 (11.67)	4120
Poor	2262 (53.86)	592 (14.10)	694 (16.52)	652 (15.52)	4200
Middle	2201 (52.05)	364 (8.61)	855 (20.22)	809 (19.13)	4229
Rich	1826 (48.29)	197 (5.21)	756 (19.99)	1002 (26.50)	3781
Richest	886 (33.11)	79 (2.95)	500 (18.68)	1211 (45.25)	2676
Individual information					
Age					
15–19 years	5306 (48.13)	1386 (12.57)	1907 (17.3)	2425 (22.00)	11024
19–23 years	3951 (49.50)	908 (11.38)	1393 (17.45)	1730 (21.67)	7982
Education					
None	5028 (50.68)	1774 (17.88)	1513 (15.25)	1607 (16.20)	9922
Primary	2297 (48.49)	387 (8.17)	874 (18.45)	1179 (24.89)	4737

	Affordability	Knowledge	Availability	Cultural /Religious Reasons	Total
Secondary	1487 (46.11)	123 (3.81)	682 (21.15)	933 (28.93)	3225
Higher Secondary/University	445 (39.66)	10 (0.89)	231 (20.59)	436 (38.86)	1122
Occupation					
Within the home	4383 (49.18)	888 (9.96)	1547 (17.36)	2094 (23.50)	8912
Unskilled manual labor	1917 (47.81)	955 (23.82)	431 (10.75)	707 (17.63)	4010
Skilled manual labor	2152 (50.75)	401 (9.46)	920 (21.70)	767 (18.09)	4240
Other/Professional/Unemployed	48 (49.48)	6 (6.19)	16 (16.49)	27 (27.84)	97
Student	757 (43.33)	44 (2.52)	386 (22.10)	560 (32.05)	1747
Marital status					
Never married	6862 (47.55)	1664 (11.53)	2553 (17.69)	3353 (23.23)	14432
Married	2323 (52.11)	619 (13.89)	731 (16.40)	785 (17.61)	4458
No longer married	72 (62.07)	11 (9.48)	16 (13.79)	17 (14.66)	116
Religion					
Muslim	8207 (48.29)	1814 (10.67)	3093 (18.20)	3882 (22.84)	16996
Other	1050 (52.24)	480 (23.88)	207 (10.30)	273 (13.58)	2010
Decision maker about what to use during menstruation					
Participant	8027 (48.89)	1893 (11.53)	2798 (17.04)	3700 (22.54)	16418
Mother	211 (25.03)	146 (17.32)	310 (36.77)	176 (20.88)	843
Participants + others	1007 (60.01)	226 (13.47)	176 (10.49)	269 (16.03)	1678
Others/No response	12 (17.91)	29 (43.28)	16 (23.88)	10 (14.93)	67

	Affordability	Knowledge	Availability	Cultural /Religious Reasons	Total
Hand Washing Index					
0	110 (39.01)	98 (34.75)	47 (16.67)	27 (9.57)	282
1	375 (49.60)	138 (18.25)	87 (11.51)	156 (20.63)	756
2	1221 (48.63)	309 (12.31)	363 (14.46)	618 (24.61)	2511
3	7551 (48.85)	1749 (11.32)	2803 (18.13)	3354 (21.70)	15457
Data presented as n (%)					

Consequences of menstruation

Slightly less than half of participants (45.4%) indicated that their routine activities were restricted due to menstruation. Among the 2147 participants who reported attending school regularly, 22.2% mentioned not going school while menstruating.

Discussion

The current literature suggests that various socio-cultural and structural reasons are important to why many girls and women living in LMICs often do not practice appropriate MHM. (4, 11) Notably, within South Asia, MHM is widely excluded from public infrastructure design and public health promotion campaigns, and there is limited guidance to health workers. (2) We aimed to further understand MHM practices, and the predictors and barriers to practicing appropriate MHM, among a cohort of adolescent and young women in rural Pakistan.

We found that 25% of participants practiced appropriate MHM, which is lower than figures reported in other regions of Pakistan, although none were conducted rurally, as was the case in our study. Michael et al (2020) recently reported 68.7% use of commercially available sanitary pads in a study conducted in Quetta. (15) Mumtaz et al (2016) reported that 50.2% of adolescent girls either use sanitary pads or new cloths during menstruation in a study conducted in peri-urban Islamabad. (26) In a Karachi-based study, Ali et al (2010) reported that 41.4%, 29.9% and 21.2% adolescent girls from private schools, public schools and out-of-school, respectively, used hygienic MHM materials. (20) Furthermore, based from the findings of a meta-analysis of community-based studies conducted in India, a third of adolescent girls used sanitary pads (PP 32%, 25–38%, I^2 98.6%, $n = 56$, $p < 0.0001$). (11) Collectively, this demonstrates that a greater proportion of adolescent and young women in Matiari practice inappropriate MHM material to manage menstruation.

Affordability is known to be a barrier to the use of appropriate MHM materials across LMICs. (11, 27–29). Various studies carried out in parts of Africa and Asia have suggested the suboptimal use MHM materials is because of the high cost of hygienic absorbents. Most qualitative and quantitative findings are from school-based settings.(11, 13, 20, 27–29) In our community-based study, household wealth had the strongest association to the use of either material during menstruation. Participants who belonged to poorest wealth quintile were > 4 times as likely to practice inappropriate MHM during menstruation compared to those in the richest quintile. Study results revealed that almost half (48.7%) of participants reported cost as barrier to the use of sanitary napkins. This suggests that the production of and access to affordable hygienic sanitary material will be critical to improving MHM in the study setting.

Our study findings revealed a robust relationship between having formal education and the appropriate use of menstrual hygiene material, as schooling was significantly associated with higher use of sanitary pads (OR 3.9; 95% CI = 3.36 to 4.52, P < 0.0001). Because education level increased correspondingly with wealth quintile, it is possible that access to appropriate MHM materials is limited by poverty. A review of studies from Indian settings showed less common use of old cloths to manage menstruation (inappropriate MHM) in the studies carried out in school settings compared to those situated in the community. (11) Ali et al (2010) reported greater than two-fold use of sanitary pads among adolescent girls who were studying in private school, in contrast to out-of-school participants Karachi, and emphasized the need to initiate MHM awareness programs beyond school platforms. (20) Together with our current findings, this suggests the importance of community-based platforms to reach out-of-school girls and women, given that the practice of inappropriate MHM among these groups was high.

We found that two-thirds of study participants reported inappropriate MHM. The majority lived in more remote villages within the study catchment area. Consistent with the trends reported in several studies, univariate analysis suggested that participants who belonged to comparatively urban areas were more likely to practice appropriate MHM OR 2.56 (CI 59% = 1.69, 3.88, P < 0.0001). (5, 11) The impact of living rurally on the use of sanitary products may not be well understood in isolation, as educational attainment and access to sanitary product is higher in urban areas.

Our current findings revealed that about one fifth of study participants (17.4%) lacked access to hygienic MHM material. This is further complicated by study participants' reported unease in buying sanitary pads from the shops, which are usually run by male vendors, on top of that they did not feel comfortable asking their parents to buy MHM materials. The lack of suitable facilities at which to dispose of sanitary napkins was also identified to restrict the uptake of the use of sanitary pads. Interestingly, a tenth of participants were not familiar with sanitary pads, the majority of whom were from rural and semi-urban areas, belonged to poorer wealth quintiles and lacked formal education. Overall, we believe there is a role of improved knowledge and awareness around the appropriate use of MHM materials, as highlighted by various researchers across settings in order to dissipate stigma, spatial restrictions, gender inequalities and enhance school attendance. (15, 18, 28, 30)

Limitations

While we aimed to understand what materials participants within the MaPPS trial used to manage menstruation, we did not investigate the diverse factors that contributed to their decision-making. Study data was limited to self-reported, structured questionnaire information, which does not allow for more nuanced and qualitative data capture that could be informative to why appropriate menstrual hygiene management practices were low. The inclusion of health manager and market suppliers' perspective around MHM materials could have enriched the data and allowed for more robust recommendations to address the issue. Given the observed effect of menstruation on girls' school attendance, an assessment of facilities for private and appropriate hygiene and disposal in schools could offer greater insight.

Strengths

This study included data from > 25,000 adolescent and young women aged 15–23 years. While the majority of studies on MHM have only focused adolescent girls enrolled in schools, the current study provides us with an opportunity to expand to understanding community-based MHM practices. Furthermore, the study fills the gap in information on MHM in rural settings within Pakistan. We hope this might serve as a platform for researchers to further explore and enable appropriate MHM practices. The presented evidence may help health managers to design a programmatic set of action to address the MHM issues of girls and women living in similar settings.

Conclusions

Within our assessment, the majority of participants were not found to practice what is considered appropriate MHM. The factors that predicted the use of appropriate MHM and the barriers reported to inhibit the use of sanitary pads are not unique to this setting and reflect the findings within several other LMICs. To adequately tackle the identified barriers to MHM in this setting, there is a need for a synergistic initiative from different sectors. The introduction of MHM-specific and MHM-sensitive interventions ranging from availability of low cost MHM materials to the inclusion of MHM awareness in school curriculums and educational materials for use in community platforms can potentially improve MHM. Given the existing culture of silence around menstruation, the educational material should also aim to sensitize the male segments of communities. Moreover, local low-cost production of MHM materials, possibly accompanied by the engagement of local girls and women, could not only serve to address the MHM-specific barriers but also contribute to overall women's economic empowerment.

Abbreviations

CI: Confidence Interval

LBW: Low Birth Weight

LHWs: Lady Health Workers

LMICs: Low and Middle-Income Countries

LSBE: Life Skills Building Education

MaPPS: Matiari Empowerment and Preconception Supplementation

MHM: Menstrual Hygiene Management

OR: Odd Ratios

PDHS: Pakistan Demographics and Health Survey

PP: Pooled Prevalence

SD: Standard Deviation

SDGs: Sustainable Development Goals

SES: Socioeconomic Status

UNICEF: United Nations International Children's Emergency Fund

WASH: Water Sanitation and Hygiene

WHO: World Health Organization

Declarations

Ethics approval and consent to participate

Ethics review committee of Aga Khan University Karachi approved this trial dated August 16, 2016 (Reference number: 4324-Ped-ERC-16). On November 17, 2016 this was permitted by Research Ethics Board at the Hospital for Sick Children (Reference number: 1000054682). All the study participants dully read/understand and signed the consent form. They were informed about study aims, objectives, procedures, potential risks, benefits and volunteer nature of participation. Right to refusal and withdrawn without any sort of consequence communicated in local language.

Consent for publication

Yes

Availability of data and materials

The datasets used for the article and the study is available from the corresponding author on request.

Competing interests

The authors declare that they have no financial or non-financial competing interests.

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Authors' contributions

Dr. Zulfiqar Ali Bhutta (PI) conceived the trial and availed Sponsorship. SBS, ZAB, JBB had initially hypothesized and drafted study protocol. YW & QJ contributed to multiple amendments, field SOPs development, trainings and implementation. YW, JBB, & AR conceptualize this manuscript and data analysis plan. AR, FS, AH, and IA developed data collection applications, assisted with instrument development and cleaning and data analysis. YW produced initial draft of this manuscript with inputs from team mentioned above. All the listed authors reviewed and approved final draft for publication.

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Supplementary Files

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