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Menstrual hygiene knowledge and practices among female senior high school students in the new Juaben North municipality of Ghana: a cross-sectional study

Nana Nimo Appiah-Agyekum[1], Mary Adebi Nyamekye[1], Ivy Akushika Agbenu[2] and Desmond Dzidzornu Otoo[2*]

Abstract

Background Menstruation is a natural and inevitable process in females. However, adolescent girls continue to face challenges with several misconceptions and myths. Despite numerous efforts and campaigns, limited knowledge and unhygienic practices persist, leading to various adverse social and health outcomes. This study examined knowledge, practices and factors influencing menstrual hygiene management practices among female senior high school students in the New Juaben Municipality of Ghana.

Methods A descriptive cross-sectional study was conducted among 2 senior high schools. Students were selected using systematic random sampling. Data were collected using a structured questionnaire adapted from literature between August to September 2022. Data was entered into Microsoft Excel Software (2020) and then exported to STATA/MP version 17 (STATA Corp) for analysis. Descriptive statistics and multiple logistic regression were conducted with p-values ≤ 0.05 considered significant.

Results A total of 557 students were included in the study. 61.22% of students demonstrated good knowledge of menstruation, and 57.09% practiced good menstrual hygiene. Disposable sanitary pads were the most commonly used (97.44%) and preferred (93.25%) menstrual products. Most students changed their sanitary pads two or three times per day (47.49% and 47.30%, respectively). Nearly all participants (99%) bathed during menstruation, with water only (61.13%) being the most common method for genital cleaning. Logistic regression analysis revealed that students who lived with their mothers only (AOR = 1.88, 95% CI: 1.16–3.02, $p = 0.01$), had access to dedicated disposal bins (AOR = 2.20, 95% CI: 1.42–3.39, $p < 0.001$), and reported adequate facilities for menstrual hygiene needs (AOR = 0.60, 95% CI: 0.39–0.91, $p = 0.017$) were more likely to practice good menstrual hygiene.

Conclusion Generally, female students had good MHM knowledge and practices with few misconceptions. The study underscores the importance of enhancing menstrual hygiene education, improving school infrastructure, and supporting family-based health education to promote safe and effective menstrual hygiene practices among

*Correspondence:
Desmond Dzidzornu Otoo
ddotoo@st.ug.edu.gh

Full list of author information is available at the end of the article

adolescent girls. Targeted interventions involving schools, parents, and policymakers are needed to create a supportive environment that ensures menstrual health and educational continuity for all girls.

Keywords Health education, Adolescent wellbeing, Menstrual hygiene, Sanitation

Background

Menstruation is a physiological process that occurs in females when they reach their puberty stage [1, 2], which leads to significant changes in their cognitive, physical, emotional, and social lives [3, 4]. Menstruation remains fundamental in the life of women. It unites the personal, political, intimate, public, socio-cultural and physiological aspects of an individual [5]. Menstrual hygiene management (MHM) remains a public health issue in sub-Saharan Africa (SSA), including Ghana. Hygiene Management (MHM) is defined as the "use of clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period, using soap and water for washing the body as required and having access to facilities to dispose of used menstrual management materials" [6]. While awareness campaigns on menstruation and menstrual hygiene among adolescent girls has been high in recent times, significant gaps persist in MHM. Some of the key challenges include limited access to information, inconsistent use of sanitary products and limited access to water sanitation and hygiene (WASH) facilities [7]. This is further complicated culture, taboos [4, 8] and myths which can lead to stigma, isolation, and absenteeism for schoolgirls [1, 9, 10].

Even though menstruation is a natural and inevitable process that occurs in females, some societies especially in Low-and-middle income countries continue to face challenges with resultant consequences. These challenges contribute to poor menstrual hygiene practices, which may lead to increased risk of reproductive tract infections, isolation, negative impacts on girls' education and reduced academic performance among many others [3]. MHM can be seen as a major public health issue in addition to its links to human rights, education, and health [6].

MHM has received much attention on the public health agenda to decrease gender inequality in education and to keep school aged girls at school [11], however, major gaps continue to exist in the implementation of this agenda [12]. Research shows that adolescents in most low-and middle-income countries (LMICs) engage in poor menstrual hygiene management practices [13] and this is linked to inadequate knowledge on MHM, cultural practices, lack of WASH facilities among others which prevents them from achieving their MHM needs [14–16].

Ghana has 11,782,614 (38.2%) of its total population classified as young people (15–35 years) according to the 2021 Demographic and Health Survey [17]. This group forms a significant part of the country's population and are mostly found at different levels of the educational system. Despite efforts to improve MHM through the educational system, there is limited information on how these efforts translate into improved practices particularly in rural and peri-urban areas. Several female adolescents in the rural and peri-urban areas, still face challenges with managing menstruation effectively [4]. MHM continues to be a personal, hygienic, social, and public health problem for many female students across Ghana. Understanding adolescent girls' knowledge and practices of MHM is essential to identify hidden gaps, guide interventions, and support the broader goals of improving adolescent's health. This study, therefore, sought to examine the knowledge, practices and factors influencing and menstrual hygiene management practices among female senior high school students in the New Juaben North Municipality of Ghana.

Materials and methods

Study design and setting

A descriptive cross-sectional survey using the quantitative research was conducted among 2 Senior High Schools in the New Juaben North Municipality in the Eastern Region of Ghana. According to the recent report from the 2021 population and Housing Census, the population of the municipality stands at 93,201 with 46,799 females and 46,402 males [18]. The municipality was selected due to its average intensity of poverty of 41.7% [18] and its peri-urban nature. The two senior high schools were selected randomly from 5 senior high schools in the Municipality. The first school (school A) had a total female population of 1163 and the second (school B) had a female population of 1637. The study population based on the female population in these schools was 2800.

Study population

The study population were female students in the two senior high schools who were present during the data collection period. Female students who had experienced menarche were included in the study.

Sample size

The sample size was determined with the Cochran formula $n = Z^2pq/d^2$. Where N = sample size, z = z-score of a 95% confidence (1.96), p = proportion of menstrual hygiene knowledge (estimated as 50%). The 50% estimation yields the largest sample size. $q = 1 - p = 0.5$, and

m = margin of error = 5%. With a non-response rate of 10%, a total of 428 was estimated. However, a total of 557 students were recruited to participate in the study. Since the estimated sample size is the minimum, increasing the number of students recruited could reduce the margin of error and improve the precision of estimates.

Sampling technique

The participating schools were randomly selected from among the schools in the Municipality. Using a systematic sampling technique, the female students were selected from both schools based on their population until the minimum sample size was achieved. A total of 305 responses were obtained from students in School A and 257 responses from School B.

Data collection tools/procedure

Data was collected with a structured questionnaire consisting of mostly close-ended questions. Questionnaire was adopted from other published studies done on menstrual hygiene management [1, 19, 20].

The questionnaires were administered face-to-face by the researcher and three (3) assistants whiles others were self-completed by the respondents in English since that was the official language of teaching and learning in senior high schools in Ghana. Students were approached during their break times and after the closing of lessons for the day for possible participation in the study. Questionnaires were administered after consent was sought from all respondents. Data collection took approximately 25 min. Data was collected from August to September 2022.

Data quality assurance

To ensure the quality of data, academic experts in MHM and WASH were made to review the questionnaire to check relevance of questions. Questions were mainly adopted from already published studies as mentioned under the data collection tools. The questionnaire was pre-tested at a senior high school in the Greater Accra Region using 50 female students. All discrepancies and unclear questions from the expert review and the pre-test were corrected before the main study.

Data analysis

Data collected was entered into Microsoft Excel Software (2020) for cleaning and validation. Data was then exported to STATA/MP version 17 (STATA Corp) for analysis. In assessing knowledge, 7 questions were used. Out of the total score of 7, the scores were rounded to 100%. Any score less than 50% was graded as "poor" any score between 50 and 70% were graded as "moderate" and scores between 80 and 100% were graded as "good". A total of 10 statements elicited menstrual hygiene practices with a score of 1 for good practices and 0 for poor practices. The scores were rounded to 100%. Any score less than 80% was considered poor practice and scored 80% and above were considered good practices. Descriptive statistics and multiple logistic regression were performed and reported. All p-values ≤ 0.05 were considered significant.

Ethical consideration

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval for the study was sought from the Institute of Statistical and Economic Research Ethics Committee (ECH) of University of Ghana with number ECH 122/22–23 The principles of privacy and confidentiality were upheld during the research and written informed consents were obtained from respondents.

Results

Background characteristics of respondents

A total of 557 participants were included in the study. Table 1 shows the socio-demographic characteristics of participants. The mean age was 16.50 ± 0.96 years with a range between 14 years and 19 years. Out of the total responses, 62.36% ($n = 345$) of the students were from the Eastern Region followed by the Greater Accra Region at 29.84% ($n = 165$). The remaining were spread sparingly among all the other regions in Ghana. 57.91% ($n = 322$) of the students were in their first year and the rest 42.09% ($n = 234$) were in second year. For their religious affiliations, 91% ($n = 509$) of the students were Christians whiles 7.75% ($n = 43$) were Muslims. More than half of the students, 75.63% ($n = 419$) who participated in the study, were in the boarding house.

60.36% ($n = 335$) stayed with both parents while 25.59% ($n = 142$) stayed with their mothers alone. Most mothers had at least junior high school education 31.05% ($n = 172$) and 31.39% ($n = 172$) of fathers had senior high school education. These findings are presented in Table 1 below.

Knowledge of students on menstruation

In relation to specific menstruation hygiene topic areas, about 95.6% ($n = 529$) of the students mentioned that menstruation is the natural shedding of blood on a monthly basis. 2.17% ($n = 12$) mentioned that menstruation was a disease and 2.35% ($n = 13$) said menstruation was a type of curse to women.

It was evident that most of the students, 476 (87.50%) knew that menstruation was caused and regulated by hormones. Very few mentioned that it was a curse of God and caused by diseases while 43 (7.90%) had no idea about the question. Also, more than half 355 (65.38%) knew that the menstrual blood comes from the uterus (womb) while 121 (22.28%) indicated that it originated

Table 1 Socio-demographic characteristics of respondents

Variables	Frequencies (*n*)	Percentages (%)
Age: Mean: 16.50 ± 0.96 CI: [16.42–16.58] Min: 14 Max: 19		
Menarche: Mean: 13.19 ± 1.44 CI: [13.07–13.32]		
Region of Residence		
Ashanti Region	7	1.27
Bono East	5	0.90
Brong Ahafo	9	1.63
Central Region	17	3.07
Eastern Region	345	62.39
Greater Accra Region	165	29.84
Northern Region	1	0.18
Western Region	4	0.72
Total	**553**	**100.00**
Level of Study		
Form 1	322	57.91
Form 2	234	42.09
Total	**556**	**100.00**
Religion		
Islam	43	7.75
Christianity	509	91.71
Traditional	3	0.54
Total	**555**	**100.00**
Accommodation Status		
Day	133	24.01
Boarding	419	75.63
Total	**554**	**100.00**
With whom do you live with when not in school		
Both Parents	335	60.36
Mother Only	142	25.59
Father Only	30	5.41
Household without elder female member	7	1.26
Household with elder female member other than mother	35	6.31
Alone	6	1.08
Total	**555**	**100.00**
Mother's Educational Level		
No Education	30	5.42
Primary	47	8.48
JHS	172	31.05
SHS	147	26.53
Tertiary	98	17.69
Technical/Vocational	59	10.65
Total	**554**	**100.00**
Father's Educational Level		
No Education	27	4.93
Primary	19	3.47
JHS	90	16.42
SHS	172	31.39
Tertiary	171	31.20
Technical/Vocational	69	12.59
Total	**548**	**100.00**

from the abdomen. 34 (6.26%) mentioned that the blood was from the bladder while 33 (6.08%) had no idea. On the duration of normal menstruation, 507 (92.01%) indicated that it was between two (2) to seven (days) while 29 (5.25%) mentioned greater than 7 days. Also, 12 (2.18%) did not know the duration of normal menstruation. Students were also asked the normal duration between two menstrual cycles (in days). 333 (61.78%) indicated 20–35 days while 77 (14.29%) indicated less than 20 days. 113 (20.96%) indicated they did not know. 244 (45.10%) mentioned that menstruation was a lifelong process. The majority of the students 502 (90.61%) indicated that they were told about menstruation before they had their first menstruation. (Table 2).

On the source of their information, the majority mentioned that they had the information from teachers (301; 54.04%), followed by their mothers (236; 42.37%) and friends (210; 37.70%). Other sources stated were their sisters (143; 25.67%), Television (93; 16.70%) the internet (84; 15.08%). (Fig. 1).

When asked about menstrual hygiene materials, 524 (94.08%) of the participants knew about disposable pads. 114 (20.47%) knew about menstrual cloth with the least known being menstrual cups. (Fig. 2).

We assessed the students' knowledge using 7 knowledge questions on menstruation. Out of the total score of 7, any score less than 3 was graded as poor, scores between 4 and 5 were graded as moderate and scores above 5 were graded as good. Overall, 341 (61.22%) of the students exhibited good knowledge, 119 (21.36%) had moderate knowledge and 97 (17.21%) had poor knowledge on menstruation and its associated practices. (Table 3).

Table 2 Knowledge of menstruation

	Freq.	Percent
What is menstruation		
A disease on monthly basis	12	2.17
Natural shedding of blood on monthly basis	529	95.66
Type of curse	13	2.35
It is a Physiological process	42	7.59
Don't know	5	0.90
None of the above	2	0.36
What is the cause of menstruation		
Curse of God	20	3.68
Caused by Diseases	4	0.74
Hormones	476	87.50
Don't Know	43	7.90
Which Organ does the menstrual blood come from?		
Uterus/Womb	355	65.38
Bladder	34	6.26
Abdomen	121	22.28
Don't know	33	6.08
What is the duration of normal menstruation?		
Less than 2 days	2	0.36
2–7 days	507	92.01
> 7 days	29	5.26
Don't Know	12	2.18
What is the interval between two menstrual cycles?		
< 20 days	77	14.29
20–35 days	333	61.78
> 35 days	14	2.60
Don't know	113	20.96
Menstruation of a lifelong process		
Yes	244	45.10
No	297	54.90
Did anyone tell you about menstruation before your first menstruation occurred?		
No	39	7.04
Yes	502	90.61
Don't Know/Don't Remember	12	2.17

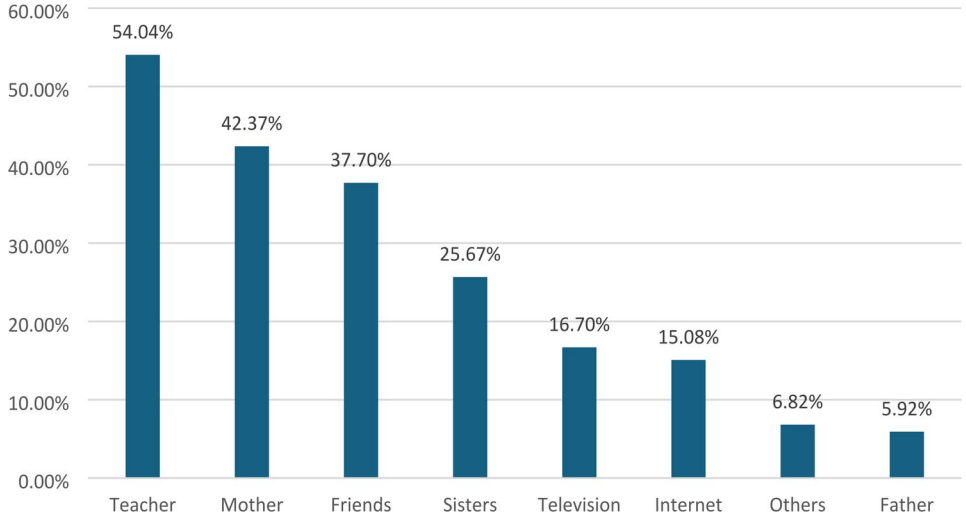

Fig. 1 Sources of information

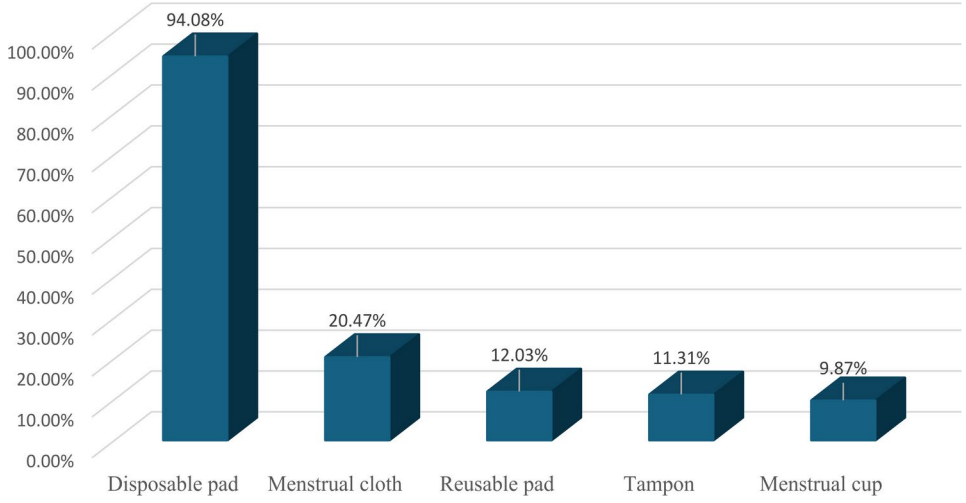

Fig. 2 Knowledge of menstrual products

Table 3 Knowledge rating on menstruation

	Frequency	Percentage
Poor	97	17.41
Moderate	119	21.36
Good	341	61.22
Total	557	100.00

Menstrual hygiene management practices

The majority of respondents reported using disposable sanitary pads (532; 97.44%) as their main absorbent material during menstruation. When given the choice of preference, disposable sanitary pads still remained the preferred choice (511; 93.5%) followed by tampons (16; 2.92%). Menstrual cups, reusable sanitary pads, napkins/cloths/towels, and cotton were the least preferred. Most students changed their sanitary pads either twice (265; 47.49%) or three or more times per day (263; 47.30%).

Nearly all students (99%) bathed during menstruation. For genital cleaning, the most common practice was using water only (324; 61.13%), followed by the use of water and antiseptics (114; 16.79%). Almost half (239; 47.90%) of the students mentioned that they rest during their menstrual periods. 158 (31.66%) of students indicated that they take medications as remedies. 74 (14.83%) mentioned that they usually engage in activities while the others, 25 (5%) isolate themselves. Few students indicated that they resort to prayers as a remedy. (Table 4).

Disposal practices varied between home and school. At home, burning was the most common method (53.14%), followed by dropping in a bin (32.85%), while the lowest practice was dropping in a drain (0.18%). At school, dropping in a bin was most common practice (46.86%), followed by burning (25.67%), and the least practice was also dropping in a drain (0.36%). More students dropped

Table 4 Menstrual hygiene management practices

	Frequency	Percentage
Main absorbent material you use during menstruation		
Disposable Sanitary pads	532	97.44
Napkin/Cloth/Towel	2	0.37
Reusable sanitary pads	4	0.73
Tampon	5	0.92
Menstrual cup	2	0.37
Preferred absorbent material		
Disposable Sanitary pads	511	93.25
Napkin/Cloth/Towel	1	0.18
Reusable sanitary pads	6	1.09
Tampon	16	2.92
Menstrual cup	9	1.64
Cotton	1	0.18
Frequency of changing sanitary pads per day		
Once a day	29	5.21
Twice	265	47.49
Three or more	263	47.30
Bathing during menstruation		
Yes	551	99%
No	6	1%
Materials for genital cleaning		
Water & Soap	89	16.79
Water only	324	61.13
Only towels/wipes	3	0.57
Water & Antiseptic	114	21.51
Remedies during menstruation		
Rest	239	47.90
Medication	158	31.66
Involved in activities	74	14.83
Isolation	25	5.01
Prayers	3	0.60

their used sanitary pads in the toilet at school (21.54%) compared to being at home (9.52%). (Fig. 3).

Overall, more than half 318 (57.09%) of the students predominantly adopted good hygiene practices during menstruation while 231 (42.91%) were involved in poor practices. (Table 5).

Factors influencing menstrual hygiene practices

A multiple logistic regression was conducted. In the unadjusted model, students aged ≥ 18 years were 4.24 times more likely to engage in good MHM practices compared to those aged ≤ 14 years (OR = 4.24, 95% CI: 1.191–15.102, $p = 0.026$). However, this was not significant in the adjusted model (AOR = 2.85, 95% CI: 0.67–12.17, $p = 0.158$). Students who stayed with their mothers only had significantly higher odds of good menstrual hygiene practices compared to those living with both parents, both in the unadjusted (OR = 1.87, 95% CI: 1.24–2.84, $p = 0.003$) and adjusted models (AOR = 1.88, 95% CI: 1.16–3.02, $p = 0.01$). Students in schools where there were specific bins for pad disposal were 2 times more likely to engage in good menstrual hygiene practices in both models (unadjusted OR = 1.99, 95% CI: 1.40–2.82, $p < 0.001$; adjusted AOR = 2.20, 95% CI: 1.42–3.39, $p < 0.001$) compared to schools with no dedicated bins. Also, girls in schools that have separate toilet facilities on campus and in the dormitories are 1.59 times more likely to adopt good menstrual hygiene practices than those who do not have separate toilet facilities (OR = 1.59, $p < 0.05$, 95% CI: 1.01–2.53). Additionally, students who reported adequate facilities for menstrual hygiene needs were 40% less likely to engage in poor practices in the adjusted model (AOR = 0.60, 95% CI: 0.39–0.91, $p = 0.017$). (Table 6).

Discussion

Knowledge generation and sharing has been a key part of health education and a major factor that influences health beliefs and practices. In this study, more than half of the students showed good knowledge (61.22%) of menstruation and its related hygiene practices with 21.36% exhibiting moderate knowledge, while 17.41% exhibited poor knowledge. The appreciable percentage of students

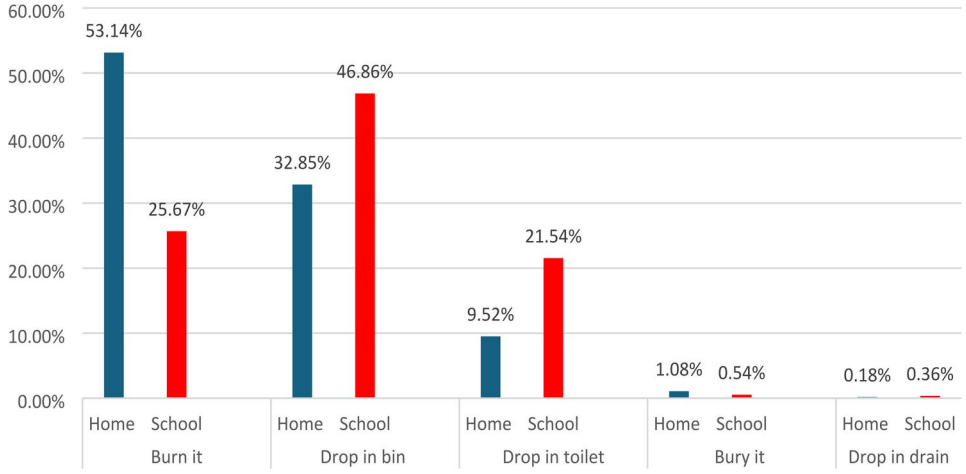

Fig. 3 Disposal of sanitary pads

Table 5 Rating of menstrual hygiene practices

	Frequency	Percentage
Poor	231	42.91
Good	318	57.09
Total	557	100

with good knowledge in this study aligns with findings from other studies. A study in Ethiopia among both preparatory and high school students reported that around three-fourths of students had good knowledge about menstrual hygiene management [21]. A similar study in reported 58.7% good menstrual knowledge among adolescents with attribution to effective school-based health education programs [22]. Despite a higher percentage of students with good knowledge in this study, those with poor knowledge in this study (17.41%) was relatively lower compared to other studies. A report in Uganda reported minimal knowledge on menstrual health among females [23]. Also, an evidence synthesis conducted in Africa report in Africa, noted that most adolescent females had low knowledge about menstruation before they experienced it, with few sources of reliable information [24]. Same way poor knowledge about menstruation was reported among school girls in Ethiopia [25]. These differences in knowledge level seen across different African countries could be due to the difference in location, demographics, and the period the studies were conducted. It could also be assumed that the recommendations by earlier studies [25] were implemented thus improving the knowledge of school girls on menstruation in later studies [21]. Even though there were few misconceptions and knowledge gaps among some students, the majority showed good knowledge.

Regarding knowledge of specific areas, most students (95.6%) correctly identified menstruation as the monthly natural shedding of blood. Also, the majority of students (92.01%) knew that a normal menstrual cycle lasts between 2 and 7 days with 61.78% accurately knowing the normal cycle length as 20–35 days. Only 7% knew that menstruation was a physiological phenomenon. In other LMICs, as many as 83% of respondents knew menstruation as a physiological process [26]. Despite not knowing about menstruation being a physiological process, knowledge about the hormonal regulation of menstruation was high (87.50%), demonstrating a fair understanding of the biological and physiological basis of menstruation. UNICEF notes that knowledge about the biological and physiological nature of menstruation helps to build confidence, contributes to social solidarity and encourages healthy habits [27]. A small percentage of students believed that menstruation is a disease (2.17%) or a curse (2.35%), which indicates the persisting existence of myths about menstruation. A scoping review [28] reported that cultural perceptions and myths influenced the experience of menstruation among adolescent girls. Also, in the study by Yadav et al. [26], about 1.1% thought menstruation was a curse from God. In the study among adolescent girls in Ethiopia [21], 24.1% mentioned it was a curse from God. These findings underscore the need for accurate and culturally sensitive menstrual health education in schools and communities.

In this current study, most students (90.61%) received information about menstruation before menarche which is higher than proportions reported in some sub-Saharan African contexts. A systematic review among adolescent girls in West Africa reported that less than half knew about menstruation before menarche [29]. Also in Kenya, about 57% of girls had not heard about menstruation before menarche [30]. Marianti et al. [31] notes that early menstrual health education is important for preparing girls positively for menarche and promoting menstrual hygiene management. Results of this study further indicates that, teachers (54.04%) were the highest source of information followed by mothers (42.37%). In the study

Table 6 Multivariate logistic regression

Variables	OR (95% CI)	*p*-value	AOR (95% CI)	*p*-value
Age				
≤ 14 years	Ref		Ref	
15–17 years	2.93(0.89, 9.64)	0.077	2.34(0.62, 8.78)	0.209
≥ 18 years	4.24(1.19, 15.10)	0.026*	2.85(0.67, 12.17)	0.158
Level				
Form 1	Ref		Ref	
Form 2	1.28(0.91, 1.80)	0.157	0.98(0.62,1.56)	0.937
Religion				
Islam	Ref		Ref	
Christianity	1.44(0.77, 2.69)	0.248	1.46(0.72, 2.98)	0.294
Traditional	2.10(0.18, 24.87)	0.558	3.89(0.25, 60.91)	0.334
School residency status				
Day	Ref		Ref	
Boarding	1.32(0.89, 1.95)	0.166	1.19(0.75, 1.89)	0.47
Who student stays with				
Both Parents	Ref		Ref	
Mother Only	1.87(1.24, 2.84)	0.003*	1.88(1.16,3.02)	0.01*
Father Only	0.64(0.30, 1.37)	0.250	0.51(0.22, 1.22)	0.131
Household without elderly female	0.34(0.064, 1.758)	0.197	0.13(0.01, 1.46)	0.098
Household with elderly female	1.12(0.56, 2.26)	0.750	1.19(0.54, 2.62)	0.67
Alone	0.84(0.17, 4.23)	0.833	0.52(0.09, 3.04)	0.465
Mother's educational level				
No Education	Ref		Ref	
Primary	0.95(0.38, 2.38)	0.908	0.98(0.34, 2.81)	0.971
JHS	1.06(0.49, 2.32)	0.880	1.48(0.59, 3.69)	0.401
SHS	1.05(0.47, 2.32)	0.907	1.20(0.47, 3.08)	0.706
Tertiary	0.94 (0.41, 2.14)	0.880	0.91(0.34, 2.48)	0.858
Technical/Vocational	1.04(0.43, 2.53)	0.931	1.27(0.42, 3.87)	0.673
Father's educational level				
No Education	Ref		Ref	
Primary	0.50(0.15, 1.65)	0.254	0.49(0.11, 2.10)	0.335
JHS	0.69(0.29, 1.64)	0.400	0.35 (0.11, 1.10)	0.072
SHS	1.05(0.46, 2.40)	0.905	0.53 (0.17,1.65)	0.271
Tertiary	1.07 (0.47, 2.44)	0.878	0.56 (0.18, 1.72)	0.307
Technical/Vocational	0.75(0.31, 1.85)	0.532	0.42(0.12, 1.44)	0.165
Bins identified for disposal of pads only				
No	Ref		Ref	
Yes	1.99(1.40, 2.82)	0.00*	2.20(1.42, 3.39)	0.00*
Separate toilets on campus and in the dormitory				
No	Ref		Ref	
Yes	1.59(1.01, 2.53)	0.048*	1.65(0.96, 2.83)	0.069
Adequacy of facilities for menstrual needs				
No	Ref		Ref	
Yes	0.72(0.50, 1.03)	0.068	0.60(0.39, 0.91)	0.017*
Knowledge level				
Poor	Ref		Ref	
Moderate	1.05(0.67, 1.66)	0.830	0.96(0.56, 1.65)	0.893
Good	1.14(0.66, 1.96)	0.641	0.92(0.49, 1.73)	0.795

* Significant at $p < 0.05$

by Bulto [21], about 94% of girls had received information from their mothers as compared to the majority who received from teachers in this study. Eze et al. [22] from Nigeria corroborated the findings of this study in their reported that 83.8% and 94.6% of girls learnt about menstruation from parents and teachings in school respectively. In another Nigerian study, different sources of information were identified. The Media (Radio, Television, and Print) were reported as the commonest sources with teachers and parents contributing 35.9% and 37.8% respectively [32].

It was noted that about 57% of students were engaged in good menstrual hygiene practices and 43% engaged in poor menstrual hygiene practices. A similar study in Ethiopia among both preparatory and high school students reported that only 34.7% of the students surveyed were engaged in adequate menstrual hygiene practices [21]. In this study, the schools sampled were mostly in peri-urban areas with quite modern facilities with most of the respondents coming from urban areas and spending their vacations there. It was therefore not surprising that the majority were engaged in good practices. However, owing to the amount of information available to such a group of students, it was concerning that around 43% of students were engaged in poor MHM practices. Good menstrual hygiene practices are associated with improved health outcomes and reduced risk of infections among adolescents [33–35].

Regarding the sanitary materials used, this study revealed that a majority of participants (97.44%) used disposable sanitary pads as their main absorbent material, and 93.25% preferred them as their top choice. This finding is consistent with studies conducted in sub-Saharan Africa and other low- and middle-income countries (LMICs), where disposable pads are often preferred [36] for their convenience, and comfort [21, 37, 38] even though Kambala et al. [37] reported high cost of disposable sanitary pads. The study found that most participants changed their sanitary pads twice (47.49%) or three or more times per day (47.30%). Only 5.21% of the participants changed their pads once daily. It is recommended for females to change sanitary pads at least every 2–3 h to maintain hygiene and reduce the risk of infections [39–41]. The majority of participants (61.13%) used water only for genital cleaning, while 21.51% used water with antiseptics, and 16.79% used water and soap. In Kenya, 68.7% used water with soap while 31.3% used water only [42]. The use of water alone for genital hygiene is common in many LMICs, however using soap along with water is recommended for maintaining genital hygiene [43].

In this study, disposal practices varied between home and school settings. At home, burning (53.14%) and disposal in bins (32.85%) were the predominant methods. At school, disposal in bins (46.86%) was most common, followed by burning (25.67%). More students disposed of pads in the toilet at school (21.54%) than at home (9.52%). Inappropriate disposal methods, such as dropping pads in drains (0.18% at home and 0.36% at school) can pose environmental and health hazards and contribute to the spread of diseases and pollution [44].

The study found that students who were 18 years and above were more likely to engage in good menstrual hygiene practices compared to those younger than 14 years, although this association lost significance in the adjusted model. Older girls may have greater awareness and experience in managing menstruation. Students who lived with only their mothers showed significantly higher odds of good menstrual hygiene practices compared to those living with both parents. This finding is consistent with other studies that report mothers as primary sources of menstrual education and support for adolescent girls as well us educational curriculum [45, 46]. The increased influence of mothers in single-parent households could lead to more open communication about menstruation, and better guidance on hygiene practices. The availability of specific disposal bins for menstrual pads and the presence of separate toilet facilities on campus were predictors of good menstrual hygiene practices. These findings are supported by studies indicating that adequate facilities in schools, such as clean and private toilets, proper waste disposal mechanisms, and access to water and soap, are critical for effective menstrual hygiene management [20, 34, 36, 45].

In a qualitative study in Zambia, it was revealed that the menstrual health needs of adolescent girls include adequate supply of menstrual materials, improved WASH services, safety, and enhanced privacy [47]. Communities and schools needed to provide a supportive environment for girls to manage their periods.

Conclusions

Most of the adolescent female students exhibited good menstrual hygiene knowledge and practices. However, there are still areas that require improvement particularly in dispelling the myths and misconceptions about menstruation. The presence and access to dedicated WASH facilities, separate toilets, an enabling school environment and parental support significantly influenced good hygiene practices. Thus, there is a need for targeted health education, improved sanitation facilities, and the integration of MHM into school curricula to offer an integrated education. There is a need for collaboration among stakeholders, including schools, parents, and policymakers, to create a conducive environment that supports adolescent girls' health, well-being, and educational outcomes. It is recommended that stakeholders in the educational sector, especially the Ministry of Education,

the Ministry of Health, and NGOs develop and implement holistic and comprehensive health education programmes with practicalities to educate students on issues relating to menstruation in order to improve knowledge and dispel all misconceptions. Reproductive health clubs already existent in schools should be made active with new clubs to foster peer education and learning. Heads of educational units should put in place WASH facilities with adequate privacy to create conducive environments for female students to engage in good practices at school.

Strengths and limitations

The study was conducted among girls who have had menarche has presents first hand information from respondents with experience. The use of multiple logistic regression, allowed for the adjustment of potential confounders and provides a good estimate for factors influencing menstrual hygiene practices. The study, however, could be limited by potential recall bias since information had to be recalled. The cross-sectional nature of the study could limit the ability to infer causality from the study.

Abbreviations

MHM	Menstrual hygiene management
NGO	Non-governmental organization
LMICs	Low- and middle-income countries
WASH	Water, sanitation and hygiene
SDG	Sustainable development goal
GDHS	Ghana demographic health survey
MHMP	Menstrual hygiene management practices
RMP	Reusable menstrual pads
SRH	Sexual and reproductive health

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Author contributions

Conceptualization: MAN and NNA, Data curation: MAN, Formal analysis: MAN, DDO, IAA Investigation: MAN, DDO, IAA, Methodology: MAN, DDO, NNA, Project Administration: MAN, Supervision: NNA, DDO Validation: NNA, Writing - original draft preparation: MAN, DDO, IAA, Writing - review & editing: NNA, IAA.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

for the study was sought from the Institute of Statistical and Economic Research Ethics Committee (ECH) of University of Ghana with number ECH 122/22–23 The principles of privacy and confidentiality were upheld during the research and written informed consent and assent was sought from all students for data collection. The teachers served as guardians and provided guardian consents for respondents who were under 18 years whiles students provided assent. The teachers only facilitated initial contact with students and had no influence on the data collection process or the responses of the students.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Department of Health Service Management, University of Ghana Business School, Legon, Ghana
[2]Department of Health Policy Planning and Management, University of Ghana School of Public Health, P. O. Box LG 13, Legon, Accra, Ghana

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