Menstrual Health Literacy and Hygiene Management among Female Undergraduates at the University of Ibadan, Nigeria: An Analysis

Abiola Adiat Omokhabi
* Department of Adult Education, Faculty of Education, University of Ibadan, Ibadan, Nigeria.
(Corresponding author):
adiatomokhabi@gmail.com
Received: 30 July 2024
Accepted: 07 December 2024
Doi: 10.22038/jhl.2024.81530.1611

ABSTRACT

Background and Objectives: Menstrual health literacy is particularly important for all women irrespective of their age group as poor menstrual health literacy impacts women's quality of life and health .The study examined menstrual health literacy and hygiene management of female undergraduates at the University of Ibadan, Nigeria and identified the influencing factors.

Materials and Methods: The cross-sectional study was carried out online using easy sampling of female undergraduates at the University of Ibadan in Nigeria from March 2024 to May 2024. The researcher used Google Forms to create a survey that was distributed to study participants. The demographic factors (age, religion, course level, and faculty of study, year of first menstruation, ethnicity, and mode of residence) were the main emphasis of the first subsection. The participants' menstrual health literacy was the subject of the second subsection, while understanding of period problems and hygiene management were the subjects of the third and fourth subsections, respectively. Frequency, description computations, Pearson Product Moment Correlation Coefficient, Analysis of Variance, and multiple regression were used to examine the data.

Results: A substantial majority of female undergraduates 72.2% at the University of Ibadan demonstrated a good degree of comprehension about fundamental menstrual health topics (Menstrual health literacy). Menstrual health literacy improved knowledge of menstruation concerns among female undergraduates (r=.225, n=349, p (.001) <.05).Female undergraduates at the University of Ibadan, understanding of menstruation difficulties correlated with hygiene management (r=.378, n=349, p (.001) <.05).

Conclusion: The menstrual health literacy level among female undergraduates was high and good. Schools and homes should provide girls and young adult's females with information about the meaning of menstruation, cycle and the importance of good hygienic practices.

Paper Type: Research Article

Keywords: Menstrual Health Literacy, Female Undergraduates, Hygiene Management.

Citation: Abiola A Omokhabi. Menstrual Health Literacy and Hygiene Management among Female Undergraduates at the University of Ibadan, Nigeria: An Analysis. *Journal of Health Literacy*. Spring 2025; 10(2): 22-41.

Introduction

Menstruation is a female health and physiological natural cyclic event occurring in women every 21–35 days, lasting between 2 and 7 days and causes bleeding of about 25–80 mL per menstruation (1, 2). Women from ages 12 to 50 face practical challenges due to their monthly menstrual cycle. Most common among women, particularly school-age girls is dysmenorrhea known as menstrual pain or its associated symptoms which often results in a reduction in performance in school or induced absenteeism from school (3). Most young women have come to frame menstrual pain as a normal part of being a woman (4) and it is a common theme across varying geographic and ethnic boundaries (5, 6). Menstrual Health and Hygiene (MHH) as a public health concern and fundamental human rights to Sustainable Development Goals (SDGs) by 2030 (7-10), Menstrual Health (MH) has been sidelined in the global agenda.

With global advocacy, there is growing recognition of menstrual health's important role in achieving health, education, and gender equity. Because there are many different subjective characteristic symptoms and diagnostic criteria for dysmenorrhea, it is challenging to pinpoint the precise prevalence of the condition (11). Based on available data, it can be inferred that the prevalence of dysmenorrhea among women in Saudi Arabia (12), Ethiopia (13) and Mexico (14), as well as Iran (15) and Nigeria (16), was found to be 85.7%, 68.5%, 70.5%, 89.1% and 72.0% respectively, during their reproductive lifespan. Menstrual discomfort not only has a direct negative impact on an individual's health, but it can also negatively impact young women and adolescents socially, academically, and professionally. Therefore, it is essential to use health promotion initiatives to inform and assist young women and adolescents in managing their menstrual pain. One specific difficulty is assisting young women and teenagers in managing their menstrual pain. Menstruation has historically been strongly taboo in some nations, including Nigeria, India, and Sri Lanka (17–19). Because of their views and beliefs, as well as a lack of reliable information, this may therefore affect how women manage their menstrual pain (20). Menstrual pain, or primary dysmenorrhea, affects around 75% of women under the age of 25 worldwide.

A condition of whole physical, mental, and social well-being in respect to a woman's menstrual cycle is known as menstrual health, and menstrual health literacy can be understood as a subcomponent of health literacy that focuses exclusively on MH (21). Furthermore the degree of information about issues related to menstruation health is known as Menstrual Health Literacy, or MHL. Understanding the menstrual cycle and how to take care of one's health and wellbeing during one's period is known as menstruation literacy. The term "menstrual health literacy" also describes a person's comprehension and awareness of many menstrual-related topics. Enhancing menstrual health literacy is crucial for boosting general wellbeing, lessening stigma, and guaranteeing that people can securely and effectively manage their menstrual health (22). It is an essential part of education on sexual and reproductive health because it gives people especially young girls the power to make decisions about their menstrual health. It assists people in identifying typical monthly patterns, realising

the value of good menstrual hygiene, and resolving any difficulties or problems linked to their periods (23, 24). Menstrual literacy is crucial for achieving menstrual health, and it is acknowledged as a crucial component for realising gender equality, all genders' human rights, and the Sustainable Development Goals (25). In light of this, it is noted that young adults in Nigeria lack sufficient knowledge about menstrual health (26).

Young individuals frequently use suboptimal choices of analgesics and/or non-pharmacological therapies, including traditional and folk medicines, which may be attributed in part to poor menstrual health literacy and a lack of knowledge regarding pain management (27). Many young women report utilising other, less scientifically validated approaches, including drinking hot beverages (27). However, there is some evidence that non-pharmacological self-care, like heat (27) and exercise (27) can be useful. For young women to better manage their dysmenorrhea (menstrual pain), they must possess a solid understanding of health literacy (28) .An important aspect of MH is access to necessary materials, such as sanitary pads and absorbent materials, as well as a safe and private area for changing these materials, along with access to soap and water (21). However, the majority of female adolescents and young adults in low- and middle-income countries do not have access to these essential MH resources (24, 29).

The 2030 United Nations (UN) Sustainable Development Goals stress the significance of mental health education and resources for young women to improve their access to Water, Sanitation and Hygiene (WASH) resources (24). Efforts to enhance the educational and health results for this population can be guided by a deeper comprehension of mental health practices and obstacles (24). Menstrual abnormalities are common among university students, but many choose to self-medicate rather than seek medical attention (30, 31, 32). Menstrual health presents particular difficulties for female undergraduate students, which affects their well-being and academic achievement (7).

While the university setting is essential for women's personal growth, menstruation problems and poor self-care habits might negatively impact their attendance and academic performance (33). While many studies (26, 34, 35, 36, 33) were carried out in Nigeria, only a few examined menstrual health and hygiene knowledge and practice among young people, knowledge and practice of menstrual hygiene among female undergraduates at a private tertiary institution, knowledge and practice of menstruation and menstrual hygiene among adolescents in urban and rural secondary schools, and prevalence of menstrual disorders and self-care practices among female undergraduates in a southwestern tertiary institution. No effort has been made to determine the impact of menstrual health literacy on hygiene management, especially at a university setting. The study's objectives were to examine the relationship between MHL and hygiene management among female undergraduates at the University of Ibadan, Nigeria, and to identify the related factors associated with menstrual health literacy, given the importance of menstrual

health literacy for women's health, which is an integral part of overall health.

Materials and Methods

The present investigation examined the correlation between menstrual health literacy and hygienic management among female undergraduates at the University of Ibadan, utilising a quantitative, descriptive cross-sectional research methodology. The independent variable is menstrual health literacy while the dependent variable is hygiene management .The target audience was surveyed for the research using Google Forms, an online survey tool. Population: The study's population consists of female undergraduates who live off campus and in residence halls; they must be at least sixteen years old. Determining the Sample Size; for this investigation, the sample size for this study was estimated to be 384 based on the following calculations: N= Z 2 P (1-p)/E2

Where: N = sample size, Z = Z-score (1.96 for 95% confidence level), p = estimated proportion (0.5 for maximum variability), e=margin of error (0.05 for 5%). Thus, N=1.962 x 0.5x0.5/0.052 N=384.16 for infinite population. However, only 349 female undergraduates at the university representing 90.83% of the sample size properly filled the research instruments and were used for analysis in this study.

Sampling Technique

For the study, a purposive sample strategy was used. Because MHL and menstrual hygiene management are specifically designed for women, it posed a difficulty for the researcher in choosing a random probability-based sample for the study's population. Criteria for Inclusion and Exclusion Female undergraduates who are 16 years of age or older, live in residence halls or off campus and are willing to engage in the study are the inclusion criteria for this study. The study excluded all postgraduate students from participation.

Data Collection Procedure

The study involved the participants taking part by completing a survey created by the researcher using Google Forms. The researcher distributed the survey link through online platforms to reach all female students, including university social media groups and WhatsApp. The researcher recruited participants from various faculties at the university, Student Union body. The Faculty Association and Department Associations were asked to assist in sharing the survey link and encouraging female participation in a study on Menstrual Health Literacy regarding Hygiene Management. Before survey distribution, approval to conduct the research was secured from the Department of Adult Education at the University of Ibadan. Additionally, consent was obtained from all participants, who were assured of the confidentiality of their information before taking part in the study. Data was collected from March 2024 to May 2024. Instrument. The primary tool utilised for this study was a questionnaire, which comprised four (4) sections. The initial section centered on gathering demographic data such as age, religion, course level, mode of residence field of study, age of first menstruation, and ethnicity of the participants.. The second subsection focused on the menstrual health literacy skills of the participants while the third and fourth sub-sections focused on knowledge of menstrual issues and hygiene management respectively.

Items used to measure menstrual health literacy were adapted from various authors (23, 24& 37) and developed by the researcher in 2024 it was summated on a four point rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), with corresponding weights of 4, 3, 2, and 1. Items used to measure hygiene management was largely drawn from the studies new Menstrual Health Management framework developed by Muralidharan (38) and developed and tested by Ramaiya and Sood (39) delineates six indicators for assessing menstrual hygiene: 1. Selection of clean absorbent: What kind of absorbent is utilized, where does it come from, and is it clean? If a cloth is reused, is it washed with soap or disinfectant and water, thoroughly dried in the sun, and used exclusively? 2. Storage of clean absorbent: Is the absorbent kept in a hygienic place, such as with other clothes? 3. Privacy for changing absorbent: Is there privacy at home and school to ensure hygienic care? 4. Frequency of changing: How often is the absorbent changed in a day? 5. Disposal: Where and how is the absorbent disposed of?: Are there facilities available for bathing and washing hands with soap and water to maintain personal hygiene during menstruation? These items were rated on a scale of adequacy with a score of 2, semi-adequacy with a score of 1, and inadequacy with a score of 0. A pilot test of the instrument among a population not included in this study indicates Cronbach alpha coefficients of 0.82 for menstrual health literacy, 0.88 for knowledge of menstrual issues, and 0.83 for hygiene management. Data were analysed using descriptive statistics (frequency, means, and standard deviations) and inferential statistics, including Pearson Moment Correlation Coefficient, Analysis of Variance (ANOVA), multiple regression analysis to examine the relationship between health literacy and hygiene management.

Results

Socio-demographic characteristics 349 students participated in the study. The age distribution showed that the majority of students are within the 16-18 years range (41.5%), followed by those aged 19-21 years (30.7%) and 22 years and above (27.8%). This indicates a relatively young student population. In terms of religious affiliation, Christianity is predominant (76.2%), while Islam constitutes 23.2%, and other religions are minimally represented (0.6%).

The distribution across course levels indicated that most female undergraduates are in their first year (47.0%), with a gradual decline in numbers in higher levels, reflecting typical university enrollment patterns. The Faculty of Study data showed a broad representation across various faculties, with notable concentrations in Education (24.4%), Arts (21.5%), and Public Health (14.9%). Faculties such as Law (2.0%) and Dentistry (0.6%) have fewer female undergraduates, suggesting either lower enrollment rates or less popularity among female students. Regarding the onset of menstruation, a significant portion of students reported beginning their menstrual cycle 8 years ago or more (57.0%), while smaller groups reported starting 4-7 years ago (34.7%) and less than 1-3 years ago (8.3%). Ethnically, Yoruba students form the vast majority (80.2%), with smaller representations from Igbo (8.6%), other ethnicities (9.5%), and Hausa (1.7%).

Most students reside on campus (78.2%), with a smaller proportion living off-campus (21.8%) (Table 1).

Female undergraduates at the University of Ibadan level of menstrual health literacy showed that there is a high level of understanding among the students regarding basic menstrual health concepts, a significant majority (72.2%) strongly agreed that menstruation is a normal process for women, and 51.9% understand that menstruation typically lasts between 3 to 5 days or more.

Table 1. Demographic Characteristics of Female Undergraduates at University of Ibadan

S/N	Variables	Labels	Frequency	Percentage
1	Age	16-18 years	145	41.5
		19-21 years	107	30.7
		22 years and above	97	27.8
2	Religion	Christianity	266	76.2
		Islam	81	23.2
		Others	2	0.6
3	Course level	100 level	164	47.0
		200 level	51	14.6
		300 level	57	16.3
		400 level	58	16.6
		500 level	17	4.9
		600 level	2	0.6
4	Faculty of study	Arts	75	21.5
		Agriculture	11	3.2
		Clinical sciences	43	12.3
		Basic Medical Sciences	11	3.2
		Education	85	24.4
		Law	7	2.0
		Dentistry	2	0.6
		Social sciences	18	5.2
		Veterinary medicine	7	2.0
		Public Health	52	14.9
		Sciences	25	7.2
		Renewable Natural resources	5	1.4
		Technology	3	0.9
		Pharmacy	5	1.4
5	Years of first menstruation	Less than 1-3 years	29	8.3
		4-7 years	121	34.7
		8 years and above	199	57.0
6	Ethnicity	Yoruba	280	80.2
		Hausa	6	1.7
		Igbo	30	8.6
		Others	33	9.5
7	Mode of residence	On campus	273	78.2
		Off campus	76	21.8

Similarly, 55.6% of the students acknowledged that the absence of menstruation without pregnancy is a menstrual disorder, and 60.5% recognised that prolonged menstrual periods are also a disorder. These responses demonstrate that the students have a solid foundational knowledge of menstrual health.

However, the table also highlights areas where misconceptions or gaps in knowledge exist. For example, while many undergraduates understand the basic duration and regularity of menstrual cycles, there are mixed perceptions about the normality of cycles shorter than 24 days or longer than 38 days. Moreover, a considerable proportion of students (43.8%) incorrectly believe that women menstruate all their lives. Additionally, only 24.4% feel confident discussing their menstrual cycle and its health implications with health practitioners. The weighted mean of 3.00 and above across the table indicated a high level of menstrual health literacy (Table 2).

Table 2. Menstrual Health Literacy of Female Undergraduates

S/N	Statement	SD	D	A	SA	$\bar{x}$	S.D.
1	I understand that menstruation is blood that comes out of vagina and its normal for any woman	4 1.1%	1 0.3%	92 26.4%	252 72.2%	3.70	0.536
2	The normal menstruation for any woman is every three weeks in a month	45 12.9%	116 33.2%	148 42.4%	40 11.5%	2.52	0.859
3	I understand that the duration of menstruation is between 3 to 5 days or more for all women which is good	3 0.9%	17 4.9%	148 42.4%	181 51.9%	3.45	0.631
4	I understand that women menstruate all their lives	153 43.8%	169 48.4%	21 6.0%	6 1.7%	1.66	0.671
5	I possess the ability to comprehend and interpret written health information about menstruation and the menstrual cycle.	3 0.9%	24 6.9%	160 45.8%	162 46.4%	3.38	0.652
6	I know how to get information about menstrual cycle	2 0.6%	33 9.5%	198 56.7%	116 33.2%	3.23	0.632
7	I know that menstrual cycle is the time from the first day of girl /woman period to the day before her next period	12 3.4%	56 16.0%	158 45.3%	123 35.2%	3.12	0.798
8	I understand that monthly menstrual cycle is normal and good if is between 24-38 days	13 3.7%	64 18.3%	182 52.1%	90 25.8%	3.00	0.769
9	I understand that monthly menstrual cycle if less than 24 days is not normal and good	20 5.7%	92 26.4%	182 52.1%	55 15.8%	2.78	0.777
10	I understand that monthly menstrual cycle if 38 days is not good and normal	10 2.9%	92 26.4%	173 49.6%	74 21.2%	2.89	0.762
11	I know how to find out about information on menstrual disorders that can help enhance my menstrual health	7 2.0%	51 14.6%	193 55.3%	98 28.1%	3.09	0.707

S/N	Statement	SD	D	A	SA	$\bar{x}$	S.D.
12	I know that lower abdominal camp is a menstrual disorder	26 7.4%	123 35.2%	145 41.5%	55 15.8%	2.66	0.832
13	I know that absence of menstruation without being pregnant is a menstrual disorder	6 1.7%	35 10.0%	194 55.6%	114 32.7%	3.19	0.678
14	I know that menstruation occurring at more frequent intervals is a menstrual disorder	5 1.4%	50 14.3%	199 57.0%	95 27.2%	3.10	0.681
15	I know that vaginal bleeding at irregular intervals between expected menstrual periods is a menstrual disorder	8 2.3%	41 11.7%	197 56.4%	103 29.5%	3.13	0.699
16	I know that prolonged menstrual period is a menstrual disorder	4 1.1%	32 9.2%	211 60.5%	102 29.2%	3.18	0.632
17	I understand health warnings on my menstrual particularly the symptoms of menstrual disorder as abnormal menstrual bleeding etc.	10 2.9%	40 11.5%	198 56.7%	101 28.9%	3.12	0.712
18	I am capable of locating resources on managing menstrual issues.	3 0.9%	49 14.0%	209 59.9%	88 25.2%	3.09	0.647
19	I effectively communicate my menstrual health concerns to healthcare providers in a way that ensures they understand the issues properly.	12 3.4%	131 37.5%	153 43.8%	53 15.2%	2.71	0.762
20	I can discuss my menstrual cycle and how it affects my health with health practitioners	3 0.9%	41 11.7%	220 63.0%	85 24.4%	3.11	0.620
21	I do know that my hormonal cycles can affect my attendance in school activities like class attendance, test or examination	13 3.7%	80 22.9%	158 45.3%	98 28.1%	2.98	0.813
Weighted Mean =3.00							

* SD -Strongly Disagree, D-Disagree , A- agree , SA –Strongly Agree corresponding weights of 1, 2, 3, and 4, the benchmark weighted $\bar{x}$ -mean is (3.00).

There was a statistically significant relationship between menstrual health literacy and knowledge of menstrual issues among female undergraduates`at the University of Ibadan (r= .225, n=349, p (.001) <.05). Hence, menstrual health literacy influenced/enhanced knowledge of menstrual issues among female undergraduate in the study (Table 3).

Table 3. Pearson Product Moment Correlation (PPMC) showing the Relationship between Menstrual Health Literacy and Knowledge of Menstrual Issues among Female Undergraduates

Variables	Mean	Std. Dev.	n	r	p-value	Remarks
Menstrual health literacy Knowledge of menstrual issues	63.0860 32.1691	6.63919 6.56117	349	.225*	.001	Sig.

* Correlation is significant at the 0.05 level (2-tailed)

There is a statistically significant relationship between hygiene management and knowledge of menstrual issues among female undergraduates at the University of Ibadan (r= .378, n=349, p (.001) <.05). Hence, knowledge of menstrual issues influenced/enhanced hygiene management of female undergraduates in the study (Table 4).

Table 4. Pearson Product Moment Correlation (PPMC) showing the Relationship between Hygiene Management and Knowledge of Menstrual Issues among Female Undergraduates

Variables	Mean	Std. Dev.	n	R	p-value	Remarks
Hygiene management Knowledge of menstrual issues	50.7192 32.1691	7.24023 6.56117	349	.378*	.001	Sig.

* Correlation is significant at the 0.05 level (2-tailed)

The combined impact of demographic characteristics on menstrual health literacy among female undergraduates at the University of Ibadan did not show statistical significance. The table also displays a multiple correlation coefficient (R = .033) and a multiple R2 of .013, indicating that 3.3% of the variability was explained by seven predictor variables when considered together. The statistical significance of the combined impact was assessed at α = 0.05. Additionally, the table reveals that the analysis of variance for the regression resulted in an F-ratio of 1.656 (which was not statistically significant at the 0.05 level). This suggests that the collective influence of the independent variables on the dependent variable was not statistically significant and that other unaccounted-for variables may have contributed to the remaining variability (Table 5).

Table 5. Regression Analysis showing Joint Contribution of Demographic Characteristics on Menstrual Health Literacy among Female Undergraduates

R	R Square	Adjusted R Square	Std. Error of the Estimate
.181	.033	.013	6.59579

ANOVA						
Model	Sum of Squares	DF	Mean Square	F	Sig.	Remark
Regression Residual Total	504.397 14835.024 15339.421	7 341 348	72.057 43.504	1.656	.119	Not Sig.

The table also revealed the relative contribution of the seven independent variables to the dependent variable, expressed as beta weights, viz: Age (β = .041, p>.05), Religion (β = .090, p>.05), Course level (β = .047, p>.05), Faculty of study (β = -.033, p>.05), Year of first menstruation (β = .112, p>.05), Ethnicity (β = -.037, p>.05), and Mode of residence (β = -.047, p>.05) respectively. Hence, none of the independent variables could independently and significantly predict menstrual health literacy among female undergraduates in the study (Table 6).

Table 6. Relative Contribution of Demographic Characteristics on Menstrual Health Literacy among Female Undergraduates

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std. Error	Beta Contribution		
Constant)	59.053	2.062	0	28.634	<.001
Age	.328	.687	.041	.478	.633
Religion	1.344	.823	.090	1.633	.103
Course level	.232	.397	.047	.584	.560
Faculty of study	-.060	.097	-.033	-.614	.540
Year of first menstruation	1.148	.623	.112	1.841	.066
Ethnicity	-.247	.365	-.037	-.677	.499
Mode of residence	-.755	1.013	-.047	-.746	.456

The research findings demonstrated the practices of female undergraduates at the University of Ibadan regarding hygiene management, shedding light on their menstrual hygiene behaviour. The majority of respondents, accounting for 93.4%, favoured disposable sanitary pads as their preferred menstrual absorbent. Conversely, alternative absorbents such as new cotton cloth (2.3%), old cotton cloth (0.9%), other synthetic cloths (1.7%), reusable pads (0.9%), and tampons (0.9%) were notably less popular among the participants. These preferences indicate a clear inclination towards modern menstrual hygiene products among the surveyed individuals. Among those utilising cloth-based absorbents, 2.3% reported consistently washing the cloth before use, while 1.1% stated that they mostly did so, and 1.4% admitted to never washing it beforehand.

In relation to the disposal and cleaning of menstrual products, there are different practices. The majority of participants (26.6%) always rinse blood from their sanitary pads, tampons, sanitary napkins, and menstrual cups, while 23.2% do so most of the time. However, 28.7% never rinsed the blood, highlighting a lack of proper menstrual hygiene management. In terms of washing menstrual cloths, 69.3% use soap and water, 22.6% use additional disinfectants, and 3.7% use only water. A small percentage (1.7%) use hot water, and 2.6% use alternative methods. These results indicate that while a significant portion adheres to recommended hygiene practices, there is room for improvement, particularly in raising awareness about the importance of thorough cleaning. How menstrual clothes are dried and shared also displayed clear trends. The majority of participants (83.7%) opt to air-dry their menstrual clothes in the sunlight outdoors on a clothesline, a practice that promotes sterilisation and hygiene. Conversely, 10.9% choose to dry them in the shade indoors, and 4.6% in the shade outside, which may not offer the same level of cleanliness. Only 0.9% conceal their menstrual clothes. Additionally, nearly all participants (99.4%) use their menstrual cloths exclusively, with just 0.6% sharing them with other female family members. This suggests that the majority of participants have a strong awareness of personal hygiene, although a small percentage might benefit from additional education on optimal menstrual hygiene practices.

The findings offer insights into the hygiene management practices of female undergraduates at the University of Ibadan with a focus on how often they change menstrual absorbents and how they are stored. When it comes to storing clean absorbents such as new cotton, old cotton cloth, or synthetic cloth, a majority of respondents (77.1%) keep these items in a safe and clean place, demonstrating a high level of awareness about hygiene. A smaller percentage (3.7%) store their absorbents in hidden or concealed locations, while 4.0% keep them with their everyday clothing. Interestingly, 7.7% do not store their absorbents but instead get new ones every month, indicating a disposable approach. Less common storage methods include using a cupboard (0.9%), bag (0.9%), plastic bag (0.3%), polythene bag (3.4%), or wrapping them in paper (0.3%). In terms of storing unused sanitary pads, napkins, tampons, and menstrual cups, 39.5% of participants opt for safe and clean storage, with 12.3% choosing to store them alongside their everyday clothes. Additionally, 12.0% conceal them in hidden spots, and 11.2% opt not to store them and instead purchase new ones monthly. Other storage methods include using a cupboard (4.3%), a bag (4.6%), a plastic bag (4.0%), a polythene bag (2.6%), or wrapping them in paper and placing them in a bag (2.9%). In terms of the ability to switch absorbents in private, 65.3% of survey participants stated that they have the privacy of their hostel or room to uphold hygienic care, while 34.7% do not have such privacy. This shows that although a majority can maintain their menstrual hygiene in private, a significant portion encounters difficulties in this aspect. About the frequency of absorbent changes, 53.6% change twice a day, 33.2% change thrice a day, and 10.6% change once a day. A small percentage (2.6%) do not change at all in a day. This demonstrates diverse practices in managing menstrual hygiene, with most respondents following the recommended frequencies for changing absorbents.

The research findings indicated that female undergraduates at the University of Ibadan have different approaches to managing menstrual hygiene, particularly in how they dispose of menstrual absorbents. A considerable percentage of participants (33.8%) discard absorbents in the bins provided by the hostel management, while 15.5% use home bins. Other disposal methods include burning the absorbent (8.3%), flushing it down the toilet (14.9%), or wrapping it in a newspaper (20.6%). Furthermore, 66.2% of respondents wrap absorbents in a polythene bag before disposal, demonstrating a preference for containment. The range of disposal methods, such as discarding absorbents in the bush (2.6%) or burying them in soil (0.9%), suggests that practices are influenced by access to facilities and personal habits

The findings showed how female undergraduates at the University of Ibadan manage hygiene, focusing on the access and usage of amenities for maintaining personal hygiene during menstruation. A large majority of participants (65.3%) can use bathing facilities in their hostels, which is important for menstrual hygiene. However, only 59.0% have access to hand washing facilities, indicating a gap in overall hygiene infrastructure. The situation is even more

difficult for those who live off-campus, as only 42.1% have bathing facilities and 39.0% have hand washing facilities in their rooms. This inequality emphasizes the need for improved hygiene amenities, particularly for off-campus students. Almost all participants (96.6%) wash themselves with soap and water, and an even larger percentage (97.1%) do this regularly during their period. Furthermore, a large majority (89.7%) consistently cleanse their hands after changing menstrual products. These high adherence rates indicate that despite the limited facilities in certain situations, the students demonstrated strong personal hygiene habits (Table 7).

Table 7. Hygiene Management of Female Undergraduates at the University of Ibadan

S/N	Hygiene management	Labels	Frequency	Percentage
1	What type of menstruation absorbent do you use?	New cotton cloth every time I change	8	2.3
		Old cotton cloth	3	0.9
		Any other synthetic cloth	6	1.7
		Disposable sanitary pad	326	93.4
		Reusable pads	3	0.9
		Tampons	3	0.9
2	If option 1 to 3 answer above, do you wash the cloth before you use it to absorb menstrual blood	Always	8	2.3
		Mostly	4	1.1
		Never	5	1.4
3	Do you wash blood away from your sanitary pad, tampons, sanitary napkins, and menstrual cups?	Always	93	26.6
		Mostly	81	23.2
		Sometimes	42	12.0
		Rarely	33	9.5
		Never	100	28.7
4	How do you wash your menstrual cloth?	Water only	13	3.7
		Soap and water	242	69.3
		Any other disinfectant after washing with soap and water	79	22.6
		Hot water	6	1.7
		Any other	9	2.6
5	Where do you dry your menstrual cloth?	In the shade outside on cloth line	16	4.6
		In the shade inside the room	38	10.9
		In the sunlight outside on cloth line	292	83.7
		I hide it	3	0.9
6	Do you use menstrual cloth exclusively or share with other female members of the family?	Exclusively use	347	99.4
		Shared with others	2	0.6
	Storage of Absorbent			

S/N	Hygiene management	Labels	Frequency	Percentage
7	Storage of clean absorbent if the absorbent is new cotton, old cotton cloth or synthetic cloth	Store the absorbent in a hidden or concealed place	13	3.7
		Store the washed menstrual cloth along with other clothes of daily wear	14	4.0
		Bag	6	1.7
		Does not store, takes new one every month	27	7.7
		Store in a safe clean place	269	77.1
		In cupboard	3	0.9
		In a bag, hang it	3	0.9
		In a plastic bag	1	0.3
		Polythene bag	12	3.4
		Wrapped in paper, kept in bag	1	0.3
8	Storage of unused sanitary pad or napkins, tampons and menstrual cups	Store the unused sanitary pad or napkins, tampons in a hidden or concealed place	42	12.0
		Store the unused sanitary pad or napkins along with other cloth of daily wear	43	12.3
		Bag	23	6.6
		Does not store, by new one every month	39	11.2
		Store in a safe clean place	138	39.5
		In cupboard	15	4.3
		In a bag, hang it	16	4.6
		In a plastic bag	14	4.0
		Polythene bag	9	2.6
		Wrapped in paper, kept in bag	10	2.9
9	Ability to change absorbent in privacy: Is privacy at hostel or room to maintain hygienic care?	No	121	34.7
		Yes	228	65.3
10	Frequency of changing: How many times is the absorbent changed in a day?	Once	37	10.6
		Twice	187	53.6
		Thrice	116	33.2
		Don’t change at all in a day	9	2.6
	Disposal of Absorbent			
11	Disposal: Where is the absorbent disposed?	Dustbin provided by hostel management	118	33.8
		Dustbin provided at home	54	15.5

S/N	Hygiene management	Labels	Frequency	Percentage
		Dustbin provided by landlord	10	2.9
		Dustbin provided in school area	3	0.9
		Bury it in the soil in the field	3	0.9
		Throw it in the bush	9	2.6
		Burn the absorbent	29	8.3
		Store and then take it to the hostel incinerator	12	3.4
		Garbage lot	10	2.9
		Bury in a pit	4	1.1
		Wash	45	12.9
		Flush in the toilet	52	14.9
12	How is the absorbent disposed	Wrap inside a newspaper	72	20.6
		Wrap inside a polythene bag	231	66.2
		Not wrapped with anything	21	6.0
		Wrap with toilet roll	25	7.2
	Facilities			
S/N	Statement		No	Yes
13	Are there facilities in your hostel to take a bath in order to maintain personal hygiene during menstruation?		121 (34.7%)	228 (65.3%)
14	Are there facilities in your hostel to wash hands in order to maintain personal hygiene during menstruation		143 (41.0%)	206 (59.0%)
15	Are there facilities in your room off-campus to take a bath in order to maintain personal hygiene during menstruation?		202 (57.9%)	147 (42.1%)
16	Are there facilities in your room off- campus to wash hands in order to maintain personal hygiene during menstruation?		213 (61.0%)	136 (39.0%)
17	Do you normally take a bath with soap and water		12 (3.4%)	337 (96.6%)
18	During menstruation, do you take a bath daily with soap and water?		10 (2.9%)	339 (97.1%)
19	During menstruation, do you always wash your hands after changing your menstrual absorbent?		36 (10.3%)	313 (89.7%)

Discussion

According to the study, female undergraduates at the University of Ibadan had a high degree of menstrual health literacy when it came to understanding the fundamentals of menstruation. This corroborates the findings of Khanal, (2019) (40), which show that 53.93 percent of respondents possess sufficient health literacy. In a study published in 2020, Edet, O et al (36) found that females in rural schools had substantially less awareness about menstruation (230, 56.7%) than did respondents in urban schools (253, 42.2%). Female undergraduates may be more exposed to having access to information on menstrual health and issues than their counterparts studying in rural settings, which could account for the high level of menstrual

literacy among female students attending urban universities.

This finding was further strengthened with what was reported by Michael et al (2020) (41) girls and young women enrolled in undergraduate programmes are expected to live independently and put into practice as much of the knowledge they have received from their parents or siblings, including information on menstruation and menstrual hygiene. Menstrual health hygiene is simple to follow for university female undergraduates living independently, whether they are living on campus or off. This is due to the fact that female undergraduates, regardless of age, have similar traits and may have comparable experiences with menstrual health issues.

But the report also identifies areas with misconceptions or knowledge gaps. For instance, there are differing opinions regarding the normalcy of cycles that are longer than 38 days or shorter than 24 days, even though many students are aware of the basic length and regularity of menstrual periods. Furthermore, a sizable percentage of students (43.8%) mistakenly think that women experience menstruation for the entirety of their lives. Furthermore, just 24.4% of women feel comfortable talking to medical professionals about their menstrual cycle and the potential health risks. This is consistent with a recent study by Hassan et al 2023 (42) which found that female university students appear to have insufficient general awareness about menstruation. Nearly 81.8% of respondents accurately stated that menstruation is the flow of blood from the vagina, and 53.0% agreed that people menstruate.

A minor proportion of respondents acknowledged that women menstruate for the entirety of their lives (2.0%) and that periods lasting ten days or longer are typical. The female university students' exposure to certain subjects during their secondary school education, as well as information on menstruation from parents, family members, and various social media sites or even peers, may have contributed to their understanding of basic menstrual health concepts. This finding is consistent with a study by Shibeshi et al. (43) which discovered a favourable correlation between good menstrual health behaviours and parental knowledge of menstruation before menarche.

The results further demonstrated that among female undergraduates at the University of Ibadan, menstrual health literacy improved knowledge of menstruation concerns ($r=.225$, $n=349$, p (.001) $<.05$). It suggests that having a high level of menstrual health literacy could enhance one's understanding of menstrual issues, including symptoms like headaches, fatigue, and depression, as well as mental health problems resulting from menstrual health disorders like depression and appropriate pain management with the use of hormone contraceptives, natural remedies, exercise, and painkillers. This is consistent with a study by Armour et al. (2019) (27), which found that a lack of knowledge about pain management and low menstrual health literacy may play a major role in young people's frequent use of non-pharmacological treatments, such as traditional and folk remedies, and suboptimal analgesic choices. Sound menstrual health literacy is essential for empowering young

women to manage their dysmenorrhea more successfully.

In this study, among female undergraduates at the University of Ibadan, understanding of menstruation difficulties correlated with hygiene management (r=.378, n=349, p (.001) <.05). Therefore, awareness of menstruation-related concerns affected or improved the study's female undergraduate's hygiene management. This is in line with the discovery made by Shumie and Mengie in 2022 (44), who found pupils in grades eleven and twelve had a 2.23-fold higher likelihood of being well-versed in menstruation and menstrual hygiene and Kitesa 2016 (45), this may be the case because as women's education levels rise, they learn more about menstruation and how to manage it hygienically.

Mode of residence anticipated hygiene management among female undergraduates in the study, with female undergraduates living on campus in residence halls reporting higher scores for hygiene management ($\bar{x}$=53.39) than other female students who are not living on campus ($\bar{x}$=49.97). This emphasises how crucial it is to have facilities, sanitary supplies, and facilities available and used as important interventions for safe menstrual hygiene practices in homes or rooms rented outside of universities to shape female hygiene management.

The environment for menstrual sanitation must have been provided within residence halls for female undergraduates, so the difference in their menstrual hygiene management practices was not surprising. Concerning mode of residence, female undergraduates living in residence halls have access to various established facilities for hygiene purposes. The results are in line with Shah et al.'s 2019 (46) finding that two main obstacles to menstrual hygiene that participants mentioned are the lack of water and rigorous class schedules. Inadequate WASH (water, sanitation, and hygiene) facilities, particularly in public settings like workplaces, schools, and health centers, can also be a big obstacle for women and girls. This is also in line with a study by Phillips-Howard et al. (2016) (47), which found that some obstacles to managing menstrual hygiene effectively include not having access to clean and efficient absorbents, not having access to soap and water, not having privacy, and not having enough facilities to change, clean, and discard absorbents. This suggests that one factor influencing female undergraduates' ability to maintain proper hygiene is the amenities and services offered in their residence halls.

The findings demonstrated that the menstrual health literacy of female undergraduate students in the study was unaffected by any of the variables, including age, mode of residence, faculty of study, year of first menstruation, and ethnicity. This suggests that menstrual health literacy was not increased by factors such as age, religion, and course level, faculty of study, year of first menstruation, ethnicity, or mode of residence. None of these variables could impact menstrual health literacy.

Research and Health implications of the study

The results of this study indicate that females with high levels of menstrual health literacy tend to lead good hygiene management behaviour and understanding of menstrual issues, such as using suitable absorbent

during menstruation, storing appropriately, washing hands after changing menstrual absorbent, and disposal of absorbent in a clean manner. The results as mentioned earlier emphasise the significance of including menstrual health literacy elements in general studies courses particularly reproductive health, especially for students enrolled in all university courses not only females but males too as they will get married one day. The promotion of hygiene management scores can be attributed to knowledge of basic menstrual health concepts and menstrual issues. This implies that high or low menstrual health literacy may also directly or indirectly raise hygiene management levels.

Study Limitations and Strengths: This is one of the first research assessing the relationship between menstrual health literacy and hygiene management among female Nigerian undergraduates. Some of the limits, nevertheless, merit consideration. First, only one public university participated in the study's execution. The Nigerian first-generation institution, established in 1948 known as University of Ibadan (UI) to be the first and the best enrolled students from a variety of socioeconomic backgrounds. Future research has to be planned to measure the menstrual health literacy of female undergraduates and postgraduates from both public and private universities in mind. Second, a cross-sectional design was used in this investigation as it pertains only to female students. Nonetheless, against a background of even less research on menstrual health literacy studies in Africa, this study constitutes the first attempt to define menstrual health literacy among female Nigerian undergraduates. However, more extensive national research on the menstrual health literacy is required to establish among Adolescents and vulnerable groups

Conclusion

At the University of Ibadan in Ibadan, Nigeria the menstrual health literacy level among female undergraduates was high and good. The students' most common reports of hygiene management included using disposable sanitary pads, washing menstrual cloth, using menstrual cloth exclusively, storing absorbents in a safe clean place, disposing of absorbents in dustbins provided by hostel management as well as wrapping inside polythene bags and washing hands to maintain personal hygiene during menstruation. None of the demographic characteristics (age, religion, and course level, faculty of study, year of first menstruation, ethnicity and mode of residence) was associated with menstrual health literacy.

Acknowledgments: The author acknowledges the participation of all female undergraduates in the study, both on and off campus, as well as the different course representatives, female hall Wardens of the undergraduate's halls of residence, residence hall chairpersons, and the Dean of students who helped with participant recruitment.

Availability of data and materials: The data sets created and/or analysed for this work are made publicly available upon request.

Conflict of interest: There is no conflicting interest on this report.

Consent for publication: Not relevant

Ethics approval and consent to participate: The study was conducted in accordance with the principles of the Declaration of Helsinki. Participants completed the questionnaires anonymously and were assured of the confidentiality of their responses. Additionally, all respondents, along with the institution's Dean of Students, provided consent for participation after reviewing the study protocol and the items on the questionnaire. The University of Ibadan's Department of Adult Education and the Dean of Students gave complete ethical approval for the study. The researcher made sure all participants had read the written informed consent, understood its contents, and decided they wanted to participate in the study before they signed it.

Funding: No public, private, or nonprofit organisation provided any funding of any kind for this study.

References

1.The Lancet Child Adolescent Health. Normalising menstruation, empowering girls. Lancet Child Adolescent Health. 2018;2(6):379. https://doi.org/10.1016/S2352-4642(18)30143-3 PMid:30169273

2. Munro M.G, Critchley H.O.D, Fraser I.S; FIGO Menstrual Disorders Committee 2018. The two FIGO systems for normal and abnormal uterine bleeding symptoms and classification of causes of abnormal uterine bleeding in the reproductive years: 2018 revisions. International Journal of Gynecology and Obstetrics. 2018 143(3):393-408. https://doi.org/10.1002/ijgo.12666 PMid:30198563

3. Armour M, Parry K, Manohar N, Holmes K, Ferfolja T, Curry C, MacMillan F, Smith CA. The Prevalence and Academic Impact of Dysmenorrhea in 21,573 Young Women: A Systematic Review and Meta-Analysis. Journal of Women's Health (Larchmt). 2019;28(8):1161-1171. https://doi.org/10.1089/jwh.2018.7615 PMid:31170024

4. Armour M, Dahlen HG, Smith CA. More Than Needles: The Importance of Explanations and Self-Care Advice in Treating Primary Dysmenorrhea with Acupuncture. Evidence- Based Complementary and Alternative Medicine 2016:3467067 https://doi.org/10.1155/2016/3467067 PMid:27242909 PMCid:PMC4875987

5. Banikarim C, Chacko MR, Kelder SH. Prevalence and impact of dysmenorrhea on Hispanic female adolescents. Archives of Pediatrics and Adolescent Medicine.2000;154(12):1226-9. doi: 10.1001/archpedi.154.12.1226. PMID: 11115307. https://doi.org/10.1001/archpedi.154.12.1226 PMid:11115307

6. Wong LP. Attitudes towards dysmenorrhoea, impact and treatment seeking among adolescent girls: A rural school-based survey. Australian Journal of Rural Health. 2011;19(4):218-223. https://doi.org/10.1111/j.1440-1584.2011.01213.x PMid:21771164

7. Babbar K, Martin J, Ruiz J, Parray AA, Sommer M. Menstrual health is a public health and human rights issue. Lancet Public Health. 2022;7(1):e10-e11. https://doi.org/10.1016/S2468-2667(21)00212-7 PMid:34717798

8. UNDP. What are the sustainable development goals? 2015. https://www.undp.org/sustainabledevelopmentgoals?utm_

9. Sommer M, Torondel B, Hennegan J, Phillips-Howard PA, Mahon T, Motivans A, Zulaika G, Gruer C, Haver J, Caruso BA; Monitoring Menstrual Health and Hygiene Group. How addressing menstrual health and hygiene may enable progress across the Sustainable Development Goals. Global Health Action. 2021;14(1):1920315.https://doi.org/10.1080/16549716.2021.1920315 PMid:34190034 PMCid:PMC8253211

10. Carneiro MM. Menstrual poverty: enough is enough. Women &Health. 2021;61(8):721- 722 https://doi.org/10.1080/03630242.2021.1970502 PMid:34517781

11. Gebeyehu MB, Mekuria AB, Tefera YG, Andarge DA, Debay YB, Bejiga GS, Gebresillassie BM Prevalence, impact, and management practice of dysmenorrhea among university of Gondar students, Northwestern Ethiopia: a cross-sectional study. International Journal of Reproductive Medicine, 2017:3208276. https://doi.org/10.1155/2017/3208276 PMid:28589173 PMCid:PMC5446888

12. Rafique N, Al-Sheikh MH. Prevalence of primary dysmenorrhea and its relationship with body mass index. Journal of Obstetrics and Gynecological Research 2018; 44(9):1773-1778. https://doi.org/10.1111/jog.13697 PMid:29974566

13. Hailemeskel S, Demissie A, Assefa N. Primary dysmenorrhea magnitude, associate risk factors, and its effect on academic performance: evidence from female university students in Ethiopia. International Journal of Women's Health 2016;8:489-496. https://doi.org/10.2147/IJWH.S112768 PMid:27695366 PMCid:PMC5034908

14. Ortiz MI. Primary dysmenorrhea among Mexican university students: prevalence, impact and treatment. European Journal of Obstetrics, Gynecology and Reproductive Biology 2010;152(1):73-7, https://doi.org/10.1016/j.ejogrb.2010.04.015 PMid:20478651

15. Habibi N, Huang MS, Gan WY, Zulida R, Safavi SM. Prevalence of primary dysmenorrhea and factors associated with its intensity among undergraduate students: a cross-sectional study. Pain Management Nursing 2015;16(6):855-61 https://doi.org/10.1016/j.pmn.2015.07.001 PMid:26328887

16. Fawole AO, Babarinsa IA, Fawole OI, Obisesan KA, Ojengbede OA. Menstrual characteristics of secondary school girls in Ibadan, Nigeria. West African Journal of Medicine 2009 28(2):92-6. PMID: 19761170.

17. Yagnik AS. Reframing menstruation in India: metamorphosis of the menstrual taboo with the changing media coverage. Health Care for Women International. 2014;35(6):617-33 https://doi.org/10.1080/07399332.2013.838246 PMid:24180612

18. Kumar A, Srivastava K. Cultural and social practices regarding menstruation among adolescent girls. Social Work in Public Health. 2011;26(6):594-604. https://doi.org/10.1080/19371918.2010.525144 PMid:21932979

19. Ssewanyana D, Bitanihirwe BKY. Menstrual hygiene management among adolescent girls in sub-Saharan Africa. Global Health Promotion. 2019;26(1):105-8 https://doi.org/10.1177/1757975917694597 PMid:28485220

20. Hawkey AJ, Ussher JM, Perz J, Metusela C. Experiences and Constructions of Menarche and Menstruation Among Migrant and Refugee Women. Qualitative Health Research. 2017; 27(10):1473-1490. https://doi.org/10.1177/1049732316672639 PMid:27742765

21. Hennegan J, Winkler IT, Bobel C, Keiser D, Hampton J, Larsson G, Chandra-Mouli V, Plesons M, Mahon T. Menstrual health: a definition for policy, practice, and research. Sex Reproductive Health Matters. 2021;29(1):1911618. https://doi.org/10.1080/26410397.2021.1911618 PMid:33910492 PMCid:PMC8098749

22. van Eijk AM, Sivakami M, Thakkar MB, Bauman A, Laserson KF, Coates S, Phillips-Howard PA. Menstrual hygiene management among adolescent girls in India: a systematic review and meta-analysis. BMJ Open. 2016 ;6(3):e010290.. https://doi.org/10.1136/bmjopen-2015-010290 PMid:26936906 PMCid:PMC4785312

23. Montgomery P, Hennegan J, Dolan C, Wu M, Steinfield L, Scott L Menstruation and the Cycle of Poverty: A Cluster Quasi-Randomised Control Trial of Sanitary Pad and Puberty Education Provision in Uganda. PLoS ONE 2016: 11(12): e0166122. https://doi.org/10.1371/journal.pone.0166122 PMid:28002415 PMCid:PMC5176162

24. Sommer M., Caruso B.A., Sahin M., Calderon T., Cavill S., Mahon T., Phillips-Howard P.A. A time for global action: Addressing girls' menstrual hygiene management needs in schools. PLoS Med 2016:13(2): e1001962. https://doi.org/10.1371/journal.pmed.1001962 PMid:26908274 PMCid:PMC4764363

25. United Nations General Assembly Human Rights Council 50th session. (2016). Panel discussion on menstrual hygiene management, human rights and gender equality. https://www.ohchr.org/en/statements/2022/06/high-commissioner-human-rights-statement-menstrual-health

26. Uzoechi CA, Parsa AD, Mahmud I, Alasqah I, Kabir R. Menstruation among In-School Adolescent Girls and Its Literacy and Practices in Nigeria: A Systematic Review. Medicina (Kaunas). 2023;59(12):2073. https://doi.org/10.3390/medicina59122073 PMid:38138175 PMCid:PMC10745060

27. Armour, M., Parry, K., Al-Dabbas, M. A., Curry, C., Holmes, K., Macmillan, F., Ferfolja T,& Smith, C. A. Self-care strategies and sources of knowledge on menstruation in 12,526 young women with dysmenorrhea: A systematic review and meta-analysis. PLoS ONE, 2019 14(7).:e0220103. https://doi.org/10.1371/journal.pone.0220103 PMid:31339951 PMCid:PMC6655766

28. Armour M, Hyman MS, Al-Dabbas M, Parry K, Ferfolja T, Curry C, MacMillan F, Smith CA, Holmes K. Menstrual Health Literacy and Management Strategies in Young Women in Australia: A National Online Survey of Young Women Aged 13-25 Years. Journal of Pediatric and Adolescent Gynecology. 2021;34(2):135-143.https://doi.org/10.1016/j.jpag.2020 .11.007 PMid:33188935

29. El-Gilany AH, Badawi K, El-Fedawy S. Menstrual hygiene among adolescent schoolgirls in Mansoura, Egypt. Reproductive Health Matters. 2005;13:147-52. https://doi.org/10.1016/S0968-8080(05)26191-8 PMid:16291496

30. Adebimpe WO, Farinloye EO, Adeleke NA. Menstrual pattern and disorders and impact on quality of life among university students in south-western Nigeria. Journal of Basic and Clinical Reproductive Sciences. 2016 5 (1):27-32 ·https://www.ajol.info/index.php/jbcrs/article/view/130290 https://doi.org/10.4103/2278-960X.175741

31. Nooh AM. Menstrual disorders among Zagazig University students, Zagazig, Egypt. Middle East Fertility Society Journal 2015 ,20, (3), 198-203 https://doi.org/10.1016/j.mefs.2014.08.002

32. Olowokere AE, Oginni MO, Olajubu AO, William AE, Irinoye OO. Menstrual disorders: The implications on health and academic activities of female undergraduates in a federal university in Nigeria. Journal of Nursing Education and Practice 2014 ,4(5);126-135 DOI: https://doi.org/10.5430/jnep.v4n5p126

33. Ayamolowo, L.B, Ayamolowo, S.J, Olayinka, E.O ,Olowokere,A.E Prevalence of menstrual disorders and self-care practices among female undergraduates in a southwestern tertiary institution, Nigeria International Journal of Reproduction, Contraception, Obstetrics and Gynecology .2024;13(4):817-825 www.ijrcog.org ISSN 2320-1770 | eISSN 2320-1789DOI: https://doi.org/10.18203/2320-1770.ijrcog20240771
34. Idoko, L.O., Okafor, K.C., Ayegba, V.O., Bala, S. and Evuka,V.B. Knowledge and Practice of Men-strual Health and Hygiene among Young People in Jos, Plateau State, Nigeria. Open Journal of Obstetrics and Gynecology, 2022 12, 292-308.https://doi.org/10.4236/ojog.2022.124028 https://doi.org/10.4236/ojog.2022.124028
35. Esan D.T, Tola Y.O, Akingbade O, Ariyo S.A, Ogunniyi B.I, Agbana R.D. Knowledge and Practice of Menstrual Hygiene among Female Undergraduates at a Private Tertiary Institution in Nigeria. PRIJNR [Internet]. 2023 ;27(4):798-810. https://doi.org/10.60099/prijnr.2023.262984
36. Edet O.B.1, Bassey P.E.M.2, Esienumoh E.E.1, Ndep A.O. An Exploratory Study of Menstruation and Menstrual Hygiene Knowledge Among Adolescents in Urban and Rural Secondary Schools in Cross River State, Nigeria African. Journal of Biomedical. Research. 2020,23; 321-326
37. McGawley K., Sargent D, Noordhof D,. Badenhorst C.E, Julian R,. Govu A.D (2023) Improving menstrual health literacy in sport Journal of Science and Medicine in Sport 2023;26(7):351-357.doi: 10.1016/j.jsams..06.007. Epub 2023 Jun 22. PMID: 37407335. https://doi.org/10.1016/j.jsams.2023.06.007 PMid:37407335
38. Muralidharan A. Arriving at a framework and indicators for Menstrual Health & Hygiene Management: discussion with water, sanitation, and hygiene experts; 2015.
39. Ramaiya A ,Sood S What are the psychometric properties of a menstrual hygiene management scale: a community-based cross-sectional study BMC Public Health 2020 20:525 https://doi.org/10.1186/s12889-020-08627-3 PMid:32306931 PMCid:PMC7168814
40. Khanal, S. P. Role of Health Literacy on Menstrual Hygiene Practice among the Girl Students. Journal of Health Promotion, 2019 7, 83-90. https://doi.org/10.3126/jhp.v7i0.25518
41. Michael J, Iqbal Q, Haider S, Khalid A, Haque N, Ishaq R Saleem, F , Hassali M.A , Bashaar, M. Knowledge and practice of adolescent females about menstruation and menstruation hygiene visiting a public healthcare institute of Quetta, Pakistan. BMC Womens Health. 2020, 20(4). https://doi.org/10.1186/s12905-019-0874-3 PMid:31906921 PMCid:PMC6945726
42. Hassan S, Ghandour R, Bakri L, Shwiki, S, Safi, S., Abuzaid, R.,& Zeidan H . Menstrual health and hygiene among young Palestinian female university students in the West Bank: a cross- sectional study. MJ Open 2023;13:e069222. https://doi.org/10.1136/bmjopen-2022-069222 PMid:36997246 PMCid:PMC10069603
43. Shibeshi B.Y, Emiru A.A, Asresie M.B. Disparities in menstrual hygiene management between urban and rural schoolgirls in Northeast, Ethiopia. PLoS ONE. 2021 16(9): e0257853. https://doi.org/10.1371/journal.pone.0257853 PMid:34591900 PMCid:PMC8483289
44. Shumie Z.S, Mengie Z.A. Menstrual hygiene management knowledge, practice and associated factors Among School Girls, Northeast Ethiopia. PLoS One. 2022 19;17(7):e0271275. https://doi.org/10.1371/journal.pone.0271275 PMid:35852998 PMCid:PMC9295965
45. Kitesa B., Getahun, T. Wako, K Assessment of Knowledge and Practice of Adolescent In-School Girls Towards Menstrual Hygiene Management and Determining Factors in Lucy Village of Ethiopian Great Rift Valley, 2016 International Journal of Immunology. 4 (6) 2016, 52-63. https://doi.org/10.11648/j.iji.20160406.12
46. Shah V, Nabwera HM, Sosseh F, Jallow Y, Comma E, Keita O, Torondel B. A rite of passage: a mixed methodology study about knowledge, perceptions and practices of menstrual hygiene management in rural Gambia. BMC Public Health. 2019 19(1):277. https://doi.org/10.1186/s12889-019-6599-2 PMid:30845945 PMCid:PMC6407285
47. Phillips-Howard PA, Caruso B, Torondel B, Zulaika G, Sahin M, Sommer M. Menstrual hygiene management among adolescent schoolgirls in low-and middle-income countries: research priorities. Global Health Action. 2016 9:33032. https://doi.org/10.3402/gha.v9.33032 PMid:27938648 PMCid:PMC5148805