

Menstrual Hygiene Awareness, Knowledge and Sources of Information among Female Adolescents in Secondary Schools in Suburban Edo State, Nigeria

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ABSTRACT:

Background: Adequate menstrual health knowledge can help adolescent girls understand menstruation, prepare for menarche and adopt appropriate hygiene practices. However, access to accurate information varies across settings, and evidence from suburban communities in southern Nigeria remains limited. This paper examined menstrual hygiene awareness, knowledge, timing and sources of information, and their sociodemographic associations among female secondary-school students in suburban Edo State, Nigeria.

Methods: A descriptive cross-sectional survey was conducted among female adolescents who had attained menarche in three randomly selected secondary schools in Okada, Edo State. Of 344 questionnaires prepared for administration, 310 were completed and analysed, representing a response rate of approximately 90%. Data were collected using a structured interviewer-administered questionnaire. Descriptive statistics were used to summarise awareness, knowledge and information sources, while Pearson's chi-square test examined associations between categorised menstrual hygiene awareness and age, school class and religion. Statistical significance was set at $p < .05$.

Results: The mean age of respondents was 14.21 ± 1.36 years, and 84.5% were aged 13-16 years. Nearly all respondents, 304 (98.1%), had heard about menstrual hygiene. More than half, 169 (54.5%), reported first receiving menstrual hygiene information between 8 and 11 years of age, while 123 (39.6%) first received such information between 12 and 14 years. Knowledge of the basic hygiene components assessed was high: all 310 respondents correctly recognised that menstrual hygiene involves adequate changing of menstrual materials and regular bathing, while 297 (95.8%) correctly identified appropriate disposal of used menstrual materials as a component of menstrual hygiene. Teachers were the most frequently reported source of information, 272 (87.7%), followed by mothers, 237 (76.5%), and sisters, 197 (63.5%). Health workers, 98 (31.6%), and television or social media, 92 (29.7%), were less frequently identified, while no respondent reported receiving menstrual hygiene information from a father. Categorised menstrual hygiene awareness differed significantly by age, $\chi^2 = 14.818$, $p = .001$; school class, $\chi^2 = 109.861$, $p < .001$; and religion, $\chi^2 = 12.230$, $p < .001$.

Conclusion: Menstrual hygiene awareness and knowledge of the basic hygiene concepts assessed were high among the surveyed adolescents. Schools and female family members constituted the principal information channels, while fathers were absent from the reported information pathway. The significant sociodemographic differences in awareness indicate that menstrual health information was not distributed uniformly across the sampled population. Age-appropriate, accurate and sufficiently comprehensive menstrual health education should therefore remain an important component of school and family-based adolescent health education.

KEYWORDS: Adolescent girls; Menstrual health; Menstrual hygiene; Awareness; Knowledge; Health education; Information sources; Nigeria

INTRODUCTION

Menstruation is a normal feature of female reproductive development, yet the transition through menarche is not always accompanied by accurate or timely information. For adolescent girls, knowing what menstruation is, why it occurs and how menstrual hygiene should be maintained is an important part of entering puberty with confidence and adequate preparation. Contemporary definitions of menstrual health place access to accurate, timely and age-appropriate information alongside access to suitable materials, supportive facilities and appropriate care as

essential conditions for menstrual well-being (Hennegan et al., 2021). Knowledge is therefore not peripheral to menstrual health. It provides a foundation from which girls can interpret menstrual changes, distinguish biological processes from misconceptions and make informed decisions about personal hygiene.

The importance of such knowledge is especially evident in school settings. Schools bring large numbers of adolescents into a structured environment in which health information can be delivered before and after menarche. However, educational provision remains uneven. Recent global monitoring by the World Health

Organization and United Nations Children's Fund found that only 39% of schools for which data were available provided menstrual health education, despite the recognised importance of schools in preparing girls for menstruation (World Health Organization & United Nations Children's Fund, 2024). Earlier research had similarly identified access to reliable information and supportive school environments as central elements of efforts to improve menstrual hygiene management among school-aged girls, particularly in low- and middle-income countries (Sommer et al., 2021).

Evidence from Nigeria indicates that menstrual hygiene knowledge cannot be assumed to be uniform simply because girls attend school. Considerable variation has been reported across settings and populations. Research among adolescent girls in Southeastern Nigeria has similarly highlighted variation in menstrual health knowledge and the continuing importance of access to accurate information during adolescence (Mowah & Obohwe, 2024a). Among adolescent schoolgirls in Taraba State, menstrual hygiene management was examined within a context in which adequate knowledge was regarded as an important requirement for safe management of menstruation (Nnennaya et al., 2021). Research conducted in Ebonyi State reported that 79.7% of participating adolescent girls had good menstrual hygiene knowledge, but knowledge differed significantly according to age and class level (Obande-Ogbuinya et al., 2022). More recently, a mixed-method study of in-school adolescent girls in a Nigerian city continued to identify gaps in menstrual knowledge alongside the social and practical conditions surrounding menstrual management (Ene et al., 2024). These findings caution against treating school attendance as a sufficient indicator of menstrual preparedness.

Recent Nigerian evidence also points to marked geographical differences. In a large cross-sectional study involving 1,250 secondary-school girls in Nasarawa West Senatorial Zone, 59% were classified as having poor menstrual hygiene knowledge. Knowledge varied according to factors including residential setting, school type and maternal education (Kasali et al., 2026). Such differences are important because awareness is shaped within particular social and educational environments. Information received at school may coexist with messages acquired from mothers, sisters, peers, health

workers and media. The credibility, timing and content of these messages can differ considerably, meaning that awareness is better understood as the product of several information channels rather than a single educational encounter.

The source of menstrual information deserves particular attention during adolescence. Family members have traditionally played an important role in preparing girls for menarche, but family communication may be constrained when menstruation is considered private, embarrassing or unsuitable for open discussion. Nigerian studies have documented the continuing importance of parents, teachers and other social contacts in menstrual education, while also showing that menstrual hygiene knowledge and practices vary considerably across settings (Fehintola et al., 2017; Obande-Ogbuinya et al., 2022; Mowah & Obohwe, 2024b). School-based information may therefore complement family communication, particularly where misconceptions or silence limit what is discussed at home. The timing of information is equally important. Knowledge acquired before or during the early stages of adolescence has greater potential to prepare girls for menarche than information received only after menstrual experiences have begun.

Sociodemographic differences add another layer to this question. Age and school class may reflect differences in exposure to health education, maturity and opportunities to encounter menstrual information. Religious and family contexts may also influence whether menstruation is discussed openly and which sources are regarded as acceptable or authoritative. Existing Nigerian research has already demonstrated associations between menstrual hygiene knowledge and age or school level in some populations (Obande-Ogbuinya et al., 2022; Kasali et al., 2026), but evidence remains strongly dependent on local context. Findings from one state or geographical zone cannot automatically be transferred to another.

Evidence from suburban communities in southern Nigeria remains comparatively limited, particularly concerning the combination of awareness level, timing of first information, sources of menstrual hygiene information and sociodemographic differences in awareness. This paper therefore examines menstrual hygiene awareness and knowledge among female adolescents attending selected secondary schools in suburban Edo State, Nigeria. Particular attention is given

to when respondents first became aware of menstrual hygiene, the people and channels through which information was received, and whether awareness differed according to selected sociodemographic characteristics. The findings provide a locally grounded basis for considering how menstrual health education can reach adolescent girls early, consistently and through sources capable of providing accurate information.

METHODS

Study design and setting

A descriptive cross-sectional study was conducted among female adolescents attending secondary schools in Okada community, Ovia North-East Local Government Area, Edo State, Nigeria. Okada is situated in the South-South geopolitical zone of Nigeria and serves as the headquarters of Ovia North-East Local Government Area. The study was conducted between January and June 2023.

The target population consisted of female secondary-school students aged 10-19 years who were resident in Okada community and had attained menarche. Students were eligible if they were enrolled in one of the selected secondary schools, had experienced menarche and consented to participate. Those who did not satisfy these criteria were excluded.

Sample-size determination

The sample size was estimated using the single-population proportion formula:

$$n = Z^2pq/d^2$$

where n represented the required sample size, Z was the standard normal deviate corresponding to a 95% confidence level, p was the estimated proportion of the population with the characteristic of interest, q was 1 minus p , and d represented the desired precision. This approach is commonly used when estimating population proportions in cross-sectional studies (Bhardwaj et al., 2024).

A previous study conducted in Jos, Plateau State, Nigeria reported that 72.2% of respondents had previously received information about menstrual health and hygiene (Idoko et al., 2022). The study protocol used an anticipated proportion of 72%, with $Z = 1.96$ and a

precision of 5%. Substitution into the formula produced a minimum sample size of approximately 310 participants. An additional 10% allowance was made for non-response, increasing the target sample to 344.

A total of 344 questionnaires were prepared for administration, of which 310 were completed and returned. The effective sample analysed in this paper was therefore 310 respondents, representing a response rate of approximately 90%.

Sampling procedure

Cluster sampling was used for participant selection. The eight government-approved secondary schools in Okada community were treated as individual clusters. These were Okada Grammar School, Champions Academy, Starlight Group of Schools, Regina Mundi Catholic School, Igbinedion University Staff School, Great Future Academy, Unique Group of Schools and Divine Grace Academy.

Three clusters were selected through simple random sampling using a dice-rolling procedure. The schools selected were Okada Grammar School, Regina Mundi Catholic School and Igbinedion University Staff School. Female students who had attained menarche in the selected schools were recruited until the required sample was achieved.

Data-collection instrument

Data were collected using a structured interviewer-administered questionnaire containing both closed-ended and open-ended items. The questionnaire was adapted from previous research addressing menstrual hygiene knowledge, perceptions and management among adolescent and young female populations (November, 2021; Hussein et al., 2022; Tomlinson, 2022). These sources were explicitly identified during development of the original instrument.

The complete questionnaire contained sections on sociodemographic characteristics, awareness, perception and menstrual hygiene practice. Only the variables relevant to awareness and knowledge were included in the present analysis. These comprised previous awareness of menstrual hygiene, age at first receipt of menstrual hygiene information, knowledge of what menstrual hygiene entails, and sources of information.

Potential information sources included mothers,

fathers, sisters, teachers, health workers and television or social media. Multiple responses were permitted for the information-source item.

Measurement of menstrual hygiene awareness

The awareness component contained four knowledge-related questions. This assessed recognition that menstrual hygiene involves adequate changing of menstrual materials, regular bathing and appropriate disposal of used menstrual materials. Correct responses were assigned a score of 1 and incorrect responses a score of 0.

Item scores were summed according to the scoring system specified in the study protocol. Scores above 80% were categorised as good, scores between 69% and 79% as fair, and scores below 69% as poor. Individual awareness items, age at first receipt of information and information sources were also analysed separately because these variables addressed distinct dimensions of menstrual hygiene awareness.

Instrument pre-testing

The questionnaire was reviewed by members of the research team, the project supervisor and the Head of the Department of Community Medicine before field administration. Pre-testing was subsequently conducted in Usen, Ovia South-West Local Government Area, Edo State, approximately 5 km from Okada. The location was selected because its characteristics were considered comparable with those of the study community.

Approximately 10% of the minimum sample size was included in the pre-test. The exercise assessed the comprehensibility, suitability and sensitivity of the questionnaire, and identified problems were corrected before administration of the final instrument.

Statistical analysis

Completed questionnaires were checked for completeness, serialised and entered into IBM SPSS Statistics version 27. Descriptive statistics were used to summarise sociodemographic characteristics and menstrual hygiene awareness. Categorical variables were reported as frequencies and percentages, while age was additionally summarised using the mean and standard deviation.

Bivariate analysis was conducted using Pearson's chi-square test to examine associations between menstrual hygiene awareness and selected sociodemographic characteristics. The variables examined were age, school class and religion. Statistical significance was determined at $p < .05$.

Ethical considerations

Ethical approval was obtained from the Ethics Committee of Igbinedion University, Okada, Edo State, Nigeria, with approval code IUO/Ethics/042. Participation was voluntary, and eligible respondents were informed that refusal to participate or withdrawal from the study would attract no penalty. Names were not recorded on the questionnaires, and privacy was maintained during data collection. Completed study data were kept securely and were accessible only to members of the research team.

RESULTS

Respondent characteristics

A total of 310 respondents were included in the analysis. The mean age was 14.21 years ($SD = 1.36$), and most participants were aged 13-16 years ($n = 262$, 84.5%). Senior Secondary School 1 represented the largest class group ($n = 97$, 31.3%), followed by Junior Secondary School 2 ($n = 83$, 26.8%). Most respondents identified as Christian ($n = 268$, 80.0%), while 42 (20.0%) identified as Muslim. The selected sociodemographic characteristics used in the subsequent awareness analysis are presented in Table 1.

Table 1: Selected sociodemographic characteristics of respondents (N = 310)

Characteristic	n	%
Age (years)		
9-12	36	11.6
13-16	262	84.5

17-18	12	3.9
Class		
JSS1	6	1.9
JSS2	83	26.8
JSS3	62	20.0
SS1	97	31.3
SS2	50	16.1
SS3	12	3.9
Religion		
Christianity	268	80.0
Islam	42	20.0

Note: Percentages are based on N = 310. Mean age = 14.21 years (SD = 1.36). JSS = Junior Secondary School; SS = Senior Secondary School.

Menstrual hygiene awareness and knowledge

Prior awareness of menstrual hygiene was reported by 304 respondents (98.1%), while 6 (1.9%) reported no prior awareness. All 310 respondents correctly identified menstrual hygiene as involving appropriate changing of

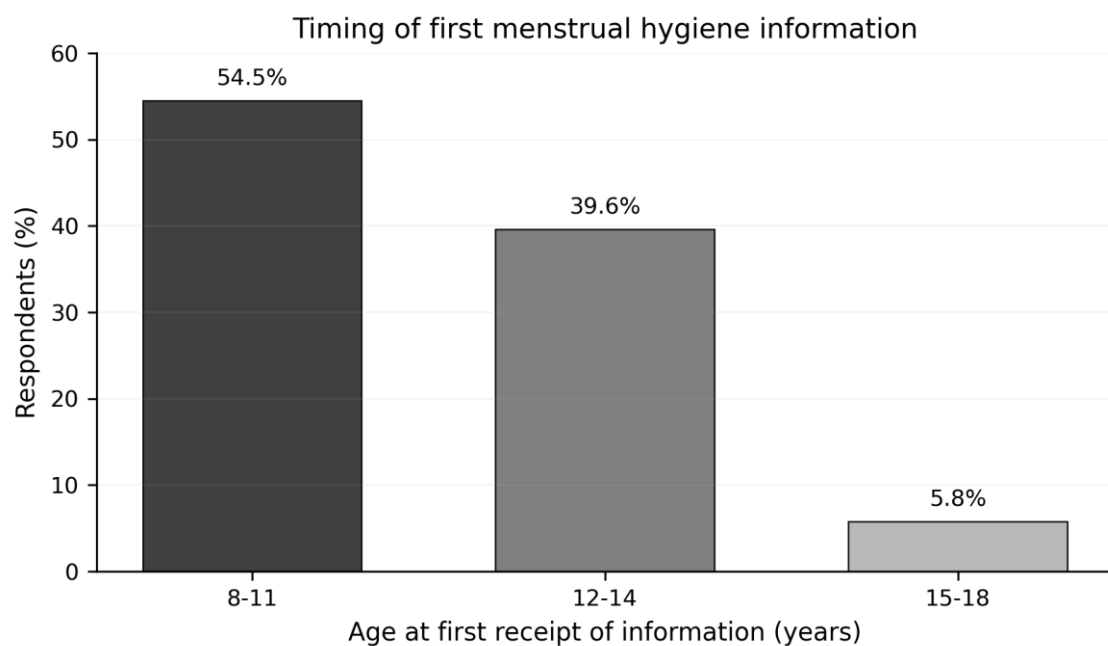
absorbent materials and regular bathing. Proper disposal of used menstrual materials was recognised as part of menstrual hygiene by 297 respondents (95.8%). These item-level findings are summarised in Table 2.

Table 2: Menstrual hygiene awareness and knowledge among respondents (N = 310)

Awareness/knowledge item	n	%
Previously heard about menstrual hygiene: Yes	304	98.1
Previously heard about menstrual hygiene: No	6	1.9
Recognised menstrual hygiene as involving appropriate pad changing, bathing and disposal	310	100.0
Recognised appropriate changing of menstrual pads as part of menstrual hygiene	310	100.0
Recognised regular bathing during menstruation as part of menstrual hygiene	310	100.0
Recognised proper disposal of used pads as part of menstrual hygiene	297	95.8
Did not recognise proper disposal of used pads as part of menstrual hygiene	13	4.2

Note: Values are frequencies and percentages of the analysed sample.

The timing of first exposure to menstrual hygiene information is shown in Figure 1. More than half of respondents reported first receiving such information at ages 8-11 years (54.5%), 39.6% reported ages 12-14 years, and 5.8% reported ages 15-18 years.

**Figure 1: Age at first receipt of menstrual hygiene information among respondents**

Note: N = 310. Percentages are those reported in the source results table; minor deviation from 100% reflects rounding.

Respondents could identify more than one source of menstrual hygiene information. As presented in Figure 2, teachers were the most frequently reported source (272, 87.7%), followed by mothers (237, 75.5% as reported) and sisters (197, 63.5%). Health workers were reported by 98 respondents (31.6%), television or social media by 92 (29.7%),

and no respondent identified a father as a source of menstrual hygiene information.

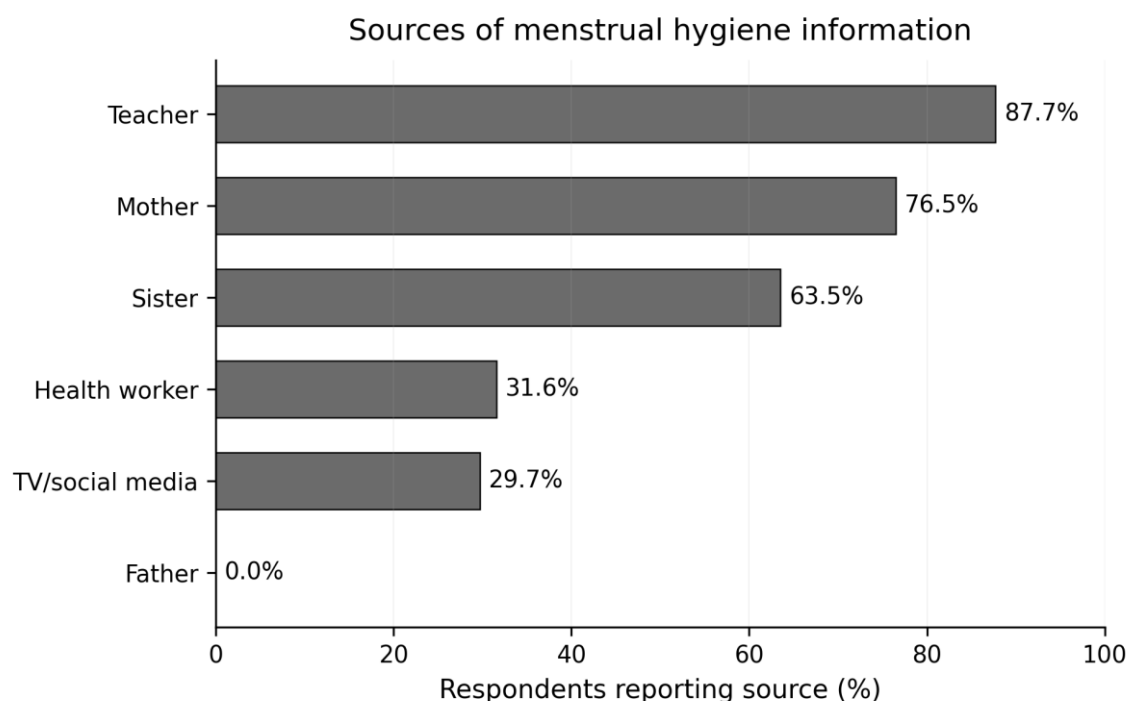


Figure 2: Reported sources of menstrual hygiene information

Note: N = 310. Multiple responses were permitted.

Sociodemographic differences in menstrual hygiene awareness

Bivariate analysis identified statistically significant associations between menstrual hygiene awareness classification and each of the three sociodemographic variables examined. Awareness differed by age, $\chi^2 = 14.818$, $p = .001$; by school class, $\chi^2 = 109.861$, $p < .001$; and by religion, $\chi^2 = 12.230$, $p < .001$. Within the age categories, good awareness was recorded for 23 of 36 respondents aged 9-12 years (63.9%), 121 of 262 aged 13-

16 years (46.2%), and none of the 12 respondents aged 17-18 years. Across school classes, the proportion classified as having good awareness ranged from 12.4% in SS1 to 100.0% in JSS1. Among Christian respondents, 135 of 268 (50.4%) were classified as having good awareness, compared with 9 of 42 Muslim respondents (21.4%). The complete cross-tabulations and inferential statistics are reported in Table 3.

Table 3: Association between selected sociodemographic characteristics and menstrual hygiene awareness (N = 310)

Variable	Category	Good, n (%)	Poor, n (%)	χ^2	p
Age (years)	9-12	23 (63.9)	13 (36.1)	14.818	.001
	13-16	121 (46.2)	141 (53.8)		
	17-18	0 (0.0)	12 (100.0)		
Class	JSS1	6 (100.0)	0 (0.0)	109.861	<.001
	JSS2	58 (69.9)	25 (30.1)		
	JSS3	50 (80.6)	12 (19.4)		
	SS1	12 (12.4)	85 (87.6)		
	SS2	12 (24.0)	38 (76.0)		
	SS3	6 (50.0)	6 (50.0)		
Religion	Christianity	135 (50.4)	133 (49.6)	12.230	<.001
	Islam	9 (21.4)	33 (78.6)		

Note. Values in the Good and Poor columns are n (row %). Pearson chi-square tests were used. JSS = Junior Secondary School; SS = Senior Secondary School.

DISCUSSION

A high level of exposure to menstrual hygiene information was identified among the female adolescents surveyed. Nearly all respondents (98.1%) had heard about menstrual hygiene, while the item-level responses showed strong recognition of basic hygiene requirements relating to changing menstrual materials, regular bathing and disposal. More than half reported first hearing about menstrual hygiene between the ages of 8 and 11 years. Teachers were the most frequently identified source of information (87.7%), followed by mothers (76.5%) and sisters (63.5%), whereas no respondent identified a father as a source. Awareness categories also differed significantly according to age, school class and religion. These findings point to substantial exposure to basic menstrual hygiene information within this school-going population, but they also demonstrate that the distribution and sources of knowledge were not uniform across respondents.

Awareness and timing of menstrual hygiene

information

The high level of prior awareness recorded in this population contrasts with evidence showing persistent deficiencies in menstrual knowledge among school-aged girls in Nigeria and elsewhere in sub-Saharan Africa. A systematic review of Nigerian studies found substantial deficits in menstrual literacy and preparation for menarche, with considerable variation between locations and study populations (Uzoечи et al., 2023). Similarly, a systematic review of 35 studies from Anglophone West Africa reported considerable heterogeneity in menstrual knowledge, with fewer than half of adolescent girls in the included studies knowing about menstruation before menarche (Tomlinson et al., 2024). More recent Nigerian evidence also demonstrates that widespread exposure to menstrual information does not necessarily equate to comprehensive knowledge. Among 1,250 post-menarche schoolgirls in Nasarawa West, 59% were classified as having poor menstrual hygiene knowledge when a broader 10-item assessment of menstrual physiology,

hygiene and cycle management was used (Kasali et al., 2026).

Differences in measurement are important when these findings are compared. The awareness instrument used here focused on a relatively concise set of basic menstrual hygiene concepts rather than an extensive assessment of menstrual physiology, cycle characteristics or reproductive biology. High recognition of basic hygiene requirements should therefore not be interpreted as evidence of comprehensive menstrual health literacy. Holmes et al. (2021) make this distinction particularly clear in their review of adolescent menstrual health literacy, showing that familiarity with menstruation may coexist with significant gaps in understanding of reproductive physiology, menstrual disorders and appropriate health-seeking responses. The present findings consequently indicate strong awareness of the hygiene concepts that were measured, rather than mastery of all dimensions of menstrual health.

The timing of first information is also notable. More than half of respondents reported first hearing about menstrual hygiene between 8 and 11 years of age, while 39.6% reported first exposure between 12 and 14 years. Evidence from West Africa has repeatedly shown that menstrual information is often received too late, sometimes only after the first menstrual period has occurred (Tomlinson et al., 2024). In Tanzania, Njee et al. (2024) found that approximately 30% of schoolgirls had not heard about menstruation until menarche. Early, age-appropriate education has therefore been identified as an important component of menstrual preparedness, particularly when it is delivered before girls encounter menstruation without adequate explanation (Plesons et al., 2021).

The age-at-information variable used here should nevertheless be interpreted carefully. It identifies when respondents recalled first hearing about menstrual hygiene, but it does not establish whether that information preceded menarche for each individual participant. No temporal linkage between individual age at menarche and age at first menstrual hygiene information was analysed. It would therefore be inappropriate to describe the 8-11-year category as direct evidence of pre-menarcheal education. What can be stated is that a substantial proportion reported exposure to menstrual hygiene information at relatively young

ages.

Teachers and family members as information sources

Teachers occupied an unusually prominent position in the information network, being identified by 87.7% of respondents. This finding is important because regional evidence commonly places mothers and other female relatives among the principal sources of menstrual information. Tomlinson et al. (2024) found that mothers, female siblings and teachers were the most frequently reported sources across West African studies, although their relative prominence differed markedly between settings. Njee et al. (2024) likewise found that sources changed according to the type of menstrual information sought. Schools played an important role in first exposure to information, while parents remained prominent sources of more detailed menstrual guidance.

The high reported contribution of teachers is consistent with the potential reach of school-based menstrual education. Evidence from intervention studies supports the capacity of structured educational programmes to improve menstrual knowledge. In a systematic review of educational interventions for young adolescent girls, Evans et al. (2022) found that educational interventions generally improved menstrual knowledge, although the content, intensity and delivery of programmes varied substantially. Interactive and multi-component approaches appeared particularly promising. This evidence does not establish that formal school instruction produced the high awareness recorded here, because respondents were asked to identify sources of information rather than the content, frequency or quality of teaching received. The result does, however, establish that teachers were widely recognised as part of the menstrual information pathway.

Mothers remained an important source, reported by 76.5% of participants, and almost two-thirds identified sisters. This pattern supports the continuing importance of interpersonal communication within families. Menstrual education in low- and middle-income settings often moves through female family networks, but the information transmitted within these networks can vary in accuracy and completeness (Plesons et al., 2021). A broader review of menstrual health literacy similarly found that young people frequently rely on mothers, relatives, peers and school-based sources simultaneously, rather than receiving menstrual knowledge through a

single channel (Holmes et al., 2021). The multiple-response format used here is therefore useful because it captures overlapping information pathways rather than requiring respondents to nominate only one source.

No respondent identified a father as a source of menstrual hygiene information. This is a striking distributional finding, particularly when contrasted with the substantial contributions reported for mothers and sisters. Menstrual health programmes have increasingly questioned approaches that position menstruation exclusively within female communication networks. Plesons et al. (2021) argue that improving adolescent menstrual health requires greater engagement with the wider social environment, including boys, men, families, schools and communities. A systematic review examining menstrual health and hygiene through a human-rights framework similarly identified social inclusion and access to information as important components of supportive menstrual environments (Sood et al., 2022).

The absence of fathers from the reported information sources should not, however, be extended beyond what was measured. The questionnaire established whether fathers were named as sources of menstrual hygiene information. It did not measure paternal financial support, attitudes towards menstruation, involvement in purchasing menstrual materials, or other forms of household support. The finding therefore indicates an absence from the reported *information pathway*, rather than evidence that fathers were uninvolved in every aspect of their daughters' menstrual health.

Sociodemographic differences in awareness

Significant bivariate associations were found between categorised menstrual hygiene awareness and age ($p = .001$), school class ($p < .001$) and religion ($p < .001$). The pattern across age groups was not linear in the direction that might ordinarily be expected from greater educational exposure. Respondents aged 9-12 years had the highest proportion classified as having good awareness, whereas none of the small group aged 17-18 years was classified in the good-awareness category. School-class differences were similarly pronounced, with particularly large variations across junior and senior classes.

This pattern differs from findings reported in several other settings. Among more than 8,000 post-menarche

schoolgirls in Tanzania, increasing age was positively associated with adequate menstrual health and hygiene knowledge after adjustment for other characteristics (Njee et al., 2024). The West African review by Tomlinson et al. (2024) also identified age and educational level among the characteristics repeatedly associated with menstrual hygiene knowledge. Such contrasts should not be treated as contradictory evidence in a simple sense because instruments, scoring thresholds, age distributions and educational contexts differ across studies.

Recent Nigerian findings further demonstrate why bivariate sociodemographic associations require cautious interpretation. Kasali et al. (2026), using multivariable logistic regression, found that maternal education, urban or semi-urban residence and private-school attendance were independent predictors of menstrual hygiene knowledge in Nasarawa West. Their analysis illustrates that observed differences between demographic groups may change when household, educational and geographical factors are considered simultaneously. The analyses reported here were limited to chi-square tests and therefore establish statistical associations, not independent predictors or causal relationships.

Religion was also associated with categorised awareness, with Christian respondents more frequently represented in the good-awareness category than Muslim respondents. Similar relationships between religion and menstrual knowledge have been reported within the heterogeneous evidence base reviewed across West Africa (Tomlinson et al., 2024). Research in Ghana has also demonstrated that menstrual understanding can develop within broader socio-cultural and religious environments in which menstruation carries particular meanings, restrictions and expectations (Kpodo et al., 2022). However, religious affiliation alone cannot explain the association observed here. No measures of religiosity, religious teaching, participation in faith communities, denominational beliefs or religion-specific menstrual norms were included. The findings therefore support a statistical relationship between reported religious affiliation and awareness category, but they do not identify the mechanism responsible for that relationship.

Implications for menstrual health education

The source profile observed here supports a multi-channel approach to menstrual health education. Teachers appear to have substantial reach, while mothers and sisters remain important family-based sources.

School-based programmes may therefore be most useful when they complement, rather than attempt to replace, family communication. Evidence from educational intervention research suggests that menstrual knowledge can be improved through structured teaching, particularly where programmes provide opportunities for interaction and questions rather than relying solely on passive information delivery (Evans et al., 2022).

The early ages at which many respondents first encountered menstrual hygiene information also support the provision of age-appropriate menstrual education before the later secondary-school years. Such education should extend beyond basic awareness and address menstrual physiology, menstrual-cycle understanding, misconceptions, when health care should be sought and the practical dimensions of menstrual self-care. This distinction is important because contemporary menstrual-health frameworks regard access to accurate knowledge as broader than simply knowing that menstruation occurs or that hygiene is necessary (Plesons et al., 2021; Sood et al., 2022).

The absence of fathers as reported information sources also identifies an area that could be examined more directly in future research. Rather than assuming that fathers are unwilling to participate, research should establish whether their absence reflects cultural expectations, discomfort, lack of knowledge, communication norms or simply the tendency for menstrual information to circulate predominantly among women and girls. Similar caution applies to the observed religious differences. More detailed measures would be required before interventions could be tailored to specific household or religious mechanisms.

Strengths and limitations

The study provides information on several dimensions of awareness that are often collapsed into a single knowledge score, including whether information had been received, the age at first exposure and the range of people or channels through which information was obtained. Allowing multiple responses for information sources also provided a more realistic representation of the overlapping pathways through which adolescent girls encounter menstrual hygiene information.

Several limitations should be considered. The cross-sectional design does not permit temporal or causal inference. Awareness and information sources were self-reported and may therefore have been affected by recall or social-desirability bias. Participants were recruited from three selected secondary-school clusters in one suburban community, which limits generalisation beyond comparable school-going populations. Girls who were not attending school were not represented.

The knowledge component was based on four items and principally assessed basic menstrual hygiene concepts. It should therefore be interpreted as a measure of the specific awareness domains assessed rather than a comprehensive measure of menstrual health literacy. In addition, the inferential analyses were bivariate. The significant associations with age, class and religion cannot be interpreted as independent determinants because potential confounding variables were not simultaneously controlled. Future studies would benefit from broader validated menstrual health literacy measures and multivariable analyses capable of distinguishing the relative contributions of individual, family, school and community characteristics.

CONCLUSION

Menstrual hygiene awareness was widespread among the female adolescents surveyed in secondary schools in suburban Edo State. Most respondents had previously heard about menstrual hygiene, and knowledge of the basic hygiene components assessed was high. More than half reported receiving menstrual hygiene information between 8 and 11 years of age, indicating that exposure to menstrual information commonly occurred during the earlier stages of adolescence.

Teachers were the most frequently reported source of menstrual hygiene information, followed by mothers and sisters. Health workers and television or social media contributed less frequently, while fathers were not identified as information sources by any respondent. The pattern indicates that menstrual hygiene information was obtained through multiple channels, with schools and female family members occupying the most prominent positions.

Awareness category was significantly associated with age, school class and religion. These associations demonstrate that awareness was not distributed uniformly across the sampled population, although the

cross-sectional and bivariate analyses do not establish causation or identify independent predictors.

The findings support the continued provision of accurate and age-appropriate menstrual health education within secondary schools, while recognising the continuing importance of family-based communication. Greater attention is also warranted to the quality, depth and consistency of menstrual information provided to adolescents, particularly because high awareness of basic hygiene principles should not be assumed to represent comprehensive menstrual health literacy. Future research should use broader validated measures and multivariable analytical approaches to examine how individual, family, school and social factors relate to menstrual hygiene knowledge among adolescent girls.

AUTHOR CONTRIBUTION

All authors played a substantive role in shaping this study and developing the manuscript. B.K.A., K.A., F.O.E., I.K.A., O.O.O., O.O.A., and T.O.O. conceptualised the study and designed the overall research framework under the supervision of H.E. Data analysis, interpretation and validation of findings were carried out collaboratively, with each author contributing to the discussions that informed the final results. E.E.E. and K.O.O. prepared the initial manuscript draft, covering the introduction, methods, results and discussion. Co-authors strengthened the analysis, offered detailed revisions and enhanced the clarity and coherence of the final document. Every author reviewed the complete manuscript, approved the final version and accepted responsibility for the integrity of the work.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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