

State and Grade-Level Predictors of Sex Education Knowledge and Attitudes among In-School Adolescents in Nigeria: A Multistate Cross-Sectional Study

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Abstract

Background:

Inconsistent implementation of sexuality education in Nigeria limits equitable knowledge acquisition despite widespread policy support. This study addressed the gap by examining adolescents' knowledge, attitudes, and structural determinants across multiple states.

Methods:

A cross-sectional design was employed among 568 secondary school students selected from six public schools across three Nigerian states. Data were collected using structured questionnaires assessing knowledge, attitudes, exposure, and perceived barriers. Multivariable regression analyses identified predictors of outcomes.

Results:

Support for sexuality education was high (over 95%), with 88.4% reporting prior exposure. Mean knowledge score was 9.08 (SD 1.35), while attitude scores indicated generally favorable perceptions. Knowledge varied significantly by state and local government area, with Ogun State and senior class levels showing higher scores. Attitudes were also higher among students in Ogun, Muslims, and senior classes. Parental involvement showed positive associations with both knowledge ($R^2=0.113$) and attitudes ($R^2=0.263$). Key barriers included poor awareness (62.5%), curriculum exclusion (48.4%), lack of policy enforcement (41.7%), inadequate funding (41.4%), and shortage of trained teachers (33.3%).

Conclusion:

Findings highlight that positive attitudes alone are insufficient; consistent implementation, teacher preparedness, and parental engagement are critical to improving adolescent sexual and reproductive health outcomes.

Clinical trial number- Not applicable

INTRODUCTION

Adolescence represents a critical window for shaping lifelong sexual and reproductive health (SRH) behaviors, yet equitable access to accurate sexuality education remains uneven across many low- and middle-income settings.

From a conceptual perspective, comprehensive sexuality education (CSE) is delivered within a socio-ecological model in which attitudes and knowledge are influenced by interacting levels of influence (e.g., family, school systems, community norms, and policy environments), with attitudes toward sexuality education reflecting normative acceptance and knowledge reflecting cognitive acquisition and retention of correct SRH information; therefore, effective CSE is not only about exposure to content but also about structured delivery, pedagogical competence, and reinforcement across various contexts.

Empirical evidence consistently shows that well-implemented CSE improves adolescents' knowledge, decision-making capacity, and protective behaviors. High-quality programs that integrate school-based curricula with parental engagement demonstrate stronger and more sustained outcomes than school-only interventions (1, 2, 3). However, recent global analyses emphasize that policy endorsement alone does not guarantee effective delivery. In many settings, implementation fidelity is undermined by sociocultural resistance, inadequate teacher training, and inconsistent curriculum integration (4, 5). Consequently, adolescents may express strong support for sexuality education while still lacking accurate knowledge, particularly when content is selectively delivered or diluted (6).

In sub-Saharan Africa, these challenges are amplified by structural and contextual heterogeneity. Variations in governance, educational infrastructure, and sociocultural norms produce uneven access to sexuality education across regions and school systems (7). Nigeria exemplifies this complexity. Although national policies formally recognize the importance of adolescent SRH education and have ensured a large scale implementation across the state. However, implementation remains fragmented. Studies indicate that sexuality education is often inconsistently delivered due to teacher discomfort, lack of standardized training, and weak policy enforcement (4, 5). Moreover, teacher preparedness has been identified globally as a critical bottleneck limiting effective CSE delivery (8, 9).

Although attention to adolescent SRH in Nigeria has been growing, several important conceptual and empirical gaps remain: First, much of the existing literature focuses on either knowledge or attitudes in isolation, and not differentiating normative acceptance and cognitive mastery. Second, most studies are based on single-school or single-state samples, limiting the ability to examine how subnational contexts influence educational outcomes. Third, the role of academic progression is insufficiently understood; although developmental theory posits that there are cumulative knowledge gains with advancing grade levels, examination-oriented systems may deprioritize non-core subjects and disrupt expected learning trajectories. Finally, although parental involvement and program exposure are known to be important, the interaction between these and institutional delivery mechanisms is understudied.

What these unresolved issues suggest is that there is a critical gap in the literature: multistate, context-sensitive evidence on how structural, institutional, and grade-level factors affect adolescents' knowledge and attitudes toward sexuality education in Nigeria, where such evidence would help policy and programmatic efforts to better understand how access and delivery quality and contextual variability affect outcomes..

This study addresses this gap by providing multistate evidence on adolescents' knowledge and attitudes toward sex education across Lagos, Ogun, and the Federal Capital Territory. It examines grade-level variation, demographic predictors, and perceived structural barriers to clarify how institutional and contextual factors shape sexuality education outcomes. It was hypothesized that, despite high attitudinal acceptance, knowledge levels would vary significantly across states and class levels, reflecting differences in implementation fidelity and educational context.

METHODS

Study Design

This school-based cross-sectional study was conducted between February and May 2024 to assess adolescents' knowledge and attitudes toward sex education and identify associated demographic and contextual predictors. Reporting followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline for cross-sectional studies (10).

Study Setting

The study was conducted in Lagos, Ogun, and the Federal Capital Territory (FCT), Abuja, selected to reflect sociocultural and educational diversity. Within each state, one Local Government Area (LGA) and corresponding Local Council Development Areas were included. Lagos has the highest secondary school enrollment, 85.5% literacy, and multiple reproductive health programs (11). The FCT is highly urbanized with approximately 94% adolescent literacy (12, 13). Ogun State, though socioeconomically linked to Lagos, includes semiurban and peri-urban populations with less consistent program coverage (11). The 2018 Nigeria Demographic and Health Survey reported sexual violence prevalence of 7.0% in Lagos, 3.0% in the FCT, and 1.3% in Ogun (11).

Participants and Eligibility Criteria

Participants were male and female adolescents aged 14–20 years enrolled in Senior Secondary School classes (SSS1–SSS3) in selected public schools. Students below SSS1, outside the age range, or without parental consent were excluded.

Sample Size Determination

Sample size was calculated using Cochran's formula (14): $n = z^2pq/d^2$. Assuming 95% confidence ($z = 1.96$), 5% margin of error, and a conservative prevalence estimate, the initial sample was 367. After finite population correction for approximately 8,100 students, the minimum sample was 360. To improve power and account for non-response, 590 students were approached of which 568 completed questionnaires were analyzed (96.3% response rate).

Sampling Technique

A multistage sampling approach was applied. Three states were purposively selected for diversity. Within each state, one LGA and corresponding LCDAs were randomly selected. Public secondary schools were then randomly selected with input from educational authorities. Within schools, students were stratified by class (SSS1–SSS3), and systematic sampling (every third student) was used to achieve proportional representation.

Variables and Measurement

Outcome Variables

Knowledge and attitude toward sex education.

Knowledge was assessed using 10 items covering puberty, contraception, sexually transmitted infections, and scope of sex education. Responses were scored as correct [1] or incorrect [0] and summed into a composite score.

Attitudes were measured using 9 Likert-scale items [1–5] assessing support for school-based sex education, parental involvement, and perceived benefits. A composite mean score was computed; higher values indicated more favorable attitudes. Behavioral belief items were analyzed separately to enhance construct validity.

Independent Variables

Age, sex, religion, tribe, class level, family type, and state of residence.

Instrument Development, Validity, and Reliability

The questionnaire was developed from existing literature and expert input. A pilot study involving 37 students ($\approx 10\%$ of estimated sample) in a non-study school informed revisions, including removal of overly explicit items. Content validity was established by public health experts. Reliability testing showed good internal consistency for knowledge (Cronbach's $\alpha = 0.82$) and strong reliability for attitude ($\alpha = 0.81$). The full instrument is provided as Supplementary File 1.

Data Collection Procedure

Following institutional approvals, trained research assistants administered questionnaires in classrooms. Participants received standardized information on study purpose, confidentiality, and voluntary participation. Completed questionnaires were retrieved immediately to ensure completeness.

Ethical Considerations

Ethical approval

was obtained from the Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital (OOUTH/HREC/607/2023AP; 22 June 2023). Additional details are provided in the Declarations section.

Data Analysis

Data were analyzed using Epi Info 7 and IBM SPSS Statistics version 25. Composite knowledge and attitude scores were treated as continuous variables. Descriptive statistics summarized participant characteristics. Associations between categorical variables were assessed using chi-square tests, while mean differences were examined using one-way ANOVA or Kruskal–Wallis tests as appropriate. Correlation and multiple linear regression analyses identified predictors of outcomes while adjusting for relevant covariates. Statistical

significance was set at $p < 0.05$. During data cleaning, 22 incomplete questionnaires (3.7%) were excluded, leaving 568 for analysis.

RESULTS

Participant Characteristics

Of the 590 students approached across six public secondary schools, 568 provided complete and analyzable responses (response rate: 96.3%), while 22 questionnaires (3.7%) were excluded due to incomplete responses (Table 1).

Knowledge and Attitudes toward Sex Education

Support for sex education was high, with over 95% agreeing it should be taught in schools and 94.5% supporting parental involvement. Overall, 88.4% reported prior exposure to sex education. The mean knowledge score was 9.08 (SD = 1.35; range 0–10), indicating generally high knowledge levels. The mean attitude score toward Sex Education scale was 13.24 (SD = 4.05), reflecting favorable attitudes toward school-based sex education (Table 1).

Table 1
Frequency - Demography, Attitudes Toward & Knowledge of Sex Education and Barriers.

a. Response theme- Demography	Total respondents	(%)
	N = 568	
State/LGAs (LCDAs) of respondents		
FCT Abuja/ (Abuja Municipal area council and Kuje area councils.)	193 (91,102)	34.0%
Lagos/Alimosho (Igando/Ikotun and Mosan-Okunola LCDAs)	171 (101,70)	30.1%
Ogun/Sagamu (Sagamu west and Sagamu South LCDAs)	204 (98,106)	35.9%
Age of respondents		
14–15	277	48.7%
16–18	272	47.9%
> 19	22	3.9%
Gender		
Female	212	37.3%
Male	356	62.7%
Religion		
Christian	419	73.8%
Muslim	145	25.5%
others	4	0.7%
Tribe		
Hausa	15	2.6%
Igbo	136	23.9%
Yoruba	319	56.2%
Others	98	17.3%
Class		
SSS 1	97	17.1%
SSS 2	138	24.3%
SSS 3	333	58.6%
Family		
Monogamous	405	71.3%

a. Response theme- Demography	Total respondents N = 568	(%)
Polygamous	163	28.7%
Family Socioeconomic status		
Upper class	147	25.9%
Middle class	384	67.6%
Lower class	37	6.5%
b. Respondents' attitudes toward and knowledge of sex education		
Response theme – Attitude toward Sex Education Mean Attitude Score (13.24 ± 4.05)	Total respondents N = 568 (Agree)	(%)
1. Sex education should be taught in all schools	543	95.6%
2. Sex education programs should be organized in schools	532	93.7%
3. Parents should be involved in teaching their children about sex education	537	94.5%
4. Adolescents should not be denied of sex education	481	84.7%
5. Sex education teaches young people good things and should be approved	517	91.0%
6. Sex education helps adolescents to make decisions about their health	510	89.8%
7. Sex education could help students avoid negative health consequences	511	90.0%
8. Adolescents should have access to private counselling sessions following sex education classes	540	95.1%
9. Sex education can help young people understand healthy and unhealthy relationships.	537	94.6%
Response theme – Knowledge of Sex Education Mean knowledge Score (9.08 ± 1.35)	Total respondents N = 568 (Agree)	(%)
1. Have you had any teaching on sex education before	502	88.4%
2. Sex education is the provision of information about one's bodily development	513	90.3%
3. Sex education includes information about puberty and reproduction	530	93.3%
4. Sex education includes information on use of contraceptives	435	76.6%

a. Response theme- Demography	Total respondents	(%)
	N = 568	
5. Sex education provides information on how best to prevent unwanted pregnancies and sexually transmitted infections (STIs)	533	93.8%
6. Sex education provides information on how to prevent sexually transmitted infections through avoiding sex (abstinence)	530	93.3%
7. Sex education gives young people the right to complete and honest information	496	87.3%
8. Sex education treats sexual development as a normal and natural part of human development	528	93.0%
9. Sex education gives people the right skills and values to make healthy choices on their sexual lives	537	94.5%
10. Information on sex education can be obtained at home, in school or from internet	554	97.54%
Factors contributing to poor sex education in schools	Freq. N = 568	
	Yes (%)	No (%)
Low manpower (low number of teachers)	189 (33.3%)	379 (66.7%)
No Government Policy on Sex education	237 (41.7%)	331 (58.3%)
Sex education is not in school curriculum	275 (48.4%)	293 (51.6%)
Poor awareness on the importance of sex education	355 (62.5%)	213 (37.5%)
Lack of funding	235 (41.4%)	333 (58.6%)
Lack of general Health education standards are what should be taught in schools	219 (38.56%)	349 (61.4%)

The values are presented as frequencies and percentages. The percentages may not total 100% because of rounding. The knowledge items were scored via binary responses (correct = 1, incorrect = 0). The attitude items were measured on a 5-point Likert scale (strongly disagree to strongly agree).

Exposure to Sex Education across States

Overall awareness of sex education did not differ significantly across states ($\chi^2 = 2.789$, $p = 0.248$). However, sources of information varied significantly ($\chi^2 = 31.5$, $p < 0.001$), with schools (47.5%) and parents (39.4%) being the primary channels. Classroom exposure to sex education also differed across states ($\chi^2 = 9.688$, $p < 0.001$) (Table 2). Although reproductive health initiatives existed in all selected schools, some students reported not receiving formal classroom instruction.

Table 2
Exposure to Sex Education across States; Associations between response themes and knowledge grades

Response theme	FCT Abuja N = 193	Lagos N = 171	Ogun N = 204	Total N (%)	Df	χ^2 test	Knowledge p-value
a. Ever heard of sex education N = 568					2	2.789	0.248
Yes	165	155	183	503 (88.7%)			
No	28	16	21	65 (11.4%)			
b. If Yes, the Source of Information N = 503					8	31.5	0.000*
Television/radio	4	15	10	29 (5.8%)			
School	68	73	98	239 (47.5%)			
Parent	81	63	54	198 (39.4%)			
Internet	9	4	20	33 (6.6%)			
All sources above	3	0	1	4 (0.8%)			
c. Thought sex education in class N = 568					2	9.688	0.007*
Yes	170	161	171	502 (88.4%)			
No	23	10	33	66 (11.6%)			

The values are presented as frequencies and percentages. χ^2 = Chi-square test for independence. P values < 0.05 indicate statistically significant variation across states.

Factors Associated with Knowledge Scores

Knowledge scores differed significantly by local government area ($\chi^2 = 43.93$, $p < 0.001$), family type ($\chi^2 = 9.27$, $p = 0.009$), and state ($\chi^2 = 13.22$, $p = 0.010$). Mean knowledge scores also varied across states (ANOVA $F = 17.25$, $p < 0.001$) (Table 3).

In multivariable linear regression (reference categories: Abuja for state; SSS1 for class), two predictors remained significant. Students in Ogun State had higher knowledge scores than those in Abuja ($\beta = -0.781$, 95% CI: -1.115 to -0.448 , $p < 0.001$), and SSS3 students had higher scores than SSS1 students ($\beta = -0.381$, 95% CI: -0.746 to -0.016 , $p = 0.041$). Age, gender, religion, and tribe were not significant predictors ($p > 0.05$) (Table 4).

Factors Associated with Attitude toward Sex Education

Mean attitude scores differed significantly across states (ANOVA $p < 0.001$) (Table 3). In adjusted regression analysis using the 9-item attitude scale, state of residence, religion, and class level were significant predictors. Compared with students in Abuja (reference), those in Ogun had higher attitude scores ($\beta = 2.302$, 95% CI: 1.287 – 3.318 , $p < 0.001$), while no significant difference was observed between Lagos and Abuja ($\beta =$

0.517, 95% CI: -0.487–1.521, $p = 0.312$). Muslim students had higher attitude scores than Christian students ($\beta = 1.248$, 95% CI: 0.463–2.032, $p = 0.002$). SSS3 students had higher attitude scores than SSS1 students ($\beta = -1.342$, 95% CI: -2.455 to - 0.229, $p = 0.018$). The model explained approximately 9% of the variance in attitude scores ($R^2 = 0.09$) (Table 4).

Table 3
Bivariate- Factors Associated with Knowledge and Attitude toward Sex Education

Variables	Df	χ^2	Knowledge score
a. Associations between the independent variables and knowledge scores of the respondents			
Age of respondents	14	7.290	0.922
Religion	4	3.505	0.477
Family type	2	9.273	0.009*
LGAs	10	43.933	0.000*
Gender	2	3.355	0.186
Tribe	6	5.259	0.511
Class	4	7.923	0.094
State	4	13.22	0.010*
Means of the knowledge scores across 3 states			ANOVA
	2	(F test) 17.250	0.000
	2	(B test) 101.112	0.000
	2	(K.Wallis test) 26.216	0.000
b. Associations between the independent variables and attitude scores of the respondents			
Age of respondents	7	7.428	0.386
Gender	1	2.973	0.084 2-tailed
Tribe	3	6.403	0.093
Religion	2	3.990	0.136
Family type	1	0.046	0.829 2-tailed
Family Social-economic status	2	1.197	0.5496
Class	2	1.793	0.407
LGAs	10	43.933	0.000*
State	2	16.570	0.000*
Means of the Attitude scores across 3 states			ANOVA
	2	(F test) 10.633	0.000
	2	(B test) 22.660	0.000
	2	(K.Wallis test) 13.216	0.000

The mean knowledge scores were compared via one-way ANOVA, the Kruskal–Wallis test, and the chi-square test, as appropriate. Higher scores indicate better knowledge. P values are two-tailed. The mean attitude scores were analyzed via one-way ANOVA, Bartlett’s test, and the Kruskal–Wallis test. Higher scores reflect more positive attitudes toward sex education. P values < 0.05 denote significant differences (*).

Table 4

Linear regression - predicting the knowledge and attitude score of respondents on sex education on the basis of multiple demographic variables.

Variable	Coefficient	95% CI (Lower–Upper)	Std. Error	F test	P value
a. Knowledge score of respondents on sex education on the basis of multiple demographic variables.					
Age	0.010	-0.072 to 0.091	0.042	0.054	0.815
Gender (Male/Female)	0.171	-0.054 to 0.395	0.114	2.232	0.135
Religion (Muslim/Christian)	0.002	-0.255 to 0.260	0.131	0.000	0.987
Religion (Others/Christian)	-0.969	-2.269 to 0.331	0.662	2.144	0.143
Tribe (Igbo/Hausa)	0.635	-0.097 to 1.367	0.373	2.900	0.089
Tribe (Others/Hausa)	0.348	-0.380 to 1.077	0.387	0.882	0.348
Tribe (Yoruba/Hausa)	0.557	-0.160 to 1.273	0.365	2.376	0.127
Class (SS2/SS1)	-0.264	-0.648 to 0.120	0.196	1.819	0.177
Class (SS3/SS1)	-0.381	-0.746 to 0.016	0.185	4.208	0.040*
Family Type (Polygamous/Monogamous)	-0.211	-0.507 to 0.085	0.150	2.504	0.084
State (Lagos/Abuja)	-0.131	-0.198 to 0.461	0.168	0.611	0.434
State (Ogun/Abuja)	-0.781	-1.115 to 0.448	0.170	21.202	0.000*
b. Attitude score of respondents on sex education on the basis of multiple demographic variables.					
Age	-0.059	-0.308 to 0.189	0.127	0.2202	0.639
Gender (Male/Female)	0.484	-0.199 to 1.167	0.348	1.9359	0.164
Religion (Muslim/Christianity)	1.248	0.463 to 2.032	0.399	9.7577	0.001*
Religion (Others/Christianity)	-1.162	-5.123 to 2.800	2.017	0.3318	0.564
Tribe (Igbo/Hausa)	0.545	-1.687 to 2.776	1.136	0.2297	0.631
Tribe (Others/Hausa)	0.601	-1.620 to 2.822	1.131	0.2828	0.595
Tribe (Yoruba/Hausa)	0.853	-1.330 to 3.037	1.112	0.5890	0.443
Class (SS2/SS1)	0.070	-1.100 to 1.240	0.596	0.0138	0.906
Class (SS3/SS1)	-1.342	-2.455 to -0.229	0.566	5.6141	0.018*
Family Type (Polygamous/Monogamous)	0.038	-0.681 to 0.757	0.366	0.0110	0.916
State (Lagos/Abuja)	0.517	-0.308 to 0.189	0.511	1.0229	0.312
State (Ogun/Abuja)	2.302	-0.199 to 1.167	0.517	19.8193	0.000*

Variable	Coefficient	95% CI (Lower–Upper)	Std. Error	F test	P value
Constant	12.748	0.463 to 2.032	2.303	30.6366	0.000

β = unstandardized regression coefficient; CI = confidence interval. The model controls for age, gender, religion, tribe, class, and state. Negative coefficients indicate lower knowledge compared with the reference category. The reference categories were Abuja (state) and SS1 (class). Positive coefficients indicate more favorable attitudes. P values < 0.05 denote significant differences (*).

Perceived Barriers to Effective Sex Education

Commonly reported barriers included poor awareness of the importance of sex education (62.5%), exclusion from school curricula (48.4%), absence of government policy (41.7%), inadequate funding (41.4%), and shortage of trained teachers (33.3%) (Table 1).

Associations with Parental Involvement and Program Exposure

Following the correlational analyses in Figs. 1 and 2 respectively, scatter plot analyses demonstrated positive associations between parental involvement and both knowledge ($R^2=0.113$, $p < 0.001$) (Fig. 1) and attitude scores ($R^2=0.263$, $p < 0.001$). Additionally, reproductive health programs in schools and formal sex education were both strongly associated with better attitude scores ($R^2=0.320$ and 0.283 respectively; both $p < 0.001$) (Fig. 2).

DISCUSSION

Our multistate study points out an important distinction in adolescent sexuality education in Nigeria: While attitudinal acceptance of sex education was nearly universal, the translation of this attitudinal acceptance into structured, consistent, and equitable knowledge acquisition was uneven, with high exposure and favorable attitudes alongside institutional inconsistencies, especially in the classroom delivery and integration of the curriculum. Importantly, both knowledge and attitudes were more influenced by contextual and structural factors (such as state of residence, school systems, and parental engagement) than by individual demographic characteristics, further demonstrating the primacy of systems-level determinants of adolescent sexual and reproductive health (SRH) outcomes.

The fact that sexuality education is so widely supported is evidence of a generational shift to normative acceptance of SRH discourse even in more conservative contexts; however, knowledge differences across states and local government areas demonstrate that institutionalizing access to correct, organized information is not standardized, implying that exposure alone, particularly through informal or fragmented avenues, is not enough to ensure cognitive mastery (15).

Parental involvement emerges as an important reinforcing factor for knowledge and attitudes, strengthening the notion of dual-channel learning with school-based instruction reinforced by family involvement. In contrast, the lack of association between knowledge and demographic variables (age, gender, and religion) suggests that institutional delivery can overcome individual-level disparities. This pattern is consistent with

the theoretical expectation of greater knowledge in older students and those with higher educational attainment, and with previous research that has found that knowledge and exposure to sexual health information tend to increase with age and educational level (16), although we interpret this pattern cautiously, as previous research has shown that in exam-based systems, where students face performance pressures (e.g., exams, grades), this can lead to less engagement with non-core subjects (17), which is explained by the fact that external performance pressures (e.g., exams, grades) move student attention towards subjects that are being evaluated, and away from subjects that are not being evaluated (i.e. sexual education), so the gains may be due to selective reinforcement rather than systematic curricular progression.

These results are consistent with recent research from around the world and in sub-Saharan Africa that highlights the importance of implementation fidelity over policy presence in determining the efficacy of sexuality education. Keogh and associates. (2018) note that while many low- and middle-income countries have comprehensive sexuality education (CSE) policies, classroom delivery is frequently uneven because of sociocultural resistance and inadequate teacher preparation (6). Namukonda and associates observed that when curricula are delivered selectively or diluted, positive adolescent attitudes toward SRH education do not always translate into accurate knowledge (18).

This finding of strong parental involvement is consistent with findings by Gavin and associates, which shows that parent-adolescent communication enhances knowledge retention and behavioral outcomes in CSE programs (19), and aligns with socio-ecological frameworks that emphasize the importance of families in adolescent health education. Also, state-level differences in knowledge and attitudes are consistent with findings by Khosla and associate, which emphasize that subnational governance, cultural norms, and school-level implementation can influence SRH outcomes in the African context (20).

These barriers (curriculum exclusion, inadequate teacher training, and weak policy enforcement) echo the systemic constraints that have been identified in recent literature (7). Inconsistent delivery of sexuality education has been reported in Nigeria, where teachers feel uncomfortable teaching the content and are not properly trained (6). Teacher preparedness has also been found to be a significant global bottleneck to effective delivery of CSE (8). The relatively low explanatory power of the attitude model also implies that other factors, such as peer environment, media exposure, and school climate, influence adolescent attitudes about sex, similar to another previous study by Kanchan M and associates (21).

Crucially, the gap between the availability of reproductive health programs and actual classroom instruction highlights the fact that program availability does not equate to effectiveness (19). The main factor influencing CSE outcomes is implementation quality rather than program existence (22).

Strength and Limitation

One of the strengths of this study is its multistate design, which captures contextual diversity, something single-site studies often cannot do, and permits analysis of subnational variation. The assessment of knowledge, attitudes, and perceived barriers in combination provides a comprehensive view, but the cross-sectional design hinders causal inference about parental involvement, and self-reported data may be subject

to social desirability bias, while the lack of qualitative insights into teaching methods limits understanding of classroom dynamics.

Implications and future directions

Findings such as these underscore the importance of transitioning from policy endorsement to standardized implementation, such as strengthening teacher training, integrating sexuality education into examinable curricula, and establishing accountability mechanisms. Additional research is needed to examine these issues longitudinally and using mixed methods to explore how knowledge and attitudes change over time and the role of peer networks, digital media, and school climate in shaping adolescent SRH outcomes.

CONCLUSION

This study provides multistate evidence on adolescents' knowledge and attitudes toward sexuality education in Nigeria. It demonstrates that while acceptance of sexuality education is widespread, meaningful knowledge acquisition depends on consistent institutional delivery, teacher preparedness, and parental engagement. By revealing the dominance of structural over individual determinants, the findings reframe sexuality education as a systems-level responsibility, emphasizing that improving adolescent SRH outcomes requires not only policy presence but coherent implementation across schools, families, and governance structures.

Declarations

Ethics Approval: This study was approved by the Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital (OOUTH/HREC/607/2023AP) on 22 June 2023. The approved protocol included adolescents aged 14–20 years enrolled in senior secondary schools. Permission to conduct the study was obtained from the respective school authorities. The study objectives and procedures were presented to parents during scheduled Parent–Teacher Association meetings prior to data collection. Parental authorization for eligible students (SSS1–SSS3) was granted through formal school-mediated approval processes, and students whose parents declined authorization were excluded from participation.

All participants were informed about the purpose of the study, assured of confidentiality, and provided written assent/consent prior to participation. Participation was voluntary, and respondents were free to withdraw at any time without consequence. No identifying information was collected.

All study procedures were carried out in accordance with the ethical principles of the 2013 Declaration of Helsinki and relevant Nigerian national research guidelines.

Consent to participate: Informed consent was obtained from all participants prior to data collection. For participants below 18 years, parental/guardian consent and participant assent were obtained in accordance with ethical guidelines.

Consent to Publish: Not applicable

Clinical Trial Number: Not Applicable

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Authors' contributions

HOA conceived the study, designed the methodology, performed the statistical analysis, coordinated data collection, and drafted the manuscript.

UGO contributed to study design, data collection, and critical revision of the manuscript.

IA contributed to data collection and manuscript review, and manuscript review

TWO contributed to data collection and manuscript review, and manuscript review

OAS contributed to data collection and manuscript review.

EEO contributed to study conceptualization, data collection, and manuscript review.

EAA contributed to study conceptualization, data collection, and manuscript review.

OAA contributed to study design, data collection, and manuscript review.

YOO contributed to data collection and manuscript review.

MOO contributed to data collection and manuscript review.

EAC contributed to data collection, assisted with drafting the manuscript, and manuscript review.

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Data Availability- This will be provided upon reasonable request

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<https://doi.org/10.2147/AHMT.S20081> - The study notes that knowledge and exposure to sexual health information tend to increase with age and educational level, supporting the theoretical expectation of higher knowledge in senior classes.

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Figures

Correlational Analyses

Equation: $Y = (-0.6584) X + 9.9654$ $R^2 = 0.1132$; $p = 0.0000$

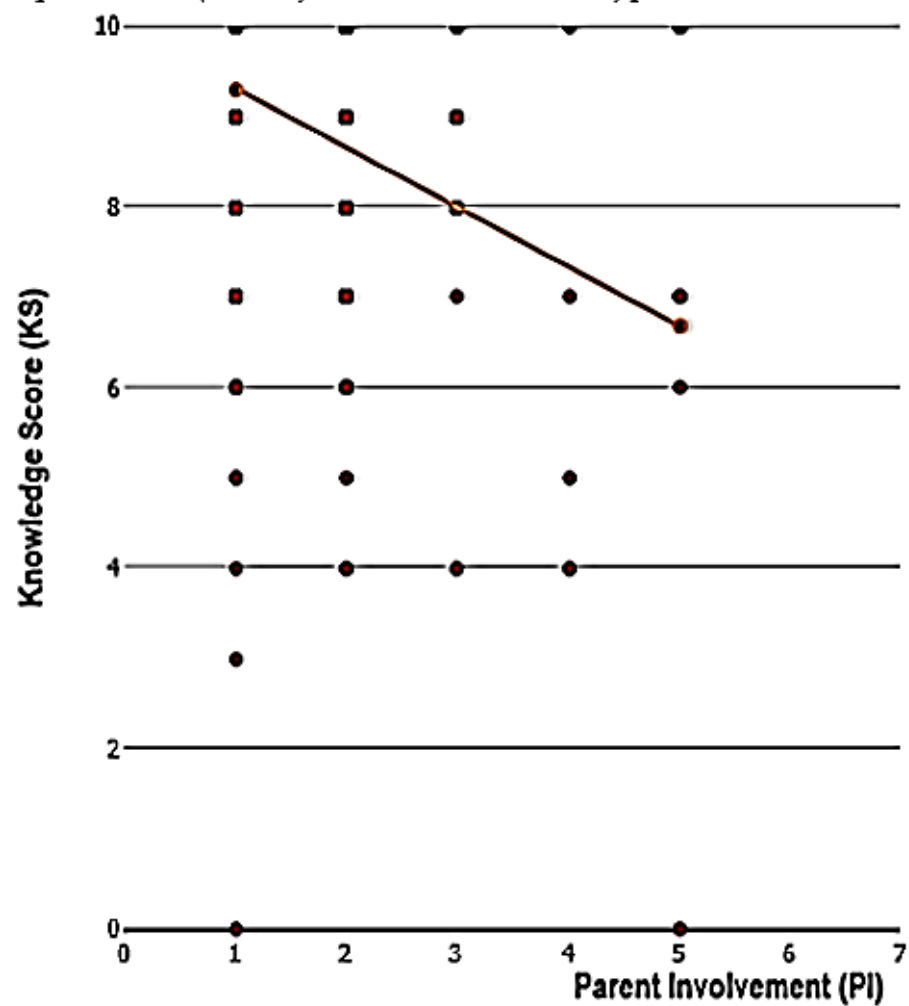


Figure 1

correlational analyses of associations between parental involvement and both knowledge

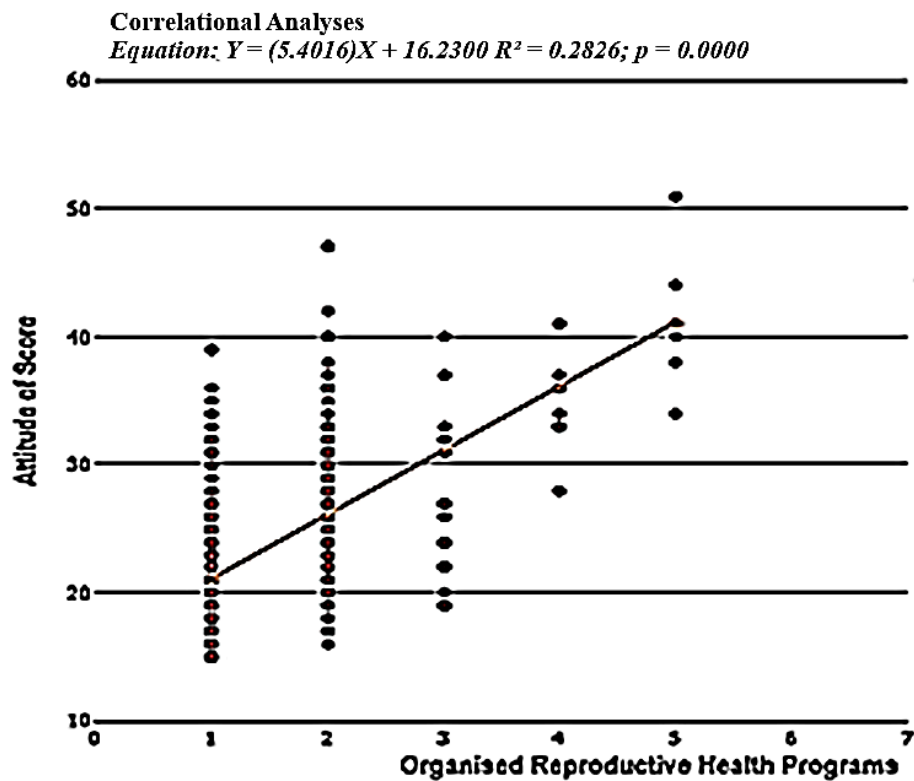
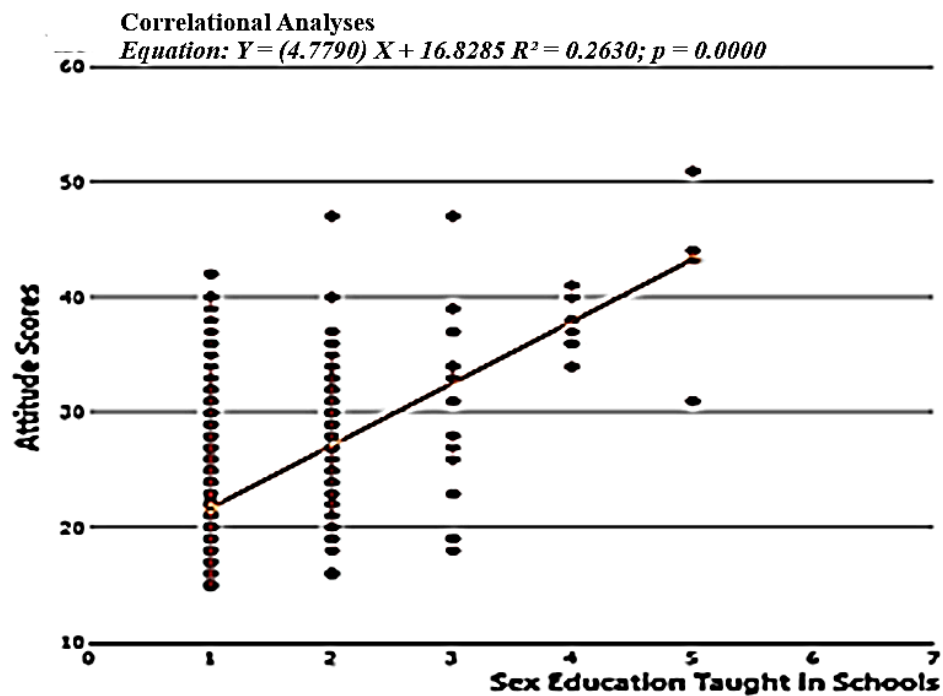


Figure 2

correlational analyses of associations between Attitude scores and [1] formal sex education and [2] reproductive health programs in schools, respectively

Supplementary Files

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