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Knowledge, Prevalence and Factors Associated with Sexually Transmitted Diseases among Female Students of a Federal University in Southern Nigeria

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Abstract: Background: Globally, over 40 million people are estimated to be living with sexually transmitted infection/diseases (STI/Ds), including HIV/AIDS. It is said that sub-Saharan Africa accounts for over a half of that figure, making it the continent most affected with HIV/AIDS and other STI/Ds. This study was designed and conducted to assess the knowledge and prevalence of sexually transmitted diseases, and factors that are associated with it, among female students of a university in southern Nigeria. Methods: This cross-sectional analytical study was conducted among female students in five faculties in the University of Benin, Benin City. The instrument used for the collection of data was a self-administered questionnaire. Data were analyzed with the aid of SPSS, version 22.0. A level of significance was set at $p < 0.05$ and descriptive statistics were used to summarize the data. An odds ratio with a 95% confidence interval for prevalence and factors associated with STI/Ds was computed using binary and multinomial logistic regression models. Results: A total of 423 female students participated in the study. Over half (224, 53.0%) of the participants have had sexual intercourse. The results show that majority of the respondents (95.3%) were aware of STIs and 83.1% had good knowledge of STIs. The prevalence of STI/Ds among the participants was 27.7%, with gonorrhea being the most frequent STI/D that the respondents reported testing positive for. Conclusion: The present study was able to ascertain a higher prevalence of sexually transmitted diseases among female students. To this end, it is imperative that families and agencies (both government and private agencies) should synergize to remove the embargo seemingly placed on women by our cultures and faith-based institutions regarding sexuality. This may help to improve access to sexual and reproductive health education and commodities for women, thereby play a vital role in reducing the transmission of STI/Ds.

Keywords: knowledge; prevalence; sexually transmitted diseases; factors; female students; southern Nigeria

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1. Introduction

Sexually transmitted infections (STIs) can be curable or incurable, but are most often modifiable diseases or infections which are mainly contracted through unprotected sexual intercourse. The curable STIs include syphilis, gonorrhea and chlamydia, while the incurable but modifiable STIs include human papilloma virus (HPV), hepatitis B, human immune virus (HIV) and herpes simplex [1,2]. According to WHO, 20% of people living with human immune virus/acquired immunodeficiency syndrome (HIV/AIDS) are in their second decade of life and, each year, one out of every twenty young people contract an STI [1]. Indulging in unprotected sexual intercourse suggests a high-risk predisposition

to unintended and unwanted pregnancies and STIs, including AIDS, among adolescents and young people. Globally, 33.3 million people are estimated to be living with HIV/AIDS. It is said that sub-Saharan Africa accounts for nearly 22.5 million of the people living with HIV/AIDS, making it the most HIV/AIDS-affected region in the world. Amongst all leading killer diseases globally, HIV/AIDS ranks third, while in Africa, it is the primary cause of death among people between 15 and 29 years of age [3,4].

The literature has many examples demonstrating that people with STIs have a ten-fold-increased chance of HIV infection [5]. Infertility, cervical cancer, chronic pelvic discomfort, recurrent pregnancy loss, premature labor, and newborn/child health issues are among the severe health implications of STIs on numerous aspects of reproductive health [6,7]. Even in low- and middle-income nations, STIs have a significant economic impact [7]. The high prevalence of HIV in Africa is linked to a high percentage of STIs that are untreated or inadequately treated [8,9]. Africa currently accounts for 20–35% of the global burden of curable and non-curable STIs [9]. There are no official data for STI prevalence in Nigeria; however, prior studies have found a prevalence of curable STIs ranging from 0% to 18% among the low-risk population [10,11] and 23% among sex workers [12,13]. In Nigeria, the average national seroprevalence of HIV infection among people aged 15 to 49 years is 1.4 percent, with a greater prevalence among high-risk groups (sex workers, men who have sex with men, and drug users) [14,15], accounting for as much as 32% of HIV infections in the country, though their total population is about 3.4% of the nations' population. Of these most vulnerable groupsare: women, young people, children and orphans, 3.4% people living with HIV/AIDS inject drugs (drug users) and 58% are women [16].

Most African countries have few specialized clinics for STI prevention and treatment due to poor health infrastructure and a shortage of manpower [9,17]. People with STIs are more likely to visit pharmacies, patent medication stores, and traditional healers in Africa, according to several studies [18–20]. In addition, to avoid humiliation and stigma at routine health clinics, teenagers and young people frequently self-medicate. Case management, counseling, and behavioral interventions are all part of the overall STI prevention strategy, as are investments in rapid point-of-care diagnostic testing, antimicrobial treatment, vaccine research, and other associated treatments [21–23]. Counseling and behavioral interventions allow caregivers and clients to communicate and discuss measures to avoid STI recurrence and encourage adherence to treatment protocols. At a community level, culturally responsive behavioral change communication programs assist the raising of STI awareness and knowledge, as well as potentially reducing the risk in the population [24].

Furthermore, because of their demonstrated role in facilitating HIV infection, interest in STIs and their care has skyrocketed, increasing vulnerability to other STIs [25]. Increased urbanization, modernization, travel, education, and exposure to Western media have all been related to an increase in the incidence of STIs in emerging nations. Sexual activity has grown as a result of this, particularly among young people [26,27]. STIs, especially in women, are frequently asymptomatic. Multiple sexual partners (premarital and extra-marital sex), irregular condom use, and sexual preferences have all been identified as risk factors for STIs [28,29]. Previous STIs, contact with a symptomatic partner and weakened immunity are all known risk factors. Notwithstanding the fact that STIs play a significant role in the transmission of the human immunodeficiency virus, they cause significant consequences in terms of morbidity and mortality among infected individuals [25]. The fact that the profile of many diseases varies depending on socioeconomic, cultural, geographic, and environmental factors that exist in various sections of the country, it is, then, very crucial that the design, implementation, and monitoring of focused intervention programs, baseline information on the epidemiology of STIs, the proportion of symptomatic and asymptomatic infections, and other associated risk behaviors are intently and always considered [30].

According to the report of NDHS, 2018, only about 40% of children in upper primary school who had been engaging in sexual intercourse with two or more partners were using a condom [31]. This report may show why adolescents and young people are

disproportionately affected by STIs, despite the decline in the prevalence of STIs, including HIV/AIDS, in Nigeria. In a study designed to determine the knowledge and awareness of STIs among adolescents in southwestern Nigeria, it was observed that about 7% of the adolescents had not heard about sexually transmitted infections prior to the study [32]. The study concluded that only 6.9% of the adolescents who participated in that study had good knowledge of sexually transmitted infections in terms of knowledge and awareness of mode of transmission, preventive measures, symptoms and curative or treatment measures [32]. Other studies conducted among adolescent girls and young adults in southeastern Nigeria show that STIs among this population are very common [33,34]. We, therefore, undertook this study to determine the levels of knowledge and the prevalence of STIs among female students of the University of Benin and to provide recommendations to the authorities on possible ways to enhance safe sexual practices among students.

2. Materials and Methods

2.1. Study Settings

The study was conducted in five out of the fourteen faculties in the University of Benin, Edo State Nigeria, from February 2016 to January 2018. The University of Benin is one of the first generational universities in Nigeria and was established in 1970. The university is made up of two campuses: Ekenhuan campus and Ugbowo campus (the main campus) [35]. It is estimated that the university has over 90,000 students in both its part-time and full-time programs. The population of female students in the university is estimated to be in excess of 40,000 students. The 14 faculties and schools include in this study are: faculties of arts; education; agriculture; engineering; environmental sciences; law; management sciences; social sciences; life sciences; physical sciences and pharmacy; schools of medicine, dentistry and basic medical sciences; and well over 70 departments.

2.2. Sample Size Calculation/Sampling Procedure

The data analyzed were received from 423 female students across five faculties. The sample size was calculated using the Cochran's formula for the minimum sample size determination in a cross-sectional study. Assuming a 50% prevalence, 1.96 critical value for 95% confidence interval, 5% error margin and 10% non-response rate using the Cochran's formula [36], $n = \frac{Z^2pq}{d^2}$, a sample size of 423 was estimated.

A multistage sampling technique was used to recruit 423 female undergraduate student respondents for the study. In stage one, a simple random sampling was used to select five out of the fourteen faculties that make up the university. The selected faculties were arts, basic medical sciences, education, life sciences and management sciences. In stage two, a list of all the departments in each of the five selected faculties were obtained from the university's central record processing unit (CRPU), and numbers were allocated to each department. This was followed by using a computer-generated table of random numbers to select three departments from the five initially selected faculties, making a total of fifteen departments. In stage three, a selection of the level of study was conducted by the simple random sampling method. Fresh students or 100-level students were excluded because it was assumed that they were not yet established in the university system. Three levels of study (200, 300 and 400 levels) were selected from each of the departments that were selected in stage two. In stage four, a list of the total population of female undergraduates in each of the selected departments was obtained from the CRPU office. This aided the allocation of the sampling tool proportionally to each department and to determine the total number of respondents participating from each of the selected departments. Thereafter, lecture halls and hostels of the female students were visited, and requests were made to the female students to participate in the study. Anyone who indicated interest was interviewed, provided the student fell within the inclusion criteria and was from the departments and levels selected.

2.3. Research Instrument

The data were collected using a self-structured questionnaire adapted from the 2013 National HIV/AIDS and Reproductive Health Survey (NARHS) plus [37]. The questionnaire was structured into various sections: socio-demographic characteristics, sexual debut, sexual practices, knowledge of HIV/AIDS and other sexually transmitted infections, and its complications.

2.4. Data Collection Procedure

The questionnaire was written in English language and was administered to the respondents on a one-on-one basis. Data were collected by the primary investigator with the help of five research assistants, who were postgraduate students in the same institution. The research assistants were given two days of training on the content of the questionnaire, data collection procedure, research ethics, interviewer skills, seeking for consent and the administration of questionnaires. The data collection lasted three weeks.

2.5. Variables and Their Measures

Two outcome indicators were used for the study: knowledge of HIV/AIDS and other STIs and the prevalence of STIs. For knowledge of HIV/AIDS and other STIs, we considered whether the respondents had heard about STIs and HIV/AIDS, the STIs that were known to respondents, routes of their transmissions, and knowledge of their HIV status and that of their sexual partners. The prevalence was based on the question "*Tested positive to HIV/AIDS or any other STIs*"; a value of 1 or 0 indicated whether a respondent had tested positive for HIV/AIDS or STIs. Respondents who responded "Yes" were coded as "1", while those who responded "No" were coded "0". HIV/AIDS- and STI-related knowledge was computed as the sum of the correct answers to vital questions. For questions assessing HIV/AIDS or other STI infection knowledge, answers were recoded as follows: correct answer = 1, incorrect answer = 0. Twelve questions were included in the HIV/AIDS and other STI knowledge total score, meaning that the highest possible total score is 12. We computed the mean value of the scores. Any respondent who scored below the mean value was classified to have poor knowledge; otherwise, we classified the respondent as having good knowledge.

These variables were examined against all confounding/covariates/controlling variables, which were the socio-demographic characteristics of the respondents. The independent variables included age ($\leq$19/20–24/$\geq$25), ethnic group (Edo indigene/non-Edo indigene), religion (Catholics/non-Catholics/Islam/others), marital status (single/married), parent's marital status (living together/divorced and separated/widowed), current academic level (200 level/300 level/400 level), average monthly allowance in NGN (5000–20,000/20,001–35,000/35,001–50,000) and current place of residence (living with both parents/living alone/living with single parent/cohabiting/living with husband).

2.6. Statistical Analysis

The extracted data were entered into an Excel spread sheet and transported into SPSS for Windows, Version 25.0 Software. The analyses were undertaken in three stages. In the first stage, the frequency and simple proportion were used to describe the characteristics of respondents. In the second stage, bivariate analysis using a Chi-square test was used to test for a significant association between the levels of knowledge of STIs including HIV/AIDS, prevalence of STIs and HIV/AIDS and the various socio-demographic characteristics of respondents. In the third stage, multivariate logistic regression models were estimated to explore the determinants of levels of knowledge of STIs and prevalence of STIs. After the bivariate analysis, variables with a p value ≤ 0.05 and other plausible variables were further analyzed using multinomial logistic regression to control for confounding. Variables with $p \leq 0.05$ were considered to be significantly associated with the two outcome indicators.

2.7. Limitations

One of the limitations of the study was that some students found it difficult to divulge information that concern their sexual practices, HIV/AIDS status, and whether they had tested positive for STIs. This may be due to social and cultural norms, an attachment to the issue of sexual practices, and stigma attached to STIs and AIDS in Nigeria. This may pose as a drawback or limitation. However, efforts were made by the primary investigator to convince and assure the respondents that the information obtained from them shall be kept confidential. Codes rather than names were used to identify each respondent and their identities were not known even to the researcher; therefore, the blinding technique was employed throughout the study.

3. Results

Table 1 shows the socio-demographic and proximate characteristics of the respondents. The mean SD age of the respondents was 21.4 ± 2.6 years. Their ages range from 16 to 34 years. Over two thirds—286 (67.6%)—of the respondents were young adults (they belonged to the 20–24 years age bracket); 81 (19.2%) were adolescents, that is, ≤19 years; and 56 (13.2%) were adults, aged 25 years old and above. More than half 229 (54.2%) of the respondents were of Benin, 120 (28.4%) and Igbo, 109 (25.8%) ethnic groups. Esan and Yoruba tribes were 65 (15.4%) and 36 (8.5%), respectively. Other tribes were Urhobo/Isoko 22 (5.2%), Efik/Ibibio 21 (5.0%), Etsako 21 (5.0%), Owan 12 (2.8%), Ijaw/Itsekiri 10 (2.3%) and Hausas were 7 (1.6%) of the respondents. Majority, 385 (91%), of the respondents were Christians. Amongst the Christians, more than one third 189 (44.7%) belonged to the Pentecostal faith, 117 (27.7%) to the Catholic faith and 79 (18.6%) to the Protestant denominations. The remaining 38 (9%) were distributed among Islam 10 (2.4%), African Traditional Religion (ATR) 4 (1.0%) and others, 24 (5.6%). The majority (391, 92.4%), of the respondents were single, while 32 (7.6%) were married.

Table 1. Socio-demographic characteristics of the respondents.

Variables	Frequency (*n* = 423)	Percent
Age group (years)		
≤19	81	19.2
20–24	286	67.6
≥25	56	13.2
Ethnic Group		
Benin	120	28.4
Igbo	109	25.8
Esan	65	15.4
Yoruba	36	8.5
Urhobo/Isoko	22	5.2
Efik/Ibibio	21	5.0
Etsako	21	5.0
Owan	12	2.8
Ijaw/Itsekiri	10	2.3
Hausa	7	1.6
Religion		
Pentecostal	189	44.7
Catholics	117	27.6
Protestant	79	18.7
Islam	10	2.4
ATR	4	1.0
Others	24	5.6
Marital status		
Single	391	92.4
Married	32	7.6

Table 1. *Cont.*

Variables	Frequency (n = 423)	Percent
Faculty		
Education	132	31.2
Arts	105	24.8
Life Sciences	76	18.0
Management Sciences	62	14.7
Basic Medical Sciences	48	11.3
Current level of study		
200 level	61	14.4
300 level	193	45.6
400 level	169	40.0
Average monthly allowance (NGN)		
5000–20,000	336	79.4
20,001–35,000	64	15.1
35,001–50,000	23	5.5
Respondents' current residence		
Both parents	221	52.2
Alone	78	18.4
Single parent	66	15.6
Husband	32	7.6
Boy friend	26	6.2

Mean age ± SD of the respondents = 21.4 ± 2.6 years, ATR = African traditional religion, Others = Jehovah's Witnesses (JW), Mormons, Atheists, etc.

More than a quarter of the respondents (132, 31.2%), were drawn from the faculty of education, 105 (24.8%) from arts, 76 (18.0%) from life sciences, 62 (14.7%) from management sciences and 48 (11.3%) from basic medical sciences. Sixty-one (14.4%) of the respondents were in the 200 level of their study, 193 (45.6%) were in the 300 level, while 169 (40.0%) were in the 400 level. The mean average monthly allowance of the respondents was NGN 17,592.2 ± 9676.8. Over three quarters (336, (79.4%) of the respondents had an average monthly allowance of NGN 5000–20,000, 64 (15.1%) had an average of NGN 20,001–35,000 and 23 (5.4%) of the respondents had an average of NGN 35,001–50,000. The majority of the respondents (221, 52.2%) currently live with both parents, 78 (18.4%) live alone, 66 (15.6%) live with a single parent, 32 (7.6%) live with a husband, and 26 (6.1%) live with a boyfriend.

Table 2 shows the socio-demographic characteristics of the respondents' parents. Concerning the respondents' parental marital status, 300 (71.0%) had their parents still living together, in comparison to 78 (18.4%) whose parents were either divorced or separated. Forty-five (10.6%) of the study population were children of single parents or orphaned. The majority of respondents' fathers (274, 64.8%), and mothers (258, 61.0%), had a tertiary level of education, while (99, 23.4%) and (94, 22.2%) of the respondents' fathers and mothers, respectively, were in the skill level 4.

Table 2. Socio-demographic characteristics of the respondents' parents.

Variables	Frequency (n = 423)	Percentage (%)
Parents marital status		
Living together	300	71.0
Divorced/separated	78	18.4
Widowed	45	10.6
Father's education		
None	5	1.2
Primary	36	8.5
Secondary	108	25.5
Tertiary	274	64.8

Table 2. *Cont.*

Variables	Frequency (n = 423)	Percentage (%)
Mother's education		
None	8	2.0
Primary	51	12.0
Secondary	106	25.0
Tertiary	258	61.0
Father's occupation		
Skill level 1	34	8.1
Skill level 2	102	24.1
Skill level 3	188	44.4
Skill level 4	99	23.4
Mother's occupation		
Skill level 1	45	10.6
Skill level 2	113	26.7
Skill level 3	171	40.4
Skill level 4	94	22.2

Table 3 shows the prevalence of sexual practices among the respondents. The prevalence of sexual intercourse among the studied population was found to be 53.0%, in comparison to 199 (47.0%) who had not had sexual intercourse. Among those who had had sex, the majority (144, 64.3%), had their sexual debut within the age of adolescence ($\leq$19 years), 78 (34.8%) had theirs as young adults, while a very insignificant number of the respondents, 2 (0.9%), had their sexual debut as adults ($\geq$25 years). The mean SD age of sexual debut was 18.3 $\pm$ 2.3 years. The majority of those who had experienced sexual intercourse (140, 62.4%), had their sexual debut with their boyfriends in comparison to those who had theirs with their casual friends 47 (21.0%), relative/family member 25 (11.2%), and husband 12 (5.4%). Nine (4.0%) of the respondents who had had sexual intercourse were not sexually active in the last six months, compared with 112 (50.0%) who had sex 1–4 times, 95 (42.4%) 5–19 times and 8 (3.6%) 20 or more times. Of the respondents who had had sex, 97 (43.3%) had had multiple sexual partners in the last six months, among which 39 (40.2%) had two sexual partners, while 58 (59.8%) had three or more sexual partners in the last six months.

Table 3. Prevalence of sexual practices among the respondents.

Variables	Frequency (n = 423)	Percent
Had Sex		
Yes	224	53.0
No	199	47.0
Age at sexual debut (years)	(n = 224)	
$\leq$14	14	6.3
15–19	130	58.0
20–24	78	34.8
$\geq$25	2	0.9
Partner at sexual debut		
Boyfriend	140	62.4
Casual friend	47	21.0
Relative/family member	25	11.2
Husband	12	5.4
Time since most recent sex		
Days ago	52	23.2
Weeks ago	142	63.4
Last six months	28	12.5
Years ago	2	0.9

Table 3. *Cont.*

Variables	Frequency (n = 423)	Percent
Last sex partner		
Boyfriend	166	74.0
Husband	30	13.4
Casual friend	14	6.3
Relative/family member	14	6.3
Frequency of sexual intercourse in the last six months		
0	9	4.0
1–4	112	50.0
5–9	65	29.0
10–14	17	7.6
15–19	13	5.8
>20	8	3.6
Multiple sex partners in the last six months		
Yes	97	43.3
No	127	56.7
Number of multiple sexual partner in the last six months	(n = 97)	
2	39	40.2
≥3	58	59.8

Respondents' and partners' mean (±SD) age at sexual debut = 18.3 ± 2.3 and 23.3 ± 3.0 years, respectively.

Table 4 revealed that, overall, the knowledge of STIs among the respondents was very high—403 (95.3%). The most reported STI known to the respondents was gonorrhea 398 (98.8%), followed by HIV/AIDS 384 (95.3%), staphylococcus and syphilis, 340 (84.4%) and 328 (81.4%), respectively. The least reported STI was hepatitis B 23 (5.7%). Unprotected sexual intercourse, 380 (94.3%), and having multiple sexual partners, 323 (80.1%), were the most reported routes of transmission of STIs. On the other hand, the least reported route of transmission of STIs and HIV/AIDS was mother-to-child-transmission (MTCT), 42 (10.4%). The study further revealed that only 267 (63.1%) of the respondents knew their HIV status at the time of the study, while among those who were sexually active, only about one half of them (116, 51.8%), knew the HIV status of their sexual partners. Overall, composite knowledge scores of the respondents showed that the majority (335, 83.1%), had good knowledge of STIs, as compared to 68 (16.9%) who had poor knowledge.

Table 5 shows the binary regression model for determinants of respondents' level of knowledge of STIs. The variables in the model explained 10.4%–17.5% of the variation observed in the factors that influence the levels of STI knowledge among the respondents. The model was statistically useful (omnibus tests of model coefficient = 44.461, $p < 0.001$). Respondents who were from the faculties of arts, education and life sciences were less likely to have good knowledge of (STIs)—with odds ratios of 0.832 (95% CI: 0.29–2.38), 0.393 (95% CI: 0.15–1.03) and 0.568 (95% CI: 0.20–1.61), respectively—when compared with respondents from a management sciences faculty ($p > 0.05$). Respondents who were ≤19 and those 20–24 years were 0.442 and 0.854 less likely to have good knowledge of STIs when compared with those who were 25 years old and above (95% CI: 0.12–1.57 and 95% CI: 0.29–2.56, $p > 0.05$). Respondents who were living with their both parents were statistically significantly (three times) more likely to have good knowledge of STIs when compared with respondents who were living with their husband ($p = 0.042$, 95% CI: 1.05–12.08). The respondents who were living with a single parent and alone were also more likely to have good knowledge of STIs when compared with those living with husbands, but these variables were not statistically significant ($p > 0.05$). Respondents whose father's education was either primary or none were statistically significantly less likely to have good knowledge of STIs when compared with respondents whose fathers had at least a secondary level of education (95% CI: 0.14–0.98, $p = 0.046$).

Table 4. Knowledge of sexually transmitted infections among the respondents.

Variables	Frequency	Percent
Awareness of HIV/AIDS and STIs	(*n* = 423)	
Yes	403	95.3
No	20	4.7
Known STIs *	(*n* = 403)	
Gonorrhea	398	98.8
HIV/AIDS	384	95.3
Staphylococcus	340	84.4
Syphilis	328	81.4
Human papilloma virus (HPV)	220	54.6
Chlamydia	216	53.6
Herpes simplex virus (HSV)	173	42.9
Hepatitis B	23	5.7
STIs routes of transmission *		
Unprotected sexual intercourse	380	94.3
Multiple sexual partners	323	80.1
Blood transfusion	277	68.7
Sharing sharp objects	243	60.0
MTCT	42	10.4
Knowledge of respondents' HIV status		
Yes	267	63.1
No	156	36.9
Knowledge of HIV status of sexual partner	(*n* = 224)	
Yes	116	51.8
No	108	48.2
Level of knowledge of STIs		
Good	335	83.1
Poor	68	16.9

* Multiple responses.

Table 5. Binary logistic regression model for determinants of respondents' level of knowledge of STIs.

Predictors	Regression Coefficient (β)	AOR (95% CI)	*p*-Value
Faculty			
Art	−0.184	0.832 (0.29–2.38)	0.732
Basic medical sciences	0.209	1.233 (0.35–4.38)	0.747
Education	−0.933	0.393 (0.15–1.03)	0.058
Life sciences	−0.566	0.568 (0.20–1.61)	0.287
Management sciences **		1	
Age group (years)			
≤19	−0.817	0.442 (0.12–1.57)	0.208
20–24	−0.157	0.854 (0.29–2.56)	0.779
≥25 **		1	
Ethnic group			
Edo indigene	−0.237	0.789 (0.45–1.38)	0.409
Non-Edo indigene **		1	
Parents' marital status			
Living together	−0.521	0.594 (0.15–2.39)	0.463
Divorced/separated	0.763	2.145 (0.57–8.07)	0.259
Widowed **		1	
Current level of study			
200 level	0.556	1.744 (0.62–4.91)	0.292
300 level	−0.253	0.777 (0.40–1.53)	0.463
400 level **		1	

Table 5. *Cont.*

Predictors	Regression Coefficient (β)	AOR (95% CI)	*p*-Value
Respondents' current residence			
Both parents	1.270	3.560 (1.05–12.08)	0.042 *
Single parent	0.902	2.465 (0.45–13.59)	0.300
Alone	1.408	4.089 (0.97–17.26)	0.055
Husband **		1	
Father's education			
≤Primary	−1.010	0.364 (0.14–0.98)	0.046 *
≥Secondary **		1	

** Reference category, * Statistically significant, R^2 10.4–17.5%, CI = confidence interval, omnibus tests of model coefficient = 44.461 ($p < 0.001$), AOR = adjusted odds ratio.

Table 6 shows the prevalence of STIs among the respondents. The prevalence of a positive test for STIs among the sexually active respondents was found to be 27.7%. The most prevalent positive STI test was for gonorrhea 26 (41.9%), then syphilis 18 (29.0%), staphylococcus 13 (21.0%), Chlamydia 6 (9.7%), HIV/AIDS 4 (6.5%) and Hepatitis B 3 (4.8%). Eight percent of the respondents used antibiotics for the treatment of the STI they tested positive for, while 6.5% used herbal mixture and antiretroviral therapy (ART). Regarding the place of treatment, 48.4% were treated in pharmacy shop, 25.8% in a hospital, and 12.9% in a laboratory center, while 6.5% were treated in a patent medicine store and herbal healer's home.

Table 6. Prevalence of STIs among respondents.

Variables	Frequency	Percent
Positive test for STIs	(*n* = 224)	
Yes	62	27.7
No	162	72.3
STIs ever tested positive for *	(*n* = 62)	
Gonorrhea	26	41.9
Syphilis	18	29.0
Staphylococcus	13	21.0
Chlamydia	6	9.7
HIV/AIDS	4	6.5
Hepatitis B	3	4.8
Drug/treatment		
Antibiotics	54	87.0
Herbal mixture	4	6.5
Antiretroviral therapy (ART)	4	6.5
Place of treatment		
Pharmacy shop	30	48.3
Hospital	16	25.8
Laboratory	8	12.9
Patent medicine store	4	6.5
Herbal healer home	4	6.5

* Multiple responses.

Table 7 shows the socio-demographic characteristics of the respondents and positive test for STIs. Three (13.0%) of the respondents in the age group 19 years old and below had tested positive for STIs compared with 31 (20.4%) of those in the age group 20–24 years old and 28 (57.1%) of those in the age group 25 years old and above. This association was statistically significant ($p < 0.001$). Thirty-four (17.7%) of the single respondents had tested positive for STIs compared with 28 (87.5%) of those who are married, and this association was also significant ($p < 0.001$). About one quarter 8 (23.5%) of respondents in the 200 level had tested positive for STIs compared with more than one third (38, 35.2%) in the 300 level and one fifth (16, 20.0%) in the 400 level. The association was also statistically

significant (p = 0.045). As the average monthly allowance of the respondents increases, there is a corresponding increase in the number of positive STI tests. Thirty-seven (22.0%) of respondents whose monthly allowance was NGN 5000–20,000 had tested positive for STIs compared with 19 (42.2%) whose allowance was within the NGN 20,001–35,000 and 6 (54.5%) whose allowance was NGN 35,001–50,000. The association was statistically significant (p = 0.003). Seventeen (18.1%) respondents who were living with both of their parents had tested positive for STIs compared with 8 (22.2%) who live with a single parent, 4 (11.1%) who live alone, 5 (19.2%) who live with their boyfriend and 28 (87.5%) who live with their husband. The association was found to be statistically significant ($p < 0.001$).

Table 7. Socio-demographic characteristics and positive test to STIs among respondents.

Variables	Positive Test for STIs		*p*-Value
	Yes (*n* = 62)	No (*n* = 162)	
Age group (years)			
≤19	3 (13.0)	20 (87.0)	
20–24	31 (20.4)	121 (79.6)	<0.001 $^{+,*}$
≥25	28 (57.1)	21 (42.9)	
Ethnic group			
Edo indigene	33 (28.2)	84 (71.8)	0.854 $^{+}$
Non-Edo indigene	29 (27.1)	78 (72.9)	
Religion			
Catholics	17 (29.8)	40 (70.2)	
Non-Catholics	37 (25.0)	111 (75.0)	0.334 †
Islam	2 (33.3)	4 (66.7)	
Others	6 (46.2)	7 (53.8)	
Marital status			
Single	34 (17.7)	158 (82.3)	<0.001 $^{+,*}$
Married	28 (87.5)	4 (12.5)	
Parents marital status			
Living together	47 (30.3)	108 (69.7)	
Divorced/separated	11 (24.4)	34 (75.6)	0.328 $^{+}$
Widowed	4 (16.7)	20 (83.3)	
Current level of study			
200 level	8 (23.5)	26 (76.5)	
300 level	38 (35.2)	70 (64.8)	0.045 $^{+,*}$
400 level	16 (19.5)	66 (80.5)	
Average monthly allowance (NGN)			
5000–20,000	37 (22.0)	131 (78.0)	
20,001–35,000	19 (42.2)	26 (57.8)	0.003 †,*
35,001–50,000	6 (54.5)	5 (45.5)	
Respondents' current residence			
Both parents	17 (18.1)	77 (81.9)	
Single parent	8 (22.2)	28 (77.8)	
Alone	4 (11.1)	32 (88.9)	<0.001 $^{+,*}$
Boyfriend	5 (19.2)	21 (80.8)	
Husband	28 (87.5)	4 (12.5)	
Knowledge of STIs			
Good knowledge	47 (25.0)	141 (75.0)	0.055 $^{+}$
Poor knowledge	14 (40.0)	21 (60.0)	

* Statistically significant, $^{+}$ Pearson, Chi-square, † Fisher's Exact.

Table 8 shows Binary logistic regression model for determinants of respondents' positive test to STIs. The variables in the model explained that 24.8–36.0% of the variation was observed in the factors that influence a positive test to STIs among the respondents. The model was statistically useful (omnibus tests of model coefficient = 63.697, $p < 0.001$). Respondents who were not married (single respondents) were found to be statistically

significantly (34 times) more likely to have tested positive for STIs when compared with respondents who were married ($p < 0.001$, 95% CI: 5.08–232.85). Respondents who had good knowledge of STIs were found to be more likely to have tested positive to STIs with an odds ratio of 1.760 (95% CI: 0.52–5.98 and $p = 0.365$), when compared with those who had poor knowledge of STIs.

Table 8. Binary logistic regression model for determinants of respondents' positive test to STIs.

Predictors	Regression Coefficient (β)	AOR (95% CI)	*p*-Value
Age group (years)			
≤19	0.285	1.33 (0.23–7.65)	0.750
20–24	−0.263	0.77 (0.23–2.57)	0.669
≥25 **		1	
Marital status			
Single	3.538	34.39 (5.08–232.85)	<0.001 *
Married **		1	
Average monthly allowance (NGN)			
5000–20,000	0.978	2.66 (0.52–13.67)	0.242
20,001–35,000	0.916	2.50 (0.42–15.01)	0.316
35,001–50,000 **		1	
Respondents' current residence			
Both parents	0.118	1.13 (0.36–3.56)	0.840
Single parent	−0.056	0.95 (0.25–3.57)	0.934
Alone	0.904	2.47 (0.55–11.13)	0.239
Husband **		1	
Mother's education			
≤Primary	−0.188	0.83 (0.29–2.37)	0.726
≥Secondary **		1	
Knowledge of STIs			
Good knowledge	0.564	1.76 (0.52–5.98)	0.365
Poor knowledge **		1	
Constant	−2.964	0.052	0.003

** Reference category, * Statistically significant, R^2 24.8–36.0%, CI = confidence interval, omnibus tests of model coefficient = 63.697 ($p < 0.001$), AOR = adjusted odds ratio.

4. Discussion

From this study, it is found that 53.0% of the study participants had a history of sexual intercourse. The mean age of sexual debut was 18.30 ± 2.33 years. The observed number of sexually active respondents was slightly lower than the finding of a similar study conducted in Ekiti State University, southwest Nigeria, which found that 60.8% of the female students were sexually active and their mean age of debut was 19.11 years [38]. The observed age at sexual debut is also comparable to the report from a study conducted among female students in University of Ibadan, southwest Nigeria. The report showed that the mean age at sexual debut of the participants was 19 ± 2.3 years [39], and a study in four states of Nigeria reported the age for sexual initiation in these states to be 17.53 years [40]. The result is also in line with the finding in southeast Ethiopia, where it was found that the age of sexual debut of the female undergraduate students in Madawalabu University was 18.19 ± 1.83 years [41]. This study further revealed, through logistic regression analysis, that respondents who were at most 24 years old (young people) were very much more sexually active than those who were at least 25 years old. Life sciences students were the least likely to engage in sexual intercourse in comparison to other faculties in this study. This study also revealed that the average allowance each respondent received per month may not be a contributing factor to such an individual being involved in a sexual relationship as the binomial logistic regression analysis had shown.

The finding of this study is in support of earlier surveys on sexual behaviors of young people. The age of sexual debut and involvement in sexual activity, as found in this study,

can be explained in the light of different influencing factors, which include precocious onset of secondary sexual development and maturation, followed by the natural increase in sex hormone secretions known to stimulate sexual urges in adolescents and young adults much more than older people, peer pressure and increasing socioeconomic problems that prevail in our environment and most sub-Saharan African countries. Furthermore, sociocultural and religious beliefs contribute a large extent to early sexual debut and a general sexual life in some parts of Nigeria, especially in the northern part and Islamic-religion-dominated areas. The implication of this early sexual debut is an increase in sexual and obstetric problems such as obstetric fistula, STDs and other socio-economic problems which may include poverty, illiteracy and social vices. It has been proven that due to the patriarchal nature of African society and cultural norms, men often were the first initiators of sexual advances to women, with the latter most often having no choice than to oblige, which may be due to the need for protection or economic reasons [42,43]. The education of girls and economic empowerment of women will play a greater role in decreasing dependency on men. This, in turn, will enable women to be economically independent and, therefore, be able to negotiate safe sex, deciding when, how, and with whom to have sex.

Ninety-five percent (95.3%) of the study participants were aware of STIs and this translated into good knowledge of STIs (83.1%). The overall knowledge here is greater than the 68% reported by the National HIV/AIDS and Reproductive Health Survey, 2013 [37]. The most frequent STIs reported by the respondents were gonorrhea 98.8% and HIV/AIDS 95.3%, with unprotected sexual intercourse, 94.3%, and multiple sexual partners, 80.1%, being the most reported routes of transmission of STIs. However, a logistic regression analysis of the level of knowledge of STIs showed that respondents who were living with both parents were as likely to have good knowledge of STIs when compared to those living with their husband. This suggests that parental guidance and family life education from these parents may be contributing to good knowledge of STIs among this group of respondents. The unmarried respondents in this study had better knowledge of STIs than the married respondents, and those who were younger by age also had better knowledge than those who were older. This may suggest that the younger respondents, who also constitute most of the unmarried participants in this study, were more exposed to information regarding STIs and HIV/AIDS.

The study also showed an association between respondents' fathers' education and respondents' level of STI knowledge. Those whose fathers had, at most, a primary-level education were more predisposed to the risk of not having good knowledge of STIs. This also suggests that a university education was not indicative of a better knowledge of sexually transmitted diseases. More than half of all the respondents had knowledge of both their HIV status and that of their sexual partners, which may suggest that the respondents were being careful and mindful of their reproductive health status. This study is similar, in terms of awareness of STIs, to the study conducted in Ekiti state, southwest Nigeria. In that study, the authors reported that 93% of the respondents were aware of STIs, but had a very poor knowledge score of STIs including HIV/AIDS (6.9%) [32]. The difference could be because the Ekiti study was conducted among secondary school students; therefore, it is expected that they should have less knowledge of STIs compared with those in university. The high level of knowledge from this study shows that the health education and awareness effort on STIs including HIV/AIDS being carried out by health facilities, government agencies, and NGOs are yielding a positive outcome among young people; therefore, these efforts should be continued. Furthermore, public health attention should focus more on married women when designing interventions for reducing the burden of STIs because they were identified as having a lower STI knowledge score when compared with unmarried women in this study population.

The prevalence of STIs among the sexually active respondents in this study was 27.7%, and the most reported STI that the respondents had ever tested positive for (life time positive test) was *N.gonorrhea* (gonorrhea), followed by *Treponema pallidum* (syphilis), *Staphylococcus aureus*, *Chlamydia trachomatis* (chlamydia), HIV/AIDS and the hepatitis

B virus. The prevalence in this study is higher than that reported among undergraduate female students of Ambo University, Central Ethiopia [3], in southeast Nigeria [34], from a study among adolescent girls in Port Harcourt, South-south [33], among young people in a community close to the University of Benin, Benin City [44], and among post-primary adolescents and female students of tertiary institutions in Imo State, southeastern Nigeria [45].

Approximately three quarters of the respondents who had tested positive for an STI were treated in a pharmacy shop, by a laboratory technician, patent medicine vendors or by a herbal healer in a herbal home, while only a quarter had received their treatment in a hospital. Most young people preferred seeking health care from patent medicine stores and pharmacy shops, especially when this is a reproductive health issue, except in complicated situations [33]. This attitude may be due to feelings of shame, fear of stigmatization, and the attitude of health workers in the hospital. Many of the health institutions in Nigeria are not adolescent- and youth-friendly. Young people complain of a lack of privacy, negative comments, and insults from health workers whenever they attend health centers for reproductive health issues [33,46]. It is, therefore, very important that effort is made to reorient and train health-care providers in government hospitals for adolescent- and youth-friendly skills. This training is important because the current lack of adolescent- and youth-friendly skills among health-care providers makes young people more likely to visit a pharmacy shop or patent medicine store to purchase antibiotics or be treated when infected with an STI. These institutions are less likely to identify the real causative agent of the infection and, thereby, mistreat the patient, potentially also creating a drug-resistant strain of that STI.

The study also found out that marital status and age were associated with respondents' testing positive for STIs, but a good knowledge of STIs is not a variable which impacts the chance of an individual testing positive for an STI [33,47]. Specifically, more married respondents and those who were 25 years old and above in this study had tested positive for STIs than unmarried and younger respondents, yet those who were single were as likely to test positive when compared to the married respondents. This may not show the true situation as it is compulsory for pregnant women to always undergo screening tests for STIs during the time of pregnancy. Therefore, the result showing that more married women and respondents who were 25 years old and above and had tested positive for STIs may be more reflective of the screening tests for STIs carried out during pregnancies than normal occurrence. This suggest that there is greater chance of contracting STIs when one is engaged in risky sexual behavior, such as multiple sexual relationships, which was found to be higher among single respondents. This may also suggest that being young and single is a risk factor for testing positive to STIs. The explanation for this may be due to the fact that those who were 25 years old and above may have had more sexual episodes than the younger people, as this study did not conduct STI tests for the respondents but relied on information from previous tests conducted by the respondents.

Conclusions and Policy Recommendations

The majority of the respondent were sexually active, with the larger proportion starting sexual activity at a young age and 53.0% prevalence of sexual intercourse. The majority of the respondents were aware of STIs and had a good knowledge score of STIs and HIV/AIDS. Current place of residence and father's education were factors that positively influenced good knowledge scores among the study participants. We also found that an appreciable number of the study participants had tested positive for at least one STI and the majority did not seek treatment in a hospital. The ages of the study participants and their marital status were the significant determinants of positive tests to STIs. The result revealed that respondents who were living with both parents and those whose father's level of education were at least secondary level were more likely to have good knowledge of STIs. The sexual and reproductive health of the reproductive-aged women was a crucial indicator for the determinant of the health of the family and the future generation. To this

end, it is imperative that families and agencies (both government and private agencies) should synergize to remove the embargo seemingly placed on women by cultures and faith-based institutions regarding sexuality. This may help to improve access to sexual and reproductive health education and commodities for women, thereby playing a vital role in reducing the spread of STI/Ds.

Based on the findings from the study, the following recommendations are made with the belief that their implementation will be of great importance in improving the sexual and reproductive health of young people: (i) There is a need to implement comprehensive adolescent and young people's friendly health services to increase students' access to sexual and reproductive health information and services. (ii) Family Life Education (FLE), which is an integral part of the basic school curriculum, should be implemented so that young people will be equipped with adequate sexual and reproductive health information to enable them to make informed decisions about sexual issues. (iii) There is a need to ensure that control programs redirect efforts at sexual behaviors that put young people at greater risk of STIs, and target young adolescents before their sexual debut. (iv) Health-care workers should educate female students and their male partners on the need for them to seek for help concerning their sexual health issues.

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Informed Consent Statement: Consent was obtained from the female students and the objectives of the study were well communicated to them. Participation was purely voluntary and there was no inducement or undue influence on participants. Confidentiality and privacy were respected during the study as all the participants were assured that their identity and information given will be kept secret and will not be disclosed.

Data Availability Statement: The data used in this research are not available for the public due to the privacy agreement with the study participants; however, the data will be made available on request from the corresponding author.

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