Original Article

Statistical modeling of social risk factors for sexually transmitted diseases among female youths in Nigeria

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Abstract

Introduction: Sexually transmitted diseases (STDs) are preventable, but the social risks factors connected to them are often not understood, particularly by female youths. There has been a dearth of information on the identification of social risk factors influencing STDs among female youths in Nigeria, hence we conducted this study.

Methodology: This retrospective cross-sectional study utilized the Nigeria Demographic and Health Survey, 2008. It focused on female youths aged 15-24 (n=7,736) who ever had sexual intercourse. Data was analyzed using Chi-square and logistic regression models.

Results: The mean age of the respondents was 20.2±2.5years. More female youths aged between 20 and 24 years contracted STDs in the last 12 months (2.5%) than those between the ages of 15 and 19 months (1.4%). A year prevalence of STDs among female youths in Nigeria was 2.1%. Socio-demographic factors such as age, education, wealth index, marital status, shared toilet, residence, contraceptive use, and total life-time number of sexual partners were found to be associated risk factors for contracting STDs ($p<0.05$). Controlling for potential confounding variables at the fifth iteration, the identified predictors of contracting STDs were wealth index, total lifetime number of sexual partners, awareness of HIV/AIDS, and shared toilet facility ($p<0.05$).

Conclusions: The data confirmed the considerable impact of wealth index and awareness of HIV/AIDS as important predictors of STDs acquisition. Providing free condoms, along with teaching the importance of abstinence and improving knowledge of HIV/AIDS, can help to reduce the risk of STDs transmission.

Key words: sexually transmitted diseases; statistical modeling,; female youths; Nigeria

J Infect Dev Ctries 2013; 7(1):017-027.

(Received 25 August 2011 – Accepted 17 December 2012)

Introduction

Sexually transmitted diseases (STDs) are infections that can be transferred from one person to another during sexual activity. They involve the transmission of a disease-causing organism from one person to another during sexual contact. STDs could be either ulcerative or non-ulcerative. In developing countries, STDs exhibit a higher incidence and prevalence rates than developed countries [1]. The prevalence of STDs among Nigeria female youths is 17% [2].

Sexually transmitted diseases remain a major public health challenge because of their health consequences, severe complications and sequelae, especially among women who excessively bear their long-term consequences. STDs can lead to serious health complications and affect a woman's future reproductive plans. For example, each year untreated STDs cause infertility in at least 24,000 women in the US, and untreated syphilis in pregnant women results in infant death in up to 40 percent of cases [3]. Pregnant women can pass the disease to their babies [3]. STDs also increase the risk for transmission of HIV/AIDS [4].

Apart from physical morbidity, the victim also suffers from the social consequences of acquiring these diseases; however, some social factors also make an individual more susceptible to risk-taking behaviors, thereby increasing the risk for STDs. These social factors include educational status, socio-economic status, marital status, type of family, religion, etc. As very few studies [5] have reported comprehensively the role of these social factors, the present investigation was undertaken to examine the roles of social factors in acquiring STDs among female youths aged 15 to 24 years in Nigeria who may

be more sexually active than older or younger women [2].

Female youths in Nigeria today are growing in a world that is sharply different from that of their elders. Recent advances in communication systems expose today's youths to diverse values and ways of thinking and as such control their sexual deeds. Although important progress has been made in controlling some diseases, new pathogens have also emerged, leading to increased health risks for youths [4].

Nigeria has a fast-growing population and is confronted with numerous health challenges. With a population of more than 150 million, the country's population is young; therefore, the future of the country rests to a greater extent on how successfully its youths transition to a healthy and productive adulthood. Young women in Nigeria are facing myriad of health problems, particularly, risk of STDs [6]. The current study is essential because in the span of only a few years, the average young person makes several vital life transitions such as sexual initiation, partnership formation and childbearing, leaving school, and entering into the labour force, among others. The pathways followed by youths in their transition to adulthood are crucial to their future well-being and that of their country. Their sexual and reproductive health status will determine their futures and that of their countries [7].

Female youths, particularly adolescent, are more vulnerable to risks of STDs from unprotected sexual activity both biologically and as a result of cultural norms that limit their ability to protect themselves [8]. For instance, in adolescent females, the immature cervix is made up of constantly changing cells which make young females susceptible to certain sexually transmitted organisms [9]. Also, entrenched gender norms continue to constrain young women's control over their sexual and reproductive lives. Condom use is still infrequent during early premarital sex and is extremely low within early marriage [10,11]. Condoms are useful in decreasing the spread of certain STDs, such as chlamydia and gonorrhea; however, it does not fully protect against other infections such as genital herpes, genital warts, syphilis, and AIDS [3].

The objectives of this study were to determine prevalence of STDs, examine the socio-demographic differential in STDs, and identify the socio-demographic factors influencing STDs among female youths Nigeria. The first objective was designed with the view to knowing the level of STDs among female youths in Nigeria. The prevalence of STDs among female youths is necessary to evaluate the impact of the past and recent STDs reduction strategies put in place by Nigerian governments and international agencies.

The socio-demographic differential will reveal which segment of female youths is affected mostly by STDs, and will also provide decisive information for planning and evaluating the success of health services and interventions. The objective of removing the influence of confounding variables on predictors of STDs propelled the researchers to adopt the method used in this study. By understanding these predictors, prevention programmes can better respond to any changes in the epidemiology of STDs among female youths in Nigeria.

Methodology

The study was retrospective cross-sectional in design and the data were extracted from the records of a survey conducted by ICF Macro Calverton, Maryland, USA, in conjunction with the National Population Commission (NPC), Nigeria in 2008 [12]. During the survey, a multi-stage probability sampling technique was adopted to select the respondents who were women of child-bearing age (15 to 49 years).

Administratively, Nigeria is divided into 36 states plus FCT-Abuja. Each state is subdivided into local government areas (LGAs), and each LGA is divided into localities. In addition to these administrative units, during the last 2006 Population Census, each locality was subdivided into convenient areas called census enumeration areas (EAs). The available cartographic material demarcated for each EA was useful in the EA location and its identification; hence the sample frame was the list of EAs used in the last census population. The primary sampling unit (a cluster) for the survey was defined on the basis of EAs' census frames. A minimum requirement of 80 households for the cluster size was imposed in the design. If the selected EA was small during the listing process, then a supplemental household listing was conducted in the neighboring EA.

The target of the 2008 NDHS sample was to obtain 36,800 completed interviews. Based on the level of non-response found in the 2003 Nigeria DHS, to achieve this target, approximately 36,800 households were selected, and all women aged 15 to 49 years were interviewed using a well-designed questionnaire. A requirement was to reach a minimum of 950 completed interviews per state. In each state, the number of households was distributed proportionately

among its urban and rural areas. The selected households were distributed in 888 clusters in Nigeria, *i.e.*, 286 clusters in the urban areas and 602 clusters in the rural areas. Under the final allocation, each of the 36 designated states and FCT-Abuja had at least 950 completed interviews with women of child-bearing age.

The current study focused on responses from female youths aged 15 to 24 years who ever had sexual intercourse. In the questionnaire designed for the survey, the respondents were asked whether they had ever contracted STDs in the last 12 months to which the respondents were to choose from three options: No, Yes and Don't Know. Those who chose the last option (Don't Know) were excluded from the analysis because their status could not be determined.

The analysis began with the creation of a weighting variable which was used to account for sampling methods involved during data collection. Thereafter, Chi-square model was used to determine if an association existed between some background variables and contracting STDs in the last 12 months before the survey. Variables found to be significant in the analysis were entered into a logistic regression model to predict the strength of the associations between these variables and contracting STDs. The logistic regression on the data was performed at two stages.

Data analysis was based on the proximate determinants framework developed by Boerma and Sharon [13]. The analysis began with simple age-adjusted models for each possible risk factor because age can confound the effects of the other factors for each potential underlying socio-demographic factor (*i.e.*, age, region, residence, education, wealth index, work activity, marital status, age at first sexual intercourse, and religion) and for behavioral factors (*i.e.*, shared toilet facility, ever heard of HIV/AIDS, ever undergone HIV test, currently using condom, recent sexual activity, and total lifetime number of sexual partners).

In the multivariate analysis, the logistic regression model was used by including the socio-demographic factors to show significant effects on the age-adjusted models at a 5% level of significant. Next the behavioral factors were included to determine which of these variables still showed significant effects and to what extent the previously found associations for the underlying factors weakened or remained significant. The logistic regression model was defined as follows:

$$log\left(\frac{\gamma}{1-\gamma}\right) = \alpha_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots + \beta_k x_k$$

where

γ is the proportion of women who had experienced STDs in the last 12 months preceding the survey. $\beta_1,\ \beta_2,\ \beta_3, \ldots, \beta_k$, represent the regression coefficients to be estimated and $x_1,\ x_2,\ x_3, \ldots, x_k$ represent covariates such as age, level of education, religion, residence, wealth index, *etc*.

The SPSS self-generated logistic regression model was also used to eliminate variables that were not significant, creating room for interaction between few variables in the model. This step was performed in five iterations, thus providing five different models. The fifth model produced the best results for such interactions, since no further iteration could be performed at this stage.

Measurement scale for categorization of wealth index

For the computation of wealth index, principal components analysis (PCA) was used to assign the wealth indicator weights. This procedure first assigned scores and standardized wealth indicator variables such as ownership of bicycles or cars, type of dwelling, *etc*. Thereafter, the factor coefficient scores (factor loadings) and z-scores were calculated. Finally, for each household, the indicator values were multiplied by the loadings and summed to produce the household's wealth index value. The standardized z-score was used to categorize the overall assigned scores from poorest to poorer, middle, richer, and richest categories [12].

Results

In the NDHS survey, information was obtained from 12,626 youths; however, 7,736 were eligible for the current study, giving a participation rate of 61.3%.

Table 1 shows the percentage distribution of female youths who ever had sexual intercourse according to their STD status in the last 12 months by background characteristics. The year prevalence of STDs among female youths in Nigeria was 2.1%. The mean age of the respondents was 20.1 ± 2.5 years and there was significant difference between the mean ages of those who contracted STDs in the last 12 months preceding the survey (21.0 ± 2.3) and those who did not (20.1 ± 2.5) ($p < 0.05$). More female youths who were aged between 20 and 24 years contracted STDs in the last 12 months (2.5%) than

those between the ages of 15 and 19 years (1.5%) ($p < 0.05$).

There was a significant association between regions in Nigeria and contracting STDs in the last 12 months. The percentage of female youths who had STDs was highest in the southeastern part of the country (4.6%) and least in the northeast part (1.2%). There was a significant association between place of residence and contracting STDs ($p < 0.01$), with urban youths (2.7%) experiencing higher percentage of STDs than rural (1.8%) female youths. The percentage of female youths who contracted STDs also varied considerably among education subgroups and increased with increasing levels of education ($p < 0.001$). The prevalence ranged from 1.3% among those with no education to 4.7% among those with higher levels of education.

The data in Table 1 further shows that, in different wealth quantile levels, the percentage of female youths contracting STDs increased consistently with increasing wealth index. It increased from 0.9% among female youths in the poorest wealth index to 3.2% in the richest, and the difference was statistically significant ($p < 0.001$). The STD prevalence was higher among those who never married (2.6%) than those who had married (1.8%). Variables such as work activity, age at first sexual intercourse, and religion were not significantly associated with contracting STDs.

As seen in Table 2, STDs were found to be more common among those who shared a toilet facility (2.8%) than those who did not (1.9%), and the difference was statistically significant ($p < 0.05$). A significant difference also existed between female youths who had ever heard of HIV/AIDs (2.4%) and those who were not aware of the disease (0.3%; ($p < 0.001$). A higher proportion of female youths who had ever undergone HIV testing (4.4%) experienced STDs in the last 12 months before the survey than those who had not undergone the test. The total lifetime number of sexual partners and contraceptive use were both significantly associated with contracting STDs. A higher percentage of those who had had at least four sexual partners (4.0%) contracted STDs than those with only one (1.8%) and between two and three (2.8%) sexual partners. It is striking that STD prevalence was higher among female youths who were currently using condoms (3.0%) than those who were not currently using condoms (1.9%). Out of all the behavioral factors considered, only recent sexual activity was not significantly associated with contracting STDs.

Table 3 shows ordinary logistic regression analysis of the respondents' socio-demographic and behavioral characteristics influencing their contracting STDs in the last 12 months. Variables were entered into the analysis in two phases: at first, the socio-demographic factors and the behavioral factors thereafter. At the first phase, only region, education and wealth index were found to be significantly related to contracting STDs in the last 12 months preceding the survey. At the first phase when behavioral factors were added into the socio-demographic factors, only region, wealth index and awareness of HIV were found to be significantly related to contracting STDs. The relationship between education and contracting STDs was found to be significant; however, the significance disappeared when behavioral factors were added to the variables in the model.

Table 4 shows the multiple logistic regression analysis of the respondents' socio-demographic and behavioral characteristics influencing their contracting STD in the last 12 months. When the analysis was restricted to only socio-demographic variables, the data revealed that youths from the southwest (OR = 0.495; C.I = 0.280-0.873) and south-south (OR = 0.425; C.I=0.231-0.783) parts of Nigeria were less likely to contracting STDs in the last 12 months prior the survey than those residing in the north-central regions. Also, female youths who were from middle, richer and richest wealth indices were 2.4 ($p < 0.01$), 2.5 ($p < 0.01$) and 2.8 ($p < 0.01$) times respectively more likely to have contracted STDs than those in the poorest wealth index. According to levels of education, having higher education inhibits (OR = 3.065; C.I = 1.521-6.175) contracting STDs than those with no formal education.

Addition of awareness of HIV/AIDs as the only behavioral factor which was found to be significantly related to contracting STDs; during ordinary logistic regression, analysis rarely changed the strength of relationship between region, wealth index, and contracting STDs. However, the data show that female youths who had ever heard of HIV/AIDs were about six times ($p < 0.01$) more likely to contract STDs than those who had never heard of HIV/AIDs.

Table 1. Percentage distribution of female youths who ever had sexual intercourse according to their STD status in the last 12 months by background socio-demographic characteristics

Socio-demographic characteristics	Had STD in the last 12 months		Total	Chi-square	p-value
	No	Yes			
Total	97.9(7574)	2.1(162)	100.0(7736)		
Age**				**8.737**	**0.003**
15-19	98.5(2822)	1.5(42)	100.0(2864)		
20-24	97.5(4752)	2.5(120)	100.0(4872)		
Mean age*	**20.1±2.5**	**21.0±2.3**	**20.1±2.5**		**0.047**
Region***				**29.277**	**p<0.001**
North Central	97.5(1004)	2.5(26)	100.0(1030)		
North East	98.8(1142)	1.2(14)	100.0(1156)		
North West	98.0(2132)	2.0(43)	100.0(2175)		
South East	95.4(684)	4.6(33)	100.0(717)		
South West	98.2(1413)	1.8(26)	100.0(1439)		
South South	98.4(1199)	1.6(20)	100.0(1219)		
Residence**				**6.865**	**0.009**
Urban	97.3(2269)	2.7(64)	100.0(2333)		
Rural	98.2(5305)	1.8(98)	100.0(5403)		
Education***				**27.564**	**p<0.001**
No	98.7(2878)	1.3(39)	100.0(2917)		
Primary	98.2(1162)	1.8(21)	100.0(1183)		
Secondary	97.5(3067)	2.5(79)	100.0(3146)		
Higher	95.3(467)	4.7(23)	100.0(490)		
Wealth index***				**25.991**	**p<0.001**
Poorest	99.1(1710)	0.9(16)	100.0(1726)		
Poorer	98.5(1573)	1.5(24)	100.0(1597)		
Middle	97.5(1421)	2.5(36)	100.0(1457)		
Richer	97.3(1616)	2.7(44)	100.0(1660)		
Richest	96.8(1255)	3.2(42)	100.0(1297)		
Work activity				**1.178**	**0.278**
No	98.1(4078)	1.9(81)	100.0(4159)		
Yes	97.7(3433)	2.3(81)	100.0(3514)		
Marital status*				**6.809**	**0.033**
Never married	97.4(2431)	2.6(65)	100.0(2496)		
Married	98.2(5002)	1.8(91)	100.0(5093)		
Others	96.6 (141)	3.4 (5)	100.0 (146)		
Age at first sexual intercourse (years)				**5.655**	**0.059**
≤14	98.5(1130)	1.5(17)	100.0(1147)		
15-19	97.8(3948)	2.2(89)	100.0(4037)		
20-24	96.6(675)	3.4(24)	100.0(699)		
Religion				**5.501**	**0.064**
Christianity	97.5(3658)	2.5(92)	100.0(3750)		
Islam	98.3(3783)	1.7(65)	100.0(3848)		
Traditional	97.7(84)	2.3(2)	100.0(86)		

***Significant at 0.1
**Significant at 1
*Significant at 5%

Table 2. Percentage distribution of female youths who ever had sexual intercourse according to their STD Status in the last 12 months by behavioural characteristics

Behavioural characteristics	Had STD in the last 12 months		Total	Chi-square	p-value
	No	Yes			
Total	**97.9(7574)**	**2.1(162)**	**100.0(7736)**		
Toilet facility shared*				**8.213**	**0.016**
No	98.1(2899)	1.9(55)	100.0(2954)		
Yes	97.2(2186)	2.8(64)	100.0(2250)		
Ever heard of HIV/AIDS***				**19.589**	**p<0.001**
No	99.7(1060)	0.3(3)	100.0(1063)		
Yes	97.6(6510)	2.4(158)	100.0(6668)		
Ever undergone HIV test***				**30.338**	**p<0.001**
No	98.3(6467)	1.7(114)	100.0(6581)		
Yes	95.6(984)	4.4(45)	100.0(1029)		
Currently using condom**				**7.752**	**0.005**
No	98.1(6170)	1.9(118)	100.0(6288)		
Yes	97.0(1404)	3.0(44)	100.0(1448)		
Recent sexual activity				**2.302**	**0.129**
Active in the last 4 weeks	97.7(4711)	2.3(111)	100.0(4822)		
Not active in the last 4 weeks	98.2(2803)	1.8(51)	100.0(2854)		
Total lifetime number of sexual partners**				**13.544**	**0.001**
1	98.2(5578)	1.8(100)	100.0(5678)		
2-3	97.2(1660)	2.8(48)	100.0(1708)		
4+	96.0(336)	4.0(14)	100.0(350)		

***Significant at 0.1%
**Significant at 1%
*Significant at 5%

The five analytical models of the regression analysis in Table 5 point to the interaction effects of wealth index, region, total life-time number of sexual partners, awareness of HIV/AIDs, and shared toilet facility. In the first model, the risk of contracting STDs among youth increased with increasing wealth index. Female youths who were from poorer, middle, richer and richest wealth indices were 7.4 ($p < 0.05$), 20.1 ($p < 0.01$), 15.7 ($p < 0.01$) and 20.5 ($p < 0.01$) times respectively more likely to contract STDs than their counterparts from the poorest wealth index (Model 1). This pattern of odds of contracting STDs is similar for the wealth index categories even when region was introduced as a control (Model 2). Also, the addition of region in the second model shows that youths from the southeast were twice more likely to contract STDs than their counterparts from the north-central regions (Model 2).

Total lifetime number of sexual partners being used as the control for interaction between wealth index and region had little or no influence on the strength of relationship between these variables and contracting STDs (Model 3). However, respondents who had at least four life-time sexual partners were 2.9 ($p < 0.05$) times more likely to have contracted STDs than those with only one partner. Awareness of HIV/AIDs considerably reduced the level of relationship between wealth index and risk of contracting STDs, but the relationship between the risk of contracting STDs and living in the southeast region, which was the only region found to be significantly related to contracting STDs, disappears. The same pattern of relationship was observed when the use of a shared toilet facility was used as a control (Model 5).

Among all the variables considered in the model, only region does not show a significant relationship with contracting STDs.

Discussion

Sexually transmitted diseases (STDs) are serious health problem. If untreated, some STDs can cause permanent harm, including infertility and death. The current study, which focused mainly on identifying

Table 3. Ordinary logistic regression analysis of the respondents' socio-demographic and behavioural characteristics influencing their contacting STD in the last 12 months

Socio-demographic and behavioural characteristics	Variables							
	Socio-demographic				Socio-demographic/behavioural			
	β	S.E	Wald	Sign.	β	S.E	Wald	Sign.
Age	0.332	0.188	3.126	0.077	0.156	0.220	0.499	0.480
Region	-0.157**	0.052	9.188	0.002	-0.142*	0.066	4.551	0.033
Residence	0.091	0.196	0.214	0.644	0.250	0.218	1.310	0.252
Education	0.287*	0.124	5.355	0.021	0.165	0.147	1.259	0.262
Wealth index	0.267**	0.086	9.702	0.002	0.324**	0.109	8.782	0.003
Marital status	0.110	0.143	0.590	0.442	0.007	0.178	0.002	0.969
Religion	0.026	0.199	0.017	0.895	0.427	0.247	3.006	0.083
Toilet facility shared					0.092	0.059	2.482	0.115
Ever heard of HIV					1.647***	0.778	4.479	0.034
Ever undergone HIV test					0.352	0.230	2.334	0.127
Condom use					0.176	0.233	0.574	0.449
TLTNSP					0.304	0.159	3.659	0.056

TLTNSP: Total lifetime number of sexual partners
***Significant at 0.1%
**Significant at 1%
*Significant at 5%

Table 4. Multiple logistic regression analysis of the respondents' socio-demographic and behavioural characteristics influencing their contacting STD in the last 12 months

	Socio-demographic					Socio-demographic/behavioural				
	β	Sign.	Exp(β)	Lower	Upper	β	Sign.	Exp(β)	Lower	Upper
Region										
North Central	R.C	R.C	1.000	R.C	R.C	R.C	R.C	1.000	R.C	R.C
North East	-0.268	0.442	0.765	0.386	1.514	-0.506	0.137	0.603	0.310	1.174
North West	0.142	0.604	1.153	0.674	1.972	-0.169	0.511	0.845	0.510	1.398
South East	0.223	0.419	1.250	0.727	2.150	0.187	0.496	1.205	0.704	2.063
South West	-0.704	0.015	0.495*	0.280	0.873	-0.719	0.012	0.487*	0.277	0.856
South South	-0.856	0.006	0.425**	0.231	0.783	-0.873	0.005	0.418**	0.227	0.770
Wealth index										
Poorest	R.C	R.C	1.000	R.C	R.C	R.C	R.C	1.000	R.C	R.C
Poorer	0.464	0.158	1.590	0.835	3.028	0.427	0.193	1.532	0.806	2.912
Middle	0.861	0.007	2.365**	1.260	4.441	0.829	0.008	2.291**	1.239	4.236
Richer	0.904	0.007	2.469**	1.285	4.744	0.931	0.003	2.537**	1.364	4.719
Richest	1.039	0.003	2.828**	1.413	5.658	1.193	0.000	3.298***	1.737	6.263
Education										
None	R.C	R.C	1.000	R.C	R.C					
Primary	0.264	0.366	1.302	0.735	2.308					
Secondary	0.525	0.059	1.691	0.980	2.916					
Higher	1.120	0.002	3.065**	1.521	6.175					
Ever heard of HIV/AIDS										
No						R.C	R.C	1.000	R.C	R.C
Yes						1.705	0.002	5.500**	1.871	16.172

***Significant at 0.1
**Significant at 1
*Significant at 5%

social risk factors for STDs among female youths in Nigeria, included the following possible risk factors: age, educational status, region, religion, wealth index, marital status, age at first sexual intercourse, place of residence, current work status, shared toilet facility, awareness of HIV/AIDS, ever undergone HIV test, condom use, recent sexual activity, and total number of lifetime sexual partners. The multiple regression analysis provided a global view of the combined effects of these factors.

The majority of the subjects belonged to the age group 20 to 24 years (63.0%) and the mean age of the respondents was 20.2 ± 2.5. In the year preceding the survey, the prevalence of STDs among female youths in Nigeria was 2.1%. A higher percentage of female youths who were aged between 20 and 24 years contracted STDs in the last 12 months preceding the survey than those between the ages of 15 and 19 months. The higher prevalence of STDs in the age group 20 to 24 years than in the lower age cohort (15 to 19 years) could be due to the fact that at during this age span young women tend to be more sexually active than younger women, thereby increasing their chances of exposure to STDs. This result is consistent with the findings of research conducted by the US Department of Health and Human Services at the Centers for Disease Control and Prevention [9].

The proportion of female youths who had STDs was highest in the southeast and least in northeast among the regions in Nigeria. Late marriage among women was more common in the southeast due to dowry paid on women before marriage than any other regions in Nigeria [12]. The northerners are predominantly Muslims and southerners are Christians. Females who belong to Islamic religious sects marry earlier than their Christian counterparts and this has tendency to prevent them from having sexual partners other than their husbands. Adultery is a serious crime among married Muslims, and committing this offence by a woman normally attracts severe penalty. In the north generally, early marriage is still more common than in the south [12]. This tends to reduce the sexual activity of female youths in this region and hence reduces their chances of contracting STDs [12,[14]. This result is in line with previous findings from a study conducted in the USA which shows that women who married early were less likely to contract STDs than those who married in later years [15].

A significant difference existed between urban and rural female youths, with more urban female youths experiencing STDs than their rural counterparts. This is consistent with earlier findings in Nigeria [16]. The difference could be accounted for by early marriage and lower number of sexual partners among youths peculiar to rural dwellers as compared to urban female youths [17]. Sexual networking has been proved to be less practiced in the rural areas, particularly among female youths, because sexual activities of individuals can be monitored more easily in the rural areas than in urban centres. The cultural norms that disapprove of promiscuity are still more common among the inhabitants in rural areas than in urban areas.

The prevalence of sexually transmitted diseases increases with increasing level of education. Since this study focused on youths, older youths (aged 20 to 24 years) tend to acquire higher levels of education than the younger ones. Therefore, older youths are more likely to be exposed to sexual activity than those in the age group 15 to 19 years [18]. This observation is in accordance with the findings from previous studies which show that the prevalence of sexually transmitted diseases increases with increasing level of education [19,20].

The percentage of female youths who have STDs increases consistently with increasing wealth index, with the poorest and richest experiencing least to highest prevalence of STDs respectively. In the Nigerian context, female youths from poor homes begin sexual activity earlier than those from richer homes and as such are more knowledgeable in terms of the acquisition and utilization of STD control measures, including the use of condoms [16,21]. Contrarily, Adanu and colleagues claimed that having a high wealth index, being older, and having no history of condom use were protective factors for experiencing STI symptoms [22].

The present study further revealed that female youths who never married were at increased risk of STDs as compared to those who were married. This higher risk may be due to a higher number of sexual partners, which is common among unmarried female youths than their married counterparts. This finding is in agreement with studies previously conducted in Nigeria, sub-Saharan Africa, and other parts of Africa [23,24].

STDs were found to be more common among those who a shared toilet facility than among those who did not, and the difference was statistically significant. The toilet is a place where STDs and other diseases could be contracted, especially if shared with someone who already has the disease, as shown in previous studies [25,26].

Table 5. Logistic regression models (with five iterations) of the respondents' socio-demographic and behavioural characteristics influencing their contacting STD in the last 12 months

Characteristics	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	Odd Ratio	Odd Ratio	Odd Ratio	Odd Ratio	Odd Ratio
Wealth Index					
Poorest	1.000	1.000	1.000	1.000	1.000
Poorer	7.404*	7.208*	7.258*	7.055*	7.051*
Middle	20.068**	20.127**	20.228**	18.259**	17.492**
Richer	15.680**	16.552**	16.477**	14.297**	13.760**
Richest	20.548**	23.418**	23.108**	19.804**	19.465**
Region					
North Central		1.000	1.000	1.000	1.000
North East		0.872	0.940	0.896	0.990
North West		1.388	1.546	1.444	1.615
South East		2.129*	2.099*	1.927	1.963
South West		0.700	0.584	0.542	0.496
South South		0.759	0.743	0.706	0.643
Total lifetime number of sexual partners					
1			1.000	1.000	1.000
2-3			1.508	1.473	1.446
4+			2.869**	2.845**	2.761**
Ever heard of HIV/AIDS					
No				1.000	1.000
Yes				4.728*	4.643*
Toilet facility shared					
No					1.000
Yes					1.528*
-2 Log likelihood	1107.730	1088.423	1079.226	1072.509	1066.329
Cox & Snell R^2	0.008	0.012	0.013	0.015	0.016
Nagelkerke R^2	0.040	0.059	0.067	0.074	0.080

***Significant at 0.1%
**Significant at 1%
*Significant at 5%

It is striking that STD prevalence was higher among female youths who are currently using condoms than those who are not. The result is consistent with the findings from previous studies [21,27]. In the current study, most of the users were unmarried; therefore, we hypothesize that condoms were used for pregnancy prevention rather than preventing STDs. A possible explanation for this finding is that since the interval span of the outcome variable is 12 months, a condom user must have experienced a disease, which has been treated, in an earlier part of the study period.

Awareness of HIV/AIDS was found to be significantly associated with contracting STDs among female youths in Nigeria, with a higher number of those who have heard of HIV/AIDS having STDs than those who have not. People who have STDs are likely to hear more about HIV while trying to find measures to cure their ailment than their counterparts who had never had STDs. Counselling in the course of receiving treatment for a particular STD could be an

avenue to hear more about other STDs, including HIV/AIDS [17]. A further finding was that female youths who had ever undergone an HIV test constituted a higher proportion of those who had STDs in the last 12 months prior the study than their contemporaries who had not gone for such a test. In the first instance, contracting the disease might influence an individual to go for the HIV test as part of their clinical diagnosis [28,29]. However, going for HIV test could be done independently of contracting an STD.

The total lifetime number of sexual partners was significantly associated with contracting STDs. A higher percentage of those who had multiple sexual partners contracted STDs than those with only one sexual partner. This finding is expected, as previous reports from the literature consistently attributed STDs to multiple sexual partners. Increasing sexual partners increases the risk of contracting STDs, particularly in a population where the prevalence of STDs is high [30,31].

Study limitations

The major limitation of our study is that, since no laboratory test was conducted as part of the study during the 12 months prior the survey, it is possible that some of the women who had experienced STDs might have claimed they never experienced any because of the stigmas attached to having an STD. This possibility may have biased the number of women in Nigeria who had experienced STDs in the last one year prior the survey. However, the survey questionnaire likely reduced such a bias because an option was included for those who did not which to disclose their STDs status, and these respondents were excluded from data analysis for the current study.

Conclusion

The present study recognized age, region, place of residence, educational status, wealth index, marital status, shared toilet facility, awareness of HIV/AIDS, ever having undergone an HIV test, currently using condoms, and total number of lifetime sexual partners as being significantly associated risk factors for contracting STDs. Wealth index, having a higher number of total lifetime sexual partners, awareness of HIV/AIDS, and sharing a toilet facility were found to be important predictors of STD acquisition. While developing strategies aim at reducing STDs among female youths in Nigeria, the government should include these factors as part of their key variables. Early diagnosis and treatment of the STDs will reduce their prevalence and improve the health of female youths in Nigeria.

Acknowledgements

The authors thank the National Population Commission and ICF Macro Calverton, Maryland, USA, for releasing the data for this study.

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Conflict of interests: No conflict of interests is declared.