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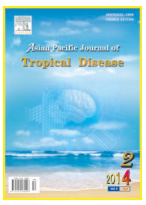

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High HIV sero-prevalence among students of institutions of higher education in Southeast Nigeria

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PEER REVIEW

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Comments

This is a valuable research work in which authors have demonstrated IHEs in Southeast Nigeria. This area has a higher HIV prevalence against the national projected rate of 2012. Female students had higher rate of infection, transactional and forced sex, unusual genital discharge and low condom use when compared with their male counterparts.
HIV prevalence and sexual risky behaviour were high among students of IHEs when compared with previous estimates of their non-institutionalised age brackets. This study suggest a prioritised tailor-made policy for HIV control for students of IHEs.
Details on Page 164

ABSTRACT

Objective: To investigate the prevalence and sexual behavioural dynamics of HIV infection in students of institutions of higher education (IHEs) as a guide to the design of a tailor-made HIV intervention programmes.

Methods: A total of 9 709 sexually matured students from five IHEs in Southeast Nigeria aged 19-24 years were recruited to obtain representative data from the institutionalised student population. HIV status was confirmed using enzyme based immuno-assay technique. Demographic and behavioural information were obtained through a structured questionnaire. Association of HIV infection with behavioural risk factors was done using multiple logistics regression model.

Results: IHEs in Southeast Nigeria have a higher HIV prevalence of 3.69% against the national projected rate of 2012. The age-specific prevalence among male students (2.91%) is non-significantly ($P>0.1$) lower than that of females (4.31%). Female students had higher rate of infection, multiple sexual partner, transactional and forced sex, unusual genital discharge and low condom use when compared with their male counterparts. These risk factors were associated with increased HIV seropositivity. HIV prevalence and sexual risky behaviour were high among students of IHEs when compared with previous estimates of their non-institutionalised age brackets. Unprotected sexual activity have a 4.2 times higher chances of infecting the partner with HIV.

Conclusions: The data showed a higher prevalence of HIV infection in students of IHEs in comparison with non-institutionalised persons of the same age bracket. Specifically, it could be inferred that appropriate HIV intervention measures was absent with higher incidence of the infection and risky behaviour found in female students. Therefore, a prioritised tailor-made policy for HIV control for students of IHEs should be considered.

KEYWORDS

Human immunodeficiency virus (HIV), Sexual behaviour, Nigeria, Youths, Institutions of higher education (IHEs), Prevalence

1. Introduction

Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) reached epidemic proportions in most parts of sub-Saharan Africa by the end of the last century[1-3]. About 21 million HIV/AIDS cases recorded in this region in 1997 was equivalent to two-thirds of the total global estimates for that year, a pattern which seemed to have been sustained for almost a decade[4,5]. Current estimates show that half of all new cases of HIV infection occur in people under the age of 25 and that 80% of AIDS cases worldwide are within the age bracket of 15 and

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24 years old[6,7]. Three-quarters of these individuals live in sub-Saharan Africa[8]. Undergraduate students in institutions of higher education (IHEs) in Nigeria fall within the age range from 15 to 24 years.

Recent reassessment of HIV and sexually transmitted infections (STI) have shown that the presence of STI is associated with increased risk of acquiring HIV infection and concurrent infection is associated with increased transmission to a sexual partner[9-11]. Young people are particularly vulnerable to contracting HIV. Most new HIV infections in sub-Saharan African countries occur among youths aged 15-24 years old, with the prevalence in this age group exceeding 20% in some countries[12,13]. Targeting this group for preventive interventions is an important strategy for controlling HIV/AIDS[14-16]. In spite of recent calls to increase attention to the high rate of HIV transmission to young women particularly in sub-Saharan Africa[17-19], there is no consensus on how best to prevent HIV infection among youth.

There may be various reasons why students at IHEs in Nigeria are exposed to HIV, such as economic, cultural and social factors, and differences in the perception of the infection between male and female students as noted by Ebeniro[20]. Generally, Nigerian students are knowledgeable about HIV infection. However, the immediate school environment still serves as a fertile ground for high-risk sexual behaviour[21]. The majority of the IHEs in Nigeria are sited either in rural areas or on the perimeter of urban cities. The host communities in most rural areas are likely to exert an influence on the pattern and dynamics of HIV infection at IHEs in Nigeria[22].

Sustainable strategies and programmes for HIV/AIDS awareness and prevention on campuses and in their host communities are grossly inadequate or are often neglected. There is a general neglect of HIV/AIDS programmes in rural communities even though people living with HIV/AIDS often return to their rural communities after contracting HIV/AIDS in urban areas. In communities where IHEs are situated social interaction between people living with HIV/AIDS and students may impact negatively on HIV infection rates. Additionally, half of the student population at IHEs in Nigeria live off-campus, amongst the villagers or rural dwellers, due to the availability of limited accommodation facilities[23]. A growing body of literature shows that it is imperative that universities implement comprehensive responses to stem the growing HIV epidemic[24]. These reports acknowledge that a thick cloak of ignorance of the disease exists in the IHEs[25,26].

Nigerian IHEs are characterised by students' militancy popularly known as "student's cultism". This is a perennial problem which affects both social and academic life[27,28]. However, information on HIV prevalence and sexual behavioural pattern of male and female students aged 19-24 across institutions of higher education are scarce. Therefore, the objective of the study was to provide primary data on HIV prevalence and sexual behavioural patterns among students aged 12-24 years which will guide in the design of tailor-made HIV intervention programmes for IHEs in Southeast Nigeria.

2. Materials and methods

2.1. Study population and subject sampling

Five tertiary institutions located in Imo State, southeastern part of Nigeria, namely, Federal University of Technology, Owerri, Imo State University, Owerri, Federal Polytechnic, Nekede, Imo State Polytechnic, Umuagwo and Alvan Ikoku Federal College of Education, Owerri were used in this cross-sectional study. The choice of these institutions was based on their urban and rural locations which confer a representative population distribution of the state. The representative sample was obtained by using a simple random sample design, the sample was thus unbiased. Students aged 19-24 years was recruited after obtaining their informed consent in accordance with the Nigerian National Ethics and Operational Guidelines for Research on Human Subjects. The study was fully subjected to institutional ethics review on human subjects obtained from Federal University of Technology, Owerri and Imo State University, Owerri. Eligible students drawn from the sample frame were asked to take part in an administered questionnaire and to provide biological specimens (blood) for HIV test after pre-test counselling.

2.2. Questionnaire and data collection

Interviews were conducted using a multiple choice option questionnaire which were designed to be self completed by participants. The questionnaire was developed based on a modification of a previously used design in another study[9].The total sample size of the study was 10 485 with a response rate of 92.6% representing a total of 9 709 students who completely responded to the questionnaire and provided blood samples. The study therefore had a total of 776 (7.4%) non-respondents.

Sex was defined as vaginal or anal heterosexual intercourse. For those students who had one lifetime sex partner, additional questions were asked on age of first sexual encounter. Transactional sex was defined as definite motivation to benefit materially from a sexual encounter such as improved grades, gifts, money, drugs, clothes *etc*. with or without feelings of affection.

2.3. Study eligibility

Each study subject had to fulfill the following eligibility criteria: a) be a bona fide undergraduate student at one of the institutions at which the study was completed; b) be a residential student *i.e.* not living with the parents/guardian; c) aged between 19-24 years.

2.4. Biologic sample collection and testing

Blood samples were collected using a sterile lancet supplied along with the test kit to pierce the thumb of the volunteer after disinfecting with alcohol soaked cotton wool. The HIV test was carried out using a one-step anti-HIV Uni-

Gold test kit manufactured by Trinity Biotechnology PLC, IDA Business Park, Bray Coy, Wicklow, Ireland. This test kit is a rapid immunoassay based on the immune chromatographic sandwich principle. Positive candidates were confirmed using an enzyme immune assay (ImmunoComb 11, version 434/Eb, Organic, Israel).

Participants were offered their HIV test results immediately in a confidential manner during a post-HIV test counselling interview. Confirmed positive candidates were referred to Voluntary Counselling and Testing (VCT) or Heart-to-Heart centres present in IHEs for care and treatment. Unfilled questionnaires of non-responders and their blood samples were excluded from the study analysis. Blood samples were taken in accordance with the Nigerian National Ethics and Operational Guidelines for Research on Human subjects.

2.5. Data analysis

The data was analysed by one-way ANOVA and multiple logistics regression models using Statistical Package for Social Sciences for windows version 17.0 (SPSS Inc., Chicago, IL, USA). The confidence level was set at 95% and $P<0.05$ significance difference. Strength of association between HIV-1 infection and various behavioural risk factors was estimated by calculating the odds ratios (OR) with 95% confidence intervals (*CI*). Multiple logistic regression with sero-HIV-1^{+} and HIV-dependent variables were used to assess potential confounders.

3. Results

3.1 HIV prevalence

Table 1 shows the characteristics of the IHEs under study with 60% (3/5) rural and 40% (2/5) urban situated institutions. Overall, the prevalence of HIV infection among students was 3.69%. The prevalence among male and female students was 2.91% and 4.31% respectively. This difference was not significant ($P>0.05$) (Table 2). Similarly, no significant difference in HIV prevalence of the five institutions under study was found except in Alvan Ikoku Federal College of Education, Owerri (AIFCE) (5.78%) (Table 1).

Table 1
Institutional demographics

Institution	Sample size	Location	IHE type	Respondents [*n* (%)]
AIFCE	4 241	Urban	College of education (Federal)	4 181 (43.04)
IMSU	1 646	Urban	University (State)	1 520 (15.68)
FUTO	1 631	Rural	University (Federal)	1 503 (15.48)
IMOPOLY	1 521	Rural	Polytechnic (State)	1 301 (13.40)
POLYNEK	1 446	Rural	Polytechnic (Federal)	1 204 (12.40)
TOTAL	10 485			9 709 (100.00)

FUTO: Federal University of Technology Owerri; IMSU: Imo State University, Owerri; POLYNEK: Federal Polytechnic, Nekede; IMOPOLY: Imo State Polytechnic, Umuagwo; AIFCE: Alvan Ikoku Federal College of Education, Owerri.

3.2 Socio-demographics and sexual behavioural pattern

Table 3 presents key socio-demographic characteristics and sexual behavioural pattern of the enrolled students. High proportions of students living in institutional facilities both on- and off-campus reported having used a condom at their last sexual encounter and spending at least one night away from the area in the past 6 months. Reports on ever having engaged in transactional sex were significantly higher among female students (4.3%) than their male (2.1%) counterparts. There were no significant differences across the five different IHEs on the key variables measured. The study results showed that female students were significantly more likely to have regular sex (90.7%), make less frequent use of condoms (84.2%, 69.1%), maintain longer relationships (79.4%), have an older sexual partner (8.3%), experience forced sex (11.4%), have more frequent HIV tests (36.4%), visit VCT centres more frequently (30.3%), have recent casual partner(s) (8.5%) and experience unusual genital discharge in the past 12 months (28.4%) when compared with the male students (Table 3). Conversely, their male counterparts had a significantly ($P<0.005$) increased activity in the following; earned or hard access to more money in school (25.7%,73.1%), number of lifetime sexual partner (5.6%), number of sexual partner in the last 12 months (2.0%) and aware of VCT centres (91%).

Table 2
HIV prevalence and survey outcome of 5 IHEs in Southeastern Nigeria.

Institution	Positive result (*n*)		Prevalent rate (%)			Negative result (*n*)		Discordant result (*n*)	
	Males	Females	Total	Male	Females	Males	Females	Males	Females
FUTO	9	13	1.47	1.05	2.11	856	617	3	5
IMSU	7	31	2.52	1.51	3.07	463	1 009	2	10
POLYNEK	9	18	2.26	1.69	2.83	534	635	2	6
IMOPOLY	11	18	2.26	2.14	2.44	515	739	10	8
AIFCE	58	180	5.78*	6.78*	5.95*	855	3 023	12	53
Total	94	260	3.69	2.91	4.31	3 223	6 023	29	82

FUTO: Federal University of Technology Owerri; IMSU: Imo State University, Owerri; POLYNEK: Federal Polytechnic, Nekede; IMOPOLY: Imo State Polytechnic, Umuagwo; AIFCE: Alvan Ikoku Federal College of Education, Owerri.
*: Significant difference.

3.3. Associations between reported sexual behavioural pattern and HIV-1 infection among students of IHEs in Nigeria

The study result showed that students residing within the school environment (OR 1.9; *CI* 0.7-2.5), those who never earned money (OR 1.9; *CI* 1.3-2.4), multiple sexual partners *i.e.* more than one sexual partner (OR 1.4; *CI* 1.3-3.0) have a higher risk of contracting HIV infection. The HIV data from the seronegative students population differ significantly from these results (Table 4). Among those students who reported not using condom always even with a casual sex partner have a 4.2 times higher chances of being infected with HIV (OR 4.2; *CI* 1.7-3.1) than their counterparts who do use condom always. Indulging in transactional sex (OR 6.1; *CI* 1.8-5.2), having casual sex partner(s) (OR 5.8; *CI* 2.2-4.0) and experiencing forced sex (OR 5.73; *CI* 3.9-7.4) are associated with higher HIV seropositivity amongst the student population. Sexual activity (OR 0.9; *CI* 0.2-1.8) are not associated with increased HIV seropositivity. Awareness of VCT centres were found to be low in HIV positive students. Similarly, HIV test experience was higher (OR 1.4; *CI* 2.9-5.2) in HIV negative student's population though very weak was observed.

Table 3

Key socio-demographic and behavioural characteristics of students at IHEs in Southern Nigeria stratified by gender.

Characteristics	FUTO (*n*=1 503) %	IMSU (*n*=1 520) %	POLYNEK (*n*=1 204) %	IMOPOLY (*n*=1 301) %	AIFCE (*n*=4 181) %	19-24 years	
						males (*n*=3 344) %	females (*n*=6 365) %
Live inside school or the surrounding (*i.e.* not with parents or guardian)	89.0	89.4	89.1	90.8	91.8	85.4	79.0*
Often or sometimes go hungry	26.9	29.5	26.2	32.7	30.0	21.5	25.2*
Earned money in the past year	26.9	31.0	28.5	25.0	31.7	25.7	15.4*
Ever earned money	61.5	79.6	54.8	50.9	58.8	73.1	54.8*
Ever had sex	66.4	69.6	68.7	70.3	71.6	59.9	84.9*
Had sex in past 12 months	79.4	87.2	85.8	88.9	87.4	81.1	90.7*
Mean number of lifetime sexual partners	3.8	3.6	3.5	2.8	4.0	5.6	2.2*
Mean number of sexual partners in the past 12 months	1.5	1.5	1.5	1.1	1.8	2.0	1.1*
Did not use condom at last sexual encounter	50.4	57.4	56.1	56.5	62.0	53.6	69.1*
Did not always use condom with most partners	74.1	71.5	76.5	62.7	69.0	61.6	84.2*
Relationship length >12 months with most recent partner	62.2	43.4	64.8	67.1	64.8	52.1	79.4*
Most recent partner was a casual partner	3.1	4.4	3.6	3.4	10.3	0.6	8.5*
Most recent partner ⩾10 years older	4.4	3.9	5.3	4.0	5.4	0.1	8.3*
Ever forced to have sex	7.6	6.5	7.4	7.8	10.7	2.3	11.4*
Ever engaged in transactional sex	2.8	2.1	2.9	2.4	4.1	2.1	4.3*
Unusual UD/VD in past 12 months	21.6	19.1	18.2	18.7	22.9	13.9	28.4*
Spent ⩾1 night away in past 6 months	40.1	41.2	43.6	44.2	46.1	39.9	46.6*
Ever tested for HIV	21.6	20.7	19.1	10.6	16.7	11.7	36.4*
Awareness of VCT centre	94.8	90.1	81.5	91.0	89.7	91.0	85.5*
Ever been to a VCT centre/clinic	54.0	40.8	48.2	39.7	51.0	29.5	30.3*

FUTO: Federal University of Technology Owerri; IMSU: Imo State University, Owerri; POLYNEK: Federal Polytechnic, Nekede; IMOPOLY: Imo State Polytechnic, Umuagwo; AIFCE: Alvan Ikoku Federal College of Education, Owerri. UD: Urethral Discharge; VD: Vaginal Discharge.

*: Significantly different from males aged 19-24 years at $P<0.05$.

Table 4

Associations between reported sexual behavioural pattern and HIV-1 infection among students of IHEs in Nigeria.

Exposures	Category	No. (%) *n*=9709	HIV+ (*n*=354)		HIV-(*n*=9246)	
			N (prevalence %)	Multivariate*	*N* (prevalence %)	Multivariate*
Live inside school/Surrounding†	Yes	6 766 (70.0)	252 (3.70)	1.90 (0.7-2.5)	6495 (70)	2.4 (1.3-2.7)
	No	2 943 (30.0)	33 (1.12)	1	2140 (23)	1
Ever earned money	Last 1 year	2 150 (22.0)	21 (0.98)	1	2129 (23)	1
	Never	4 593 (47.0)	314 (6.80)	2.90 (1.3-2.4)	4279 (46)	0.98 (0.5-2.3)
Sexual activity	Had sex	5 209 (54.0)	319 (6.10)	1	4890 (52.9)	1
	Last 12 months	4 444 (46.0)	293 (6.59)	0.90 (0.2- 1.8)	4151 (44.9)	0.92 (0.5- 1.6)
More than 1 sexual partner(s)	Lifetime	266 (2.7)	122 (46.00)	1	144 (1.56)	1
	Last 12 months	113 (1.2)	85 (75.00)	1.40 (1.34-3.0)	28 (0.3)	0.3 (0.2-1.7)
Use condom always	Yes	4 183 (43.0)	12 (0.29)	1	6171 (66.8)	1
	No	5 318 (55.0)	346 (6.50)	4.20 (1.9-3.1)	972 (10.5)	0.6 (1.6-2.7)
Used condom during last casual sex	Yes	4 043 (42.0)	10 (0.25)	1	4033 (43.6)	1
	No	4 245 (44.0)	278 (6.60)	3.90 (1.7-4.3)	967 (10.4)	0.8 (0.7-3.3)
Ever engaged in transactional sex	No	5 437 (53.0)	216 (3.97)	1	327 (3.5)	1
	Yes	216 (2.2)	205 (94.90)	6.10 (1.8-5.2)	11 (0.11)	0.4 (0.3-1.6)
Most recent partner was casual	No	4 543 (47.0)	23 (0.51)	1	4520 (48.9)	1
	Yes	373 (3.8)	198 (53.00)	5.80 (2.2-4.6)	115 (1.2)	0.2 (0.7-3.0)
Most recent partner ⩾ 10 years older	No	523 (5.4)	66 (12.60)	1	457 (4.9)	1
	Yes	346 (3.6)	237 (68.00)	4.40 (2.5-6.0)	109 (1.2)	2.7 (2.9-5.2)
Ever forced to have sex	Yes	601 (6.2)	257 (42.80)	5.73 (3.9-7.4)	344 (3.7)	0.7 (1.9-4.2)
	No	5 490 (57.0)	13 (0.24)	1	5477 (59.2)	1
Ever tested for HIV	Yes	1 336 (14.0)	136 (10.00)	1	1200 (12.9)	1
	No	4 967 (51.0)	211 (4.20)	1.10 (2.2- 10.0)	4756 (51.4)	1.4 (2.9-5.2)
Awareness of VCT centre	No	1 876 (19.0)	56 (2.90)	1	1820 (19.6)	1
	Yes	6 720 (6.9)	265 (3.90)	1.20 (1.9-3.2)	6455 (69.8)	3.7 (1.7-9.11)
	Attended	3 513 (36.0)	65 (1.80)	0.70 (2.8-5.3)	3448 (37.3)	1.9 (4.2-9.7)

*: Adjusted odds ratio, †: living without parents or guardian.

4. Discussion

The sexual behaviour of young people plays a major role in the trajectory of AIDS epidemic, for young people make up a large and growing population in developing countries. Sexual habits formed during these periods often persist

into adulthood. Studies conducted on HIV sero-prevalence in Africa are mostly on men and women of the general population. Few studies have focused on youth in institutions of higher education (IHEs) who enjoy some degree of sexual freedom. There exists a litany of enlightenment and awareness campaigns about the dangers of illicit and unprotected sexual behaviour directed at the general non-institutionalised population. However, this has not translated in magnitude to a corresponding change in high risk sexual behaviour.

Student volunteers (9709) from five IHEs in Nigeria was used to generate data on HIV infection in undergraduates of higher institutions. The largest number of volunteers came from AIFCE (43.02%), an institution located in Owerri metropolis (urban). The prevalence of 3.69% at this institution was higher than the projected estimate of 2.9% reported in the 2010 National HIV Sero-prevalence Sentinel Survey[29]. This result indicates that current efforts targeting youth may be inadequate. Our findings also showed a higher prevalence of HIV infection amongst female students (4.32%) than male students (2.92%). This result concurs with gender differences of HIV prevalent rates reported in other African countries[30]. Some factors may be responsible for the increased prevalence amongst female students, namely more regular sexual activity, higher frequency of casual sex partners, less frequent condom use, sex mostly with older sexual partners especially those that have been widely exposed to sexual activities and forced/abusive sex (much of which goes unreported and exposes female students to HIV with resultant risk of transmission much higher during rape or other sexually abusive activities). Fawole *et al*.[31] also documented risky sexual behaviour in undergraduate students.

There is a need for students to be supported and guided during their first few months at University or other IHEs. We noticed that male students reported a great deal of heterosexual sexual activity. For the most part this did not translate or predict higher HIV infection rate. This was possibly due to a higher level of HIV awareness, more consistent condom use, less engagement in transactional sex and a voluntary counselling and testing mindset. Though the percentage prevalence observed in this study was higher than the value reported by White *et al*.[32] who noted HIV prevalence of 3.1% amongst Malian students, Jacobs *et al*.[33] reported a much lower HIV prevalence of 1.5% among blood donors from students in East Africa. These data from other African countries suggest that a thorough review and or initiation of HIV control programmes in IHEs in the sub-region is required. In 2005, Norman and Gebre[34] conducted a study in which HIV testing was not associated with condom use or number of sex partners. They concluded that the lack of association does not negate the importance of HIV testing. In the present study, we discovered that despite the large number of sexual partners and increased sexual activity reported in males, their high sexual activity did not correspond with a higher HIV infection rate. This suggests that effective school HIV education and intervention activities can reduce the infection rate despite high sexual activity. Poor economic conditions in Nigeria has resulted in many youth at colleges becoming involved in sexual networking to earn a living. In this regard rural communities hosting IHEs are often neglected and unreachable. It is pertinent that host communities are included in HIV prevention programs. Our study did not address IHEs-host community interactions and the status of VCT facilities on campus, hence these omissions are limitations of our study.

Female students showed a higher incidence of the infection consistent across the five IHEs. This concurs with reports by other researchers[35-38]. A large number of students is likely to have casual or unprotected sex for the first time during their studentship especially when residing on campus or within the institutional hostels. It is generally observed that first months in the university require students to manage their freedom which was not previously granted at family homes. This most likely leads to abuse of sexual freedom which could result in increased risk of HIV infection. Gender differences was also noted on some factors that influence exposure to HIV infection namely, the length of sexual relationship, frequency of sexual partner change and the frequency of sexual intercourse. It is of note that infectivity is dramatically higher during the early stages of HIV infection lasting up to three months, and HIV transmission probability is greater when there are high levels of partner change among newly infected people[39]. Some of the factors that are associated with increased HIV seropositivy observed in the study are poverty, multiple sexual partners, casual sex, unprotected sex, transactional sex and forced sexual experiences especially to female students. These behavioural indices differ significantly from seronegative student population. Unprotected sexual activity (not using condom) have a 4.2 times higher chances of infecting the partner with HIV. This is one of the frequent ways of HIV transmission. Conversly, sexual activity was not associated with increased HIV seropositivity. Ojeifo and Gbakeji have reported unabated risky behaviour in undergraduate students in the southern part of Nigeria as well as Oruonye in Northern Nigeria[40,41].

The high awareness of VCT centres recorded by the male subjects did not correspond with attendance of VCT clinics, Uzochukwu *et al*.[42] also reported the same observation. This could be due to the belief of some undergraduate students that they possess extensive knowledge of HIV infection and therefore do not have to attend VCT centres. Awareness of VCT centres were found to be low in HIV positive students. Similarly, HIV test experience was higher in HIV negative student's population though very weak association was observed. It is possible that our respondents were ignorant about where VCT services could be obtained. It is our belief that VCT should be freely available and widely publicized in IHE communities. Both male and female students were involved in transactional sex which maybe one of the major drivers of the observed HIV prevalence.

Intervention programs aimed at IHEs, educated and unemployed young people should be part of an effective HIV prevention strategy. Such programs must address misperceptions among youth about condom use and the need for protection from HIV and other STIs. HIV prevention programmes must ensure that gender issues that places young

women at greater risk of HIV infection are urgently addressed and they must continue to emphasize the importance of reducing the number of casual sexual partners. Government and other policy makers should prioritize the importance of school based intervention models. The institutional and structural context should be targeted by working to change social norms and engaging schools in new ways of participatory learning. Therefore, adequate orientation and sexual education should form part of the first year's undergraduate orientation program, guided by appropriate counselling. The authors recommend policy revisions which focus on creating an enabling environment for young students of IHEs especially females so that they are empowered to make healthy sexual decisions. However, HIV prevention programs should be tailor-made to incorporate both the host community and IHE with effective measurable output indicators.

Limitations of this study include the absence of data on sexually transmitted diseases, host-community interaction and VCT facilities. Presence of sexually transmitted diseases is commonly included in study of factors associated with HIV positivity as sexually transmitted diseases may likely result from risky sexual practices, as well as increasing risk of HIV infection.

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Conflict of interest statement

We declare that we have no conflict of interest.

Comments

Background

Institutionalised prevalence data and pattern of sexual practice of students in IHEs in Southern Nigeria would be useful for HIV/AIDS control and intervention programmes. In this study, the prevalence and sexual behavioural pattern of HIV infection amongst students aged 19-24 years in Southeast Nigeria, a region in sub-Saharan Africa was assessed.

Research frontiers

The present research work depicts female students had higher rate of infection, transactional and forced sex, unusual genital discharge and low condom use when compared with their male counterparts. HIV prevalence and sexual risky behaviour were high among students of IHEs when compared with previous estimates of their non-institutionalised age brackets.

Related reports

It is reported that AIFCE, an institution located in Owerri metropolis (urban) has higher prevalence of HIV infection. Higher gender sensitive prevalence for females than males concurs with findings on gender differences of HIV prevalent rates in other African countries. The questionnaire was developed based on a modification of a previously used design in another study.

Innovations & breakthroughs

In the present study, authors have demonstrated the prevalence and sexual behavioural pattern of HIV infection amongst students aged 19-24 years in Southeast Nigeria, a region in sub-Saharan Africa and they suggest a prioritised tailor-made policy for HIV control for students of IHEs.

Applications

From the literature survey it has been found that only few studies are focused on youths in IHEs who relatively enjoy some degree of sexual freedom.

Peer review

This is a valuable research work in which authors have demonstrated IHEs in South-East Nigeria have a higher HIV prevalence against the national projected rate of 2012. Female students had higher rate of infection, transactional and forced sex, unusual genital discharge and low condom use when compared with their male counterparts.

HIV prevalence and sexual risky behaviour were higher among students of IHEs when compared with previous estimates of their non-institutionalised age brackets. This study suggest a prioritised tailor-made policy for HIV control for students of IHEs.

References

[1] Agha S, Van Rossem R. Impact of a school-based peer sexual health intervention on normative beliefs, risk perceptions, and sexual behaviour of Zambian adolescents. *J Adolesc Health* 2004; **34**: 441-452.

[2] James S, Reddy PS, Ruiter RA, Taylor M, Jinabhai CC, Van Empelen P, et al. The effects of a systematically developed photo-novella on knowledge, attitudes, communication and behavioural intentions with respect to sexually transmitted infections among secondary school learners in South Africa. *Health Promot Int* 2005; **20**: 157-165.

[3] Magnani R, Macintyre K, Karim AM, Brown L, Hutchinson P, Kaufman C, et al. The impact of life skills education on adolescent sexual risk behaviors in KwaZulu-Natal, South Africa. *J Adolesc Health* 2005; **36**: 289-304.

[4] Agha S. An evaluation of the effectiveness of a peer sexual health intervention among secondary-school students in Zambia. *AIDS Educ Prev* 2002; **14**: 269-281.

[5] UNAIDS. *Report on the global AIDS epidemic: A UNAIDS 10th anniversary special edition.* Geneva: UNAIDS; 2006.

[6] Mukoma W, Flisher AJ, Ahmed N, Jansen S, Mathews C, Klepp KI, et al. Process evaluation of a school-based HIV/AIDS intervention in South Africa. *Scand J Public Health* 2009; **37**(2): 37-47.

[7] Namisi FS, Flisher AJ, Overland S, Bastien S, Onya H, Kaaya S, et al. Sociodemographic variations in communication on sexuality and HIV/AIDS with parents, family members and teachers among in-school adolescents: A multi-site study in Tanzania and South Africa. *Scand J Public Health* 2009; **37**(2): 65-74.

[8] UNAIDS. *Children and young people in a world of AIDS*. Geneva: UNAIDS; 2001.

[9] Nwanguma BC, Kalu I, Ezeanyika LUS. Seroprevalence of Anti-chlamydia trachomatis IgA antibody in a Nigerian population: Diagnostic significance and implications for the heterosexual transmission of HIV. *Int J Infect Dis* 2009; **7**(2): 8-15.

[10] Covin M. Sexually transmitted infections in Southern Africa: A public health crisis. *S Afri J Sci* 2000; **96**: 335-342.

[11] UNAIDS. *Report on the global HIV/AIDS epidemic*. Geneva: UNAIDS; 2000.

[12] Demison JA. The HIV testing experience of adolescents in Ndda Zambia: Do families and friends matter? *AIDS Case* 2008; **20**(1): 101-105.

[13] Ibe SN. HIV/AIDS awareness study of fresh study in tertiary institutions in Rivers state of Nigeria. *J Appl Sci Environ Manag* 2005; **9**(1): 11-13.

[14] Muyinda H, Nakuya J, Whitworth JA, Pool R. Community sex education among adolescents in rural Uganda: Utilizing indigenous institutions. *AIDS Care* 2004; **16**: 69-79.

[15] Pronyk PM, Kim JC, Abramsky T, Phetla G, Hargreaves JR, Morison LA, et al. A combined microfinance and training intervention can reduce HIV risk behaviour in young female participants. *AIDS* 2008; **22**: 1659-1666.

[16] Singhal A, Rogers EM. *Combating AIDS: Communication strategies in action*. New Delhi, India: Sage Publications Ltd; 2003, p. 426.

[17] Gallant M, Maticka-Tyndale E. School-based HIV prevention programmes for African youth. *Soc Sci Med* 2004; **58**(7): 1337-1351.

[18] Laga M, Schwärtlander B, Pisani E, Sow PS, Caraël M. To stem HIV in Africa, prevent transmission to young women. *AIDS* 2001; **15**: 931-934.

[19] Global AIDS Surveillance--part I. *Wkly Epidemiol Rec* 1997; **72**(48): 357-358.

[20] Ebeniro CD. Knowledge and beliefs about HIV/AIDS among male and female students of Nigerian Universities. *J Comp Res Anthropol Sociol* 2010; **1**(1): 121-131.

[21] Adefuye AS, Abiona TC, Balogun JA, Lukobo-Durrell M. HIV sexual risk behaviours and perception of risk among college students: Implications for planning intervention. *BMC Public Health* 2009; **9**: 281.

[22] Ajala AS. Socio-cultural factors influencing the prevalence, care and support in HIV/AIDS among the Yoruba of Southwestern Nigeria. *Afr J Health Sci* 2007; **14**:(1-2): 61-69.

[23] Idogho PO. Transformation of students in higher education in Africa: Enhancing student services. *Ozean J Soc Sci* 2011; **4**(1): 1943-2577.

[24] Kelly MJ. The significance of HIV/AIDS for universities in Africa. *J High Educ Afr* 2003; **1**(1): 1-23.

[25] Anarfi J. *Universities and HIV/AIDS in sub-Saharan Africa: A case study of the University of Ghana, Legon*. France: International Institute for Educational Planning; 2000.

[26] Chetty D. An HIV/AIDS toolkit for tertiary institutions. In: Saint W, editor. *Crafting institutional responses to HIV/AIDS: Guidelines and resources for tertiary institutions in sub-Saharan Africa*. Africa Region: The World Bank; 2004.

[27] Nwokwule INS. Emerging culture of violence among Nigerian students. A psychological analysis. In: Maduka C. *Student unrest* Benin city, Nigeria: Faculty of Education, University of Benin; 1992, p. 18-26.

[28] Animba O. Campus secret cults in Nigeria. In: Animba O, Denga D, Omoluabi PF, editor. An appraisal of student unrest in Nigeria Enugu: ABIC Publishers; 1993, p. 90-107.

[29] National AIDS/STI control programme. Technical report, 2010 national HIV sero-prevalence sentinel survey. Abuja: Federal ministry of Health, Department of Public Health; 2010. [Online] Available at: http://www.nigeria-aids.org/documents/2010_National%20HIV%20Sero%20Prevalence%20Sentinel%20Survey.pdf. [Accessed on November 12 2011]

[30] Kenya National Bureau of Statistics (KNBS) and ICF Macro. 2010. Kenya demographic and health survey 2008-2009. Calverton, Maryland: KNBS; 2010.

[31] Fawole AO, Ogunkan DV, Adegoke GS. Sexual behaviour and perception of HIV/AIDS in Nigerian tertiary institutions: University of Ilorin, a case study. *Global J Hum Soc Sci* 2011; **11**(1): 65-71.

[32] White HL, Kristensen S, Coulibaly DM, Sarro Yd, Chamot E, Tounkara A. Prevalence and Predictors of HIV Infection amongst Malian Students. *AIDS Care* 2009; **21**(6): 701-707.

[33] Jacobs B, Berege ZA, Schalula PJ, Klokke AH. Secondary school students: a safer blood donor population in an urban with high HIV prevalence in East Africa. *East Afri Med J* 1994; **71**(11): 720-723.

[34] Norman LR, Gebre Y. Prevalence and correlates of HIV testing: an analysis of university students in Jamaica. *Med Gen* 2005; **7**(1): 70.

[35] Gaydos CA, Hsieh YH, Galbraith JS, Barnes M, Waterfield G, Stanton B. Focus-on-teens, sexual risk-reduction intervention for high school adolescents: Impact on knowledge, change of risk behaviours and prevalence of sexually transmitted diseases. *Int J STD AIDS* 2008; **19**(10): 704-710.

[36] Whaley AL, Winfield EB. Correlates of African American college student's condom use to prevent pregnancy, STD or both outcome. *J Natl Med Assoc* 2003; **95**(8): 702-709.

[37] Buve A, Newell ML. Vulnerability of young women and girls to HIV in sub-Saharan Africa. *AIDS* 2008; **22**(4): 1-86.

[38] Othero DM, Aduma P, Opil CO. Knowledge, attitude and sexual practices of university students for advancing peer HIV education. *East Afr Med J* 2009; **86**(1): 11-15.

[39] Pilcher CD, Tien HC, Eron JJ, Vernazza PL, Leu S, Stewart PW, et al. Brief but efficient: Acute HIV infection and the sexual transmission of HIV. *J Infect Dis* 2004; **189**: 1785-1792.

[40] Ojeifo OM, Gbakeji J. Analysis of spatial awareness of HIV-AIDS amongst students of tertiary institutions in Edo State, Nigeria. *Stud Ethno Med* 2009; **3**(2): 153-158.

[41] Oruonye ED. An assessment of the level of HIV/AIDS awareness and vulnerability in tertiary institutions in Jalingo lga, Taraba state, Nigeria. *Int J Sci Nat* 2012; **3**(4): 805-809.

[42] Uzochukwu B, Uguru N, Ezeoke U, Onwujekwe O, Sibeudu T. Voluntary counseling and testing (VCT) for HIV/AIDS: a study of the knowledge, awareness and willingness to pay for VCT among students in tertiary institutions in Enugu State Nigeria. *Health Policy* 2011; **99**(3): 277-284.