Prevalence of HIV-1 and HIV-2 antibodies and Knowledge about HIV/AIDS, level of awareness and Reported Risk Behaviours in a cohort of traders in Port Harcourt, Nigeria

Frank-Peterside N, Okerentugba PO, Laku CB, Okonko IO

Medical Microbiology Unit, Department of Microbiology, University of Port Harcourt, P.M.B. 5323, Choba, East-West Road, Port Harcourt, Rivers State, Nigeria;
E-mail address: iheanyi.okonko@uniport.edu.ng, Tel: +2348035380891

ABSTRACT: This study evaluated the prevalence of HIV-1 and HIV-2 antibodies in a cohort of traders in three different markets in Port Harcourt, Nigeria. Also, a structured questionnaire was used to determine their knowledge about HIV/AIDS and to ascertain the risk factors associated with HIV and to investigate the level of awareness of HIV/AIDS among these traders. Samples were collected from consented traders in Azikwe street market, Rivers State University of Science and Technology (RSUST) market and Ojoto daily market. Other information was obtained using a Performa specially designed for this purpose. Of the 52 consented traders tested, 4(7.7%) tested positive to of HIV-1 and HIV-2 antibodies. The study found age, marital status, religion and location differences ($P<0.05$) in HIV prevalence of the traders tested. Traders within age group 26-30 years (14.3%) had higher HIV prevalence compared to other age groups. However, the study found no sex and educational status differences ($P>0.05$) in the HIV seropositivity of these traders. The results also showed that of the 52 consented traders, 17 (32.7%) admitted to have been unfaithful with persons other than their spouses/partners; 19(36.6%) make use of condom regularly during sex and 16 (34.6%) were non-users. All the traders admitted to be sexually active. Thirty-four (65.4%) considered themselves at risk of HIV and 40(76.9%) had history of STDs/STIs. The study found unfaithfulness with sex partners, non-use and irregular use of condoms, and sexually activeness to be statistically associated ($P<0.05$) with HIV prevalence in a cohort of these traders. The study also found no significant differences between those who perceived to be at risk or not ($P>0.05$) as well as traders with history of STDs/STIs or not ($P>0.05$) and HIV seropositvity in this study. All the consented traders acknowledged having the knowledge of HIV and 26(50.0%) of them claimed to have gotten their information on HIV from the media (Television/Radio) while others claimed to have gotten their information mainly from news and print media (11.5%), churches (19.2%), social gathering (13.5%) and other undisclosed sources (5.8%). Our study showed that 46.2% of the traders were ignorant of the fact that HIV/AIDS can be transmitted through unprotected sex; 61.5% were ignorant of the use of unsterilized sharp objects and 92.3% claimed ignorant that transfusion of unscreened blood promotes the spread of HIV. The study found level of ignorance of these traders on the mode of transmission of HIV significantly associated ($P<0.05$) with HIV seropositivity in this study. This study however, further confirmed the presence of HIV-1 and HIV-2 antibodies among in a cohort of traders in Port Harcourt, Nigeria. This calls for urgent and concerted efforts aimed at promoting behavioural, cultural and social changes that will reverse the current trend in the prevalence of HIV among the traders.
[Frank-Peterside N, Okerentugba PO, Laku CB, Okonko IO. **Prevalence of HIV-1 and HIV-2 antibodies and Knowledge about HIV/AIDS, level of awareness and Reported Risk Behaviours in a cohort of traders in Port Harcourt, Nigeria.** *Cancer Biology* 2013;3(4):1-11] (ISSN: 2150-1041). http://www.cancerbio.net. 1

Keywords: Antibody, Cohort, Traders, Markets, HIV, Seropositivity, Risk factors

1. INTRODUCTION

In Nigeria, majority of traders constitute a reasonable percentage of the population (Frank-Peterside and Ibanga, 2009). The ranges of goods sold by these traders vary. The high rate of unemployment in the country and increased competition among traders increase their vulnerability of getting infected with HIV/AIDS and other health hazards. Human Immunodeficiency virus (HIV) is a major global health concerns as it cause high mortality and morbidity in the developing countries (Duru et al., 2009). Since the first description of HIV in 1981 in the United States of America, it has continued to spread rapidly, and this life-threatening infection is now considered a pandemic by the World Health Organization (WHO), (Joint United Nations Programme on HIV/AIDS, 2006). HIV/AIDS is a major public health problem in Nigeria. The pandemic is dominated by HIV-1, which was discovered in 1983 (Nsagha et al., 2012). In 1987, HIV-2 was discovered which is very common in West Africa1 and has not shown any significant spread from there (Nsagha et al., 2012). HIV-2 is less easily transmitted than HIV-1 and the period between initial infection and illness is longer than with HIV-1 (Cheesbrough, 2006; Nsagha et al., 2012).

Different studies to determine the prevalence of HIV among different populations have been carried out. A prevalence of 47.54% was reported for HIV in Benin City, Nigeria (Dirisu et al., 2011). Pennap et al. (2006) reported 38.65% prevalence rate of HIV and AIDS in Keffi and environs, Nassarawa State, Nigeria. Motayo et al. (2009) reported 13.6% among patients and 28.6% among pregnant women in Ibadan. A prevalence of 12.0% was also reported among patients with pyrexia of unknown origin and 10.8% among STD patients in Ibadan, Nigeria (Motayo et al., 2009). A zero seroprevalence rate was reported for HIV among blood donors in Ibadan (Alli et al., 2010).

In Rivers State, different HIV prevalences have been reported. Mbakwem-Aniebo et al. (2012a) reported a prevalence of 0.9% among fresh undergraduate student. Frank-Peterside et al. (2013a) reported 61.0% prevalence among patients. A prevalence of 11.0% was reported among undergraduate students (Frank-Peterside et al., 2013b). HIV prevalence of 2.0% was reported among secondary school students (Frank-Peterside et al., 2013c), 9.0% among street-involved youths (Frank-Peterside et al., 2013d) and 11.0% among pregnant women in Port Harcourt, Nigeria (Frank-Peterside et al., 2012).

A number of African countries have conducted large-scale HIV prevention initiatives in an effort to reduce the scale of their epidemics and these include the use of condoms (Adeyi et al., 2006) and the provision of voluntary HIV counselling and testing (VCT) (Sule et al., 2010). In many developed countries, these steps have helped to virtually eliminate mother-to-child-transmission (MTCT). Yet sub-Saharan Africa continues to be severely affected by the problem, due to a lack of drugs, services and information, and the shortage of testing facilities (Avert, 2010; Sule et al., 2010). The fear of voluntary counseling and testing (VCT) is an obstacle to HIV prevention (Nsagha et al., 2012). Thus, this study evaluated the prevalence of HIV in a cohort of traders in three different markets in Port Harcourt, Nigeria. Also, a questionnaire was used to ascertain the risk factors associated with HIV and to investigate the level of awareness of HIV/AIDS among these traders.

2. MATERIALS AND METHODS

2.1. Study Population and Locations

This study evaluated the prevalence and knowledge of HIV/AIDS in a cohort of traders in three different markets in Port Harcourt, Nigeria. A total of 52 traders consented to participate in this project study. The traders were randomly selected. There were 12 males and 40 females used in this study. Permission and approval were sought from the market union leaders in Azikwe street market, Rivers State University of Science and Technology (RSUST) market and Ojoto daily market. The choice of these three markets was due to their proximity to RSUST campus and the busy nature of these areas in Port Harcourt. Azikiwe street market is situated along Ikwerre Mile 3 road by Ikokwu Junction, Port Harcourt. Samples were collected from traders at various stands and stores which include electronic shops, provision stores, saloons and boutiques. RSUST back gate market is just 10 meters away from the main campus, closer to the female hostel; samples were collected mostly from the traders at boutiques stores, saloons, tailoring shops etc. Lastly, samples were collected from Ojoto market, which is situated along Azikiwe Street by Ojoto round about, it is a central market. It is about 100 meters from Ikokwu Junction, Mile II Diobu, Port Harcourt and about 300 meters away from the famous Mile 3 market. Samples were collected from meat sellers, fish sellers and vegetable hawkers.

2.2. Data collection

The method of data collection employed was by structured questionnaire to determine their knowledge about HIV and AIDS. With the help of the Union (traders), meetings and convergence of the traders were organized. Pre-test counseling was given to the traders and those who consented were recruited for the study. Data was obtained by quantitative methodology using structured questionnaires which were administered to the traders randomly. Confidentiality of the process was adequately explained to each participant, who was then given a number and the numbers were used on the forms instead of names. Information was obtained on demographic characteristics and knowledge of HIV/AIDS regarding existence of HIV/AIDS, is it curable, ways of transmission and factors that promote the spread of the disease. It was expected that these respondents would give honest reply to the questions. Assistances were given to those of them who could not fill the questionnaire (illiterates). Every participant were interviewed and interacted in a common language they will understand.

2.3. Collection of samples

The method of blood sample collection employed was venipuncture technique. The samples of blood were collected into EDTA bottles. The blood samples were transported in a commercially available collection and transport system for HIV to the Medical Microbiology Laboratory, Department of Microbiology, University of Port Harcourt, Port

Harcourt, Nigeria for analysis using standard laboratory procedures.

2.4. Serological Analysis

All the consented youths were screened for antibodies to HIV-1 & -2 using two enzyme-linked immunosorbent assay (ELISA) rapid screening kits, based on World Health Organization (WHO) systems-2 for detecting antibodies to HIV-1 & 2. DETERMINE® HIV-1/2 (Abbott laboratories) and HIV-1/2 STAT-PAK® (Chembio Diagnostic Systems, Inc.)', ELISA based kits, were used. The kits were designed primarily to test for the presence of HIV-1 and/or HIV-2 antibodies in the blood. This ELISA based kit is both sensitive and specific (99-100%). All tests were carried out according to the manufacturer's specifications.

2.5. Data Analysis

The prevalence for HIV-1 and HIV-2 antibodies was calculated by using traders with positive samples as numerator and the total numbers of traders enrolled in this study as denominator. The data generated from this study were presented using descriptive statistics. The data was subjected to Fisher's Exact Test for comparison of proportions to determine any significant relationship between infection rate and demographic characteristics of the traders. A total of 100 questionnaires were administered and further subjected for statistical analysis (the χ2-test, with the level of significance set at $p < 0.05$) using statistical package for social sciences (SPSS) 20.0 to determine any significant relationship between level of HIV awareness and HIV seropositivity in a cohort of traders.

3. RESULTS ANALYSIS

A total of 52 (52.0%) out of 100 traders responded and participated in this study; 16 (30.8%) were from Azikiwe street market, 18 (34.6%) from RSUST market and 18 (34.6%) from Ojoto daily market. The ages of these consented traders ranged from 19 to 35 years. Age group 26-30 years was most predominant (40.4%). Forty (76.9%) of the traders were females and 12 (23.1%) were males. Thirty-two (61.5%) were married and 20(38.5%) were singles. Majority (94.2%) of the traders were Christians. Thirty-five (67.3%) of the traders had secondary education and 3(5.8%) had no formal education (Table 1).

3.1. Prevalence of HIV-1 and HIV-2 in relation to the demographic characteristics of the traders

Table 1 shows the prevalence of HIV-1 and HIV-2 antibodies in relation to demographic characteristics of the traders. Of the 52 consented traders tested, 4(7.7%) tested positive to of HIV-1 and HIV-2 antibodies. The age-specific prevalence showed significant difference (14.3 vs. 6.3, P<0.05) between age and HIV seropositivity. Traders within age group 26-30 years (14.3%) had higher HIV prevalence compared to other age groups. The sex-specific prevalence showed no significant difference (8.3 vs. 7.5, P>0.05) between sex and HIV seropositivity. The study found no educational differences (11.1 vs. 8.6, P>0.05) in HIV prevalence of traders. The study found religion differences (8.2 vs. 0.0, P<0.05) in HIV prevalence of traders. The study found marital status differences (15.0 vs. 3.1, P<0.05) in HIV prevalence of these traders. The study found location differences (11.1 vs. 5.6; 11.1 vs. 6.3, P<0.05) in HIV prevalence of these traders (Table 1).

3.2. Perceived Risk Behaviours in a cohort of traders in Port Harcourt, Nigeria

Of the 52 consented traders, 17 (32.7%) admitted to have been unfaithful with persons other than their spouses/partners; 19(36.6%) make use of condom regularly during sex and 16 (34.6%) were non-users. All the traders admitted to be sexually active. Thirty-four (65.4%) considered themselves at risk of HIV and 40(76.9%) had history of STDs/STIs (Table 2). Table 2 shows prevalence of HIV-1 and HIV-2 seropositivity in relation to perceived risk behaviours of the traders. The study found unfaithfulness with sex partners, non-use and irregular use of condoms, and sexually activeness to be statistically associated (11.8 vs. 5.7; 18.8 vs. 0.0; 18.8 vs. 5.9; 7.7 vs. 0.0, P<0.05) with HIV prevalence in a cohort of these traders. However, the study found no significant differences between those who perceived to be at risk or not (8.8 vs. 5.6, P>0.05) as well as traders with history of STDs/STIs or not (8.3 vs. 7.5, P>0.05) and HIV seropositvity in this study (Table 2).

Table 1: Prevalence of HIV-1 and HIV-2 antibodies in relation to demographic characteristics of the traders

Characteristics	No. Tested (%)	No. Positive (%)
Age groups (years)		
19 – 25	16(30.8)	1(6.3)
26 – 30	21(40.4)	3 (14.3)
31 – 35	15(28.8)	0 (0.0)
Sex		
Females	40(76.9)	3(7.5)
Males	12(23.1)	1 (8.3)
Educational Status		
Informal	3(5.8)	0(0.0)
Primary	9(17.3)	1(11.1)
Secondary	35(67.3)	3(8.6)
Tertiary	5(9.6)	0(0.0)
Religion		
Christians	49(94.2)	4(8.2)
Muslims	3(5.8)	0(0.0)
Marital status		
Singles	20(38.5)	3(15.0)
Married	32(61.5)	1(3.1)
Locations		
Azikiwe	16(30.8)	1(6.3)
RSUST	18(34.6)	2(11.1)
Ojoto	18(34.6)	1(5.6)
Total	**52 (100.0)**	**4 (7.7)**

Table 2: Prevalence of HIV-1 and HIV-2 seropositivity in relation to perceived risk behaviours of the traders

Risk factors	No. Tested (%)	No. Positive (%)
Faithfulness		
Yes	35(67.3)	2(5.7)
No	17(32.7)	2(11.8)
Condom use		
Regular users	19(36.6)	0(0.0)
Non-users	16(34.6)	3(18.8)
irregular users	17(28.8)	1(5.9)
Sexually active		
Yes	52(100.0)	4(7.7)
No	0(0.0)	0(0.0)
At Risk		
Yes	34(65.4)	3(8.8)
No	18(34.6)	1(5.6)
History of STDs/STIs		
Yes	40(76.9)	3(7.5)
No	12(23.1)	1 (8.3)
Total	**52 (100.0)**	**4 (7.7)**

3.3. Knowledge about HIV/AIDS and Level of Awareness of HIV in a cohort of traders in Port Harcourt, Nigeria

All the consented traders acknowledged having the knowledge of HIV and 26(50.0%) of them claimed to have gotten their information on HIV from the media (Television/Radio) while others claimed to have gotten their information mainly from news and print media (11.5%), churches (19.2%), social gathering (13.5%) and other undisclosed sources (5.8%).

The following prevalences were recorded for perceived factors that promote the spread of HIV among traders: unprotected sex (53.8%), sharing of unsterilized sharp objects (38.5%) and transfusion with unscreened blood (7.7%). However, our study

showed that 46.2% of the traders were ignorant of the fact that HIV/AIDS can be transmitted through unprotected sex; 61.5% were ignorant of the use of unsterilized sharp objects and 92.3% claimed ignorant that transfusion of unscreened blood promotes the spread of HIV (Table 3).

Table 3 shows prevalence of HIV seropositivity in relation to their levels of awareness in a cohort of traders. The study found level of ignorance of these traders on the mode of transmission of HIV significantly associated (10.7 vs. 4.2, 9.4 vs. 5.0, 7.7 vs. 0.0, $P<0.05$) with HIV seropositivity in this study.

Table 3: Prevalence of HIV seropositivity in relation to their levels of awareness

Levels	No. Tested (%)	No. Positive (%)
Knowledge of HIV before		
Yes	52(100.0)	4(7.7)
No	0(0.0)	0(0.0)
Source of Information		
News and pint media	6(11.5)	0(0.0)
Social gathering	7(13.5)	1(14.3)
Television/Radio	26(50.0)	2(7.7)
Churches	10(19.2)	1(10.0)
Others	3(5.8)	0(0.0)
Mode/Route of Transmission		
Unprotected sex		
Yes	28(53.8)	3(10.7)
No	24(46.2)	1(4.2)
Sharing of unsterilized sharp objects		
Yes	20(38.5)	1(5.0)
No	32(61.5)	3(9.4)
Transfusion of unscreened blood		
Yes	4(7.7)	0(0.0)
No	48(92.3)	4(7.7)
Total	**52 (100.0)**	**4(7.7)**

4. DISCUSSION

The aim of this study was to evaluate the prevalence HIV-1 and 2 antibodies and knowledge of HIV/AIDS in a cohort of traders in Port Harcourt, Rivers State, Nigeria. Market traders are important factor in the epidemic of this disease. Due to the rising rate of unemployment, and the poor economic situation, most of these traders get into sexual relationship often for material benefits or for the augmenting of their meager income. Traders constitute a reasonable percentage of the population at risk. Majority (76.9%) of the consented traders were females. In sub-Saharan Africa region, as worldwide, female population is a key factor in the epidemiology of HIV and AIDS because 50% of all adults with HIV infection are women predominantly infected via heterosexual transmission; furthermore, females are the most severely affected (Mitchell and Stephens, 2004; WHO, 2004; Sule et al., 2010; Okonko et al., 2012a).

In this study, the overall prevalence of HIV was found to be 7.7%. This is higher compared to what was reported elsewhere in Nigeria and outside Nigeria. Different studies show variation in the prevalence of HIV among different populations. Our present value of 7.7% for HIV in this study is higher than the 0.9% reported by Mbakwem-Aniebo et al. (2012a) among fresh undergraduate student and 2.0% was reported among secondary school students in our previous study (Frank-Peterside et al., 2013c). It is higher than the 4.1% HIV prevalence reported previously among traders in Port Harcourt (Buseri et al., 2010). It is higher than the prevalence of 5.1% reported in Cameroon in 2010 (Nsagha et al., 2012). It is higher than the 3.1% reported in Osogbo, Nigeria (Buseri *et al*., 2009); the 0.0% seroprevalence reported for HIV in Ibadan (Alli et al., 2010). This rate also differs from the 3.5% seroprevalence reported in Enugu (Chukwurah and Nneli, 2005); the 3.8% seroprevalence reported in Dar es Salaam

(Matee et al., 2006) and the 5.8% reported in Maiduguri, Nigeria (Chikwem *et al*., 1997). This finding also differs from the 6.0% rate reported in Jos, Nigeria (Egah *et al.*, 2004) and the 4.55% reported in Cameroon (Musi *et al*., 2004).

The 7.7% HIV prevalence reported in this present study is comparable lower to the values reported in our previous studies (Frank-Peterside et al., 2012, 2013a,b,d). It is lower than the 61.0% reported among patients (Frank-Peterside et al., 2013a); the 11.0% reported among undergraduate students (Frank-Peterside et al., 2013b); the 9.0% among street-involved youths (Frank-Peterside et al., 2013d) and the 11.0% reported among pregnant women in Port Harcourt, Nigeria (Frank-Peterside et al., 2012). It is also lower than the 47.54% reported in Benin City, Nigeria (Dirisu et al., 2011); the 38.65% reported in in Keffi and environs, Nassarawa State, Nigeria (Pennap *et al*., 2006) and the 13.6%, 28.6%, 12.0% and 10.8% reported in Ibadan, Nigeria among patients, pregnant women, patients with pyrexia of unknown origin and STD patients respectively (Motayo et al., 2009). This finding also differs from the 10.0% seroprevalence of HIV reported in Benin City, Nigeria (Umolu *et al*., 2005); the 17.5% reported in Ibadan (Okonko et al., 2012a) and the 8.8% reported by Okonko et al. (2012b). However, it is compared favourably with the 7.0% reported previously in Benin City, Nigeria (Oronsaye and Oronsaye, 2004).

Other studies in West Africa show 0.4% HIV-1 and 0.2% HIV-2 in northern Benin (Zanchette et al., 1990; Nsagha et al., 2012), 6.6% HIV-1 and 0.9% HIV-2 in central Benin (Nsagha et al., 2012), 25% HIV-2 and 5% HIV-1/HIV-2 in Mauritania (Baidy et al., 1993; Nsagha et al., 2012), 65%HIV-1, 24% HIV-2 and 11% HIV-1/HIV-2 in Senegal (Ndiaye et al., 2008; Nsagha et al., 2012) and 12.1% HIV-1, 0.5%HIV-2 and 1.6% co-infection in north western Nigeria (Abdulazeez et al., 2008; Nsagha et al., 2012).

In this study, risk factors pertinent to transmission of HIV were evaluated. The age-specific prevalence showed significant difference between age and HIV seropositivity. Traders within age group 26-30 years (14.3%) had higher HIV prevalence compared to other age groups. This is comparable to the findings of previous studies. It agrees with Frank-Peterside et al. (2013b) who reported age-specific differences in HIV prevalence in which age groups 20-35 years had the highest prevalence compared to other age groups in their study. This is also in agreement with Okonko et al. (2012b) who also reported age associated HIV positivity. Akinjogunla and Adegoke (2009) reported a significant difference in the age of the individuals with HIV. Laah and Ayiwulu (2010) who reported higher seroprevalence rate of HIV in age group 20-34 years. Macpherson *et al*. (2006) reported in a higher prevalence of HIV among children greater than 15 years of age in Canada. The study by Middelkoop et al. (2011) showed a high force of infection among adolescents, positively associated with increasing age. Our finding differs from Mbakwem-Aniebo et al. (2012a) who reported that HIV prevalence was higher among age group 20-25years. However, this present study deviated from that of Okonko et al. (2012a) who reported no significantly association with HIV- 1/2 seropositivity and age. This was also not in line with the findings of Alikor and Erhabor (2005) and Sule et al. (2010), who reported no statistically difference in age.

The sex-specific prevalence showed no significant difference between sex and HIV seropositivity. The gender difference in patterns of HIV among young people varies substantially around the world and in this study. This compared favourably with Mbakwem-Aniebo et al. (2012a) and Frank-Peterside et al. (2013b) who found no significant association with the sex of subjects in their study. This finding deviated from the findings of some studies in Nigeria. A few studies have however, documented higher prevalence of HIV/AIDS among males (Celikbas *et al*., 2008; Avert, 2010). Previous study by Olaleye et al. (2006) showed a significantly higher HIV infection rate among males than females in different regions and even in communities within the same geographic location in the country (Olaleye et al., 2006). Akinjogunla and Adegoke (2009) reported a significant difference in the sex of the individuals with HIV. Laah and Ayiwulu (2010) reported higher seroprevalence rate of HIV in females in Nasarawa State, Nigeria. Though, most studies have attributed that higher proportion of male than female population had antibody to HIV (Olaleye et al., 2006; Sule et al., 2009), this present study agrees favorably with that of Okonko et al. (2012a) who reported no significantly association with HIV- 1/2 seropositivity and gender. This was also in line with the findings of Alikor and Erhabor (2005) and Sule et al. (2010), who reported no statistically difference in gender. However, this is disagrees with Okonko et al. (2012b) who reported sex associated HIV positivity.

The study found no educational differences in HIV prevalence of traders. This disagrees with Frank-Peterside et al. (2012) who reported significant difference between educational status and HIV seropositivity. A study by Buseri et al. (2010) found a correlation in terms of occupation and HIV seropositivity. HIV seropositivity was found among

subjects with all the occupations in their study (full-time housewives, traders, students, seamstresses, civil and public servants). The reason for this is not clear, but it may suggest involvement in unprotected promiscuous sexual relationships, since the women had not experienced blood transfusion and surgery (Buseri et al., 2010). Previous studies found that women with a low level of education, low income and low socioeconomic status are more likely to access antenatal care late or be unbooked (Akani et al., 2010; Frank-Peterside et al., 2012).

The study found religion differences in HIV prevalence of traders. This disagrees with Frank-Peterside et al. (2013b) who reported no religion differences in HIV prevalence. The 10.5% value reported for Christian students in this study is higher the 3.6% reported by Kagimu et al. (2012) in their study and the prevalence of 3.4% that was found earlier in their 2005 national sero-behavioral survey in Uganda (MOH and ORC Macro, 2006; Kagimu et al., 2012). A prevalence of 12.5% prevalence for HIV was reported for Muslims in this study. This is also higher than the 5.0% reported among Muslims in previous studies (MOH and ORC Macro, 2006; Kagimu et al., 2012). According to Kagimu et al. (2012), it is possible that religious practices such as circumcision could partly explain the differences. However, it is not clear whether those who are more religious and adhere to their religious practices have a lower HIV prevalence rate compared to those who do not (Kagimu et al., 2012). It has been suggested by scholars that studies linking religiosity to serological markers of HIV infection are likely to increase understanding of the role of religion in HIV prevention (Trinitapoli et al., 2005; Kagimu et al., 2012).

The study found marital status differences in HIV prevalence of these traders. This might be due to other contributing factor such as pre-marital and extra-marital sexual contacts which were common in Port Harcourt (Mbakwem-Aniebo et al., 2012a; Frank-Peterside et al., 2013b). Our finding is similar to what was reported by Mbakwem-Aniebo et al. (2012a) who found HIV prevalence to be highest among singles. It disagrees with Frank-Peterside et al. (2013b) who reported no marital status differences in HIV prevalence. Okonko et al. (2012b) also reported marital status associated HIV positivity in their study in Ibadan, Nigeria.

The study found location differences in HIV prevalence of these traders. This is in agreement with Okonko et al. (2012b) who also reported locality associated HIV positivity.

The study found unfaithfulness with sex partners, non-use and irregular use of condoms, and sexually activeness to be statistically associated with HIV prevalence in a cohort of these traders. In this study, 36.6% of the traders used condoms during sexual intercourse; 34.6% do not use condoms while 28.8% used condoms but not always. Traders with a reasonable knowledge of HIV may not perceive themselves to be at risk and may continue to engage in high-risk behavior (Landefeld et al., 1988; Rogers et al., 1996; Mbakwem-Aniebo et al., 2012b). Traders are particularly vulnerable to HIV infection because of the physical, psychological, social and economic attributes of adolescence (Earl, 1995; Oppong Asante and Oti-Boadi, 2012). Traders are also at risk as a result of high risky sexual behaviours, attitudes, and constraints of the societies in which they grow up (Oppong Asante and Oti-Boadi, 2012). Previous studies have documented that young people indulge in many of the behaviors that promote HIV transmission, including having sex with multiple partners (Mbakwem-Aniebo et al., 2012b), having unprotected sexual intercourse, and using drugs or alcohol during sex (Johnson et al., 1992; Taylor et al., 1997; Lewis et al., 1997; Duncan et al., 2002; Thomas et al., 2008; Mbakwem-Aniebo et al., 2012b).

Our study found no significant differences between those who perceived to be at risk or not as well as traders with history of STDs/STIs or not and HIV seropositvity in this study. Our findings on risk behaviors and perception of risk for HIV were consistent with previous studies (Gayle et al., 1990; Rogers et al., 1996; Olowosegun et al., 2009; Mbakwem-Aniebo et al., 2012b). However, it has been previously reported that peer pressure to obtain luxury items, such as expensive clothing, jewellery, fashionable hairstyles, accessories, and makeup, motivates young female traders and other young women to engage in transactional sex (Ankomah, 1998; Temin et al., 1999; Longfield et al., 2002; Oppong Asante and Oti-Boadi, 2012).

All the consented traders have knowledge of HIV before they enrolled in this study. However, contrary to our finding, Nwachukwu and Orji (2008) reported that none of the fresh graduates in their study had any prior information of their HIV status. Also, Madani *et al*. (2004) reported that at diagnosis, some infected persons do not have prior knowledge of their HIV status. This also corroborates previous findings by Orubuloye et al. (1995); Olowosegun et al. (2009) and Mbakwem-Aniebo et al. (2012b) who reported that 98.4% of the respondents in their study knew about HIV/AIDS.

We also found level of ignorance of these traders on the mode of transmission of HIV significantly associated with HIV seropositivity in

this study. The spread of HIV/AIDS is on the increase due to ignorance (Olowosegun et al., 2009; Mbakwem-Aniebo et al., 2012b). Iwoh (2004) also reported that there was low knowledge of HIV/AIDS/STIs among prison staff in Nigeria. Olowosegun et al. (2009) also reported that most people were not aware of the implication of sharing the same razor in cutting their nails. In agreement with previous studies, the prevalence of the HIV is fuelled by low levels of male and female condom use, high rates of casual and transactional unprotected sex among young people, poverty, low literacy levels, cultural and religious factors, as well as stigma and discrimination (Avert, 2010; National Population Commission and ICF Macro, 2009; Inungu and Karl, 2010; Mbakwem-Aniebo et al., 2012b).

5. CONCLUSION

The study indicates a 7.7% prevalence of HIV among traders studied. Comparatively, this HIV prevalence of 7.7% reported in this subpopulation may be a true reflection of the HIV rates in the population (FMoH, 2011). This calls for urgent and concerted efforts aimed at promoting behavioural, cultural and social changes that will reverse the current trend in the prevalence of HIV among the traders.

Correspondence to:
Iheanyi O. Okonko
Department of Microbiology,
University of Port Harcourt,
PMB 5323 Uniport Post Office, Choba,
East-West Road, Port Harcourt, Nigeria;
E-mail:mac2finney@yahoo.com;
iheanyi.okonko@uniport.edu.ng
Tel.: +234 803 538 0891

REFERENCES

1. Abdulazeez A, Alo E, and Naphthali R. Concurrent infection of HIV-1 and HIV-2 serotypes in Adamawa State Nigeria. World Journal of Medical Science 2008; 3(1): 15-18.
2. Adeyi et al. (2006) 'AIDS in Nigeria: A nation on the threshold'. Chapter 2: The epidemiology of HIV/AIDS in Nigeria. Harvard Center for Population and Development Studies.
3. Akani, C.I., O. Erhabor and O.A. Dennis, 2010. Human immunodeficiency virus prevalence in an unbooked obstetric population in the Niger Delta. HIV/AIDS- Research and Palliative Care, 2: 179-184.
4. Akinjogunla OJ and Adegoke AA. Seroprevalence of human immunodeficiency virus (HIV) 1 and 2 infections in Uyo metropolis, Akwa Ibom State. Scientific Research and Essay, 2009; 4 (11):1381-1384
5. Alikor DE, Erhabor NO (2005). Trends of HIV Seropositivity among Children in a Tertiary Health Institution in the Niger Delta Region of Nigeria. African Journal of Health Sciences, 12: 108-113
6. Alli JA, Okonko IO, Abraham OA, Kolade AF, Ogunjobi PI, Tonade OO, Ojezele MO, Nwanze JC. 2010. A serosurvey of blood parasites (Plasmodium, Microfilaria, HIV, HBsAg, HCV antibodies) in prospective Nigerian blood donors. Research Journal in Medical Sciences 4(4):255-275
7. Ankomah A. Condom use in sexual exchange relationships among young single adults in Ghana. AIDS Education and Prevention 1998; 10: 303–316.
8. Avert, 2010. HIV and AIDS in Nigeria. Retrieved from: www.avert.org/aids.htm. (Accessed date: February 18, 2010).
9. Baidy Lo B, Adimorty M, Fatimata C, Amadou S. Surveillance of HIV seroprevalence in Mauritania. Bulletin de Societé de Pathologie Exotique 1993; 86(2):133-135.
10. Buseri FI, E Seiyaboh, and ZA Jeremiah. 2010. Surveying Infections among Pregnant Women in the Niger Delta, Nigeria. J Glob Infect Dis. 2(3): 203–211.
11. Celikbas, A., O. Ergonul, N. Baykam, S. Eren, H. Esener, M. Eroglu and B. Dokuzoguz, 2008. Epidemiologic and clinical characteristics of HIV/AIDS patients in Turkey, where the prevalence is the lowest in the region. Journal of International Association of Physician. AIDS Care, 7(1): 42-45.
12. Cheesbrough M. Human immunodeficiency virus (HIV). District Laboratory Practice in Tropical Countries. Part 2, Second Edition. Cambridge University Press. 2006; 253-265.
13. Chikwem JO, Mohammed I, Okara GC, Ukwandu NC, Ola TO. 1997. Prevalence of transmissible blood infections among blood donors at the University of Maiduguri Teaching Hospital, Maiduguri, Nigeria. East African Medical Journal 74(4):213-216.
14. Chukwurah EF, Nneli RO. 2005. Prevalence of transfusion transmissible infectious disease markers among blood donors in a south Eastern state of Nigeria. Nigerian Biomedical Science Journal; 1:114–117.
15. Dirisu JO, Alli TO, Adegoke AO, Osazuwa F. A survey of prevalence of serum antibodies to human immunodeficiency deficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C

virus (HCV) among blood donors. North Am J Med Sci 2011; 3: 35-38.
16. Duncan, C., D.M. Miller, E.J. Borskey, B. Fomby, P. Dawson, and L. Davis, 2002. Barriers to safer sex practices among African American college students. Journal of National Medical Association;94:944–951.
17. Duru MU, HSA Aluyi, and KC Anukam. 2009. Rapid screening for co-infection of HIV and HCV in pregnant women in Benin City, Edo State, Nigeria. Afr Health Sci. 9(3): 137–142.
18. Earl D. Re-examination of the paradigm of HIV risk reduction in Adolescents. Journal of the American Osteopathic Association 1995; 95(12): 725-728.
19. Federal Ministry of Health (2011) Technical Report on the 2010 National HIV/Syphilis Sero-prevalence Sentinel Survey Among Pregnant Women Attending Antenatal Clinics in Nigeria. Department of Public Health National AIDS/STI Control Programme. Abuja: Nigeria.
20. Frank-Peterside N and I. Ibanga (2009). HIV/AIDS awareness among traders in Port-Harcourt, Rivers-State, Nigeria. Mary Slessor Journal of Medicine, 9(1): 63-69.
21. Frank-Peterside N, Chukwugozim-Umejuru R, Okerentugba PO, Okonko IO. 2013a. HIV-1 & -2 Co-Infections with Multi-Drug Resistant (MDR) Uropathogens in Port Harcourt, Nigeria. Nat Sci;11(11):11-20
22. Frank-Peterside N, IO Okonko, PO Okerentugba, N Jaja. 2012. Detection of HIV 1 and 2 Antibodies among Pregnant Women in Port Harcourt, Rivers State, Nigeria. World Applied Sciences Journal 16 (4): 589-598
23. Frank-Peterside N, Joshua RA, Okerentugba PO, Okonko IO. 2013b. Prevalence of HIV-1 & HIV-2 Antibodies Among Undergraduate Students Of Uniport, Nigeria. Academia Arena, 5(10):48-52
24. Frank-Peterside N, Nneji LC, Okerentugba PO, Okonko IO. 2013d. Prevalence of HIV-1 and HIV-2 antibodies in a cohort of street-involved youths in Oyigbo, Rivers State, Nigeria. World Rural Observations, 5(in press)
25. Frank-Peterside N, Okerentugba PO, Akpan HR, Okonko IO. 2013c. Prevalence of HIV-1 and HIV-2 Antibodies among Secondary School Students in Port Harcourt, Nigeria. Researcher;5(in press)
26. Gayle, H.D., R.P. Keeling, M. Garcia-Tunon, B.W. Kilbourne, J.P. Narkunas, F.R. Ingram, and et al., 1990. Prevalence of the human immunodeficiency virus among university students. New England Journal of Medicine; 323:1538–1541
27. Inungu, J. and S. Karl, 2010. Understanding the Scourge of HIV/AIDS in Sub-Saharan Africa: Factors Fuelling the Spread of HIV/AIDS in Africa. Medscape Today, Retrived from: http://www.medscape.com/viewarticle/544819_3. (Accessed date: February 22, 2010).
28. Isibor M. D., and A.J. Ajuwon, 2004. Journalists' knowledge of HIV/AIDS and attitude to persons living with HIV in Ibadan. African Journal of Reproductive Health,8(2): 101-10
29. Iwoh, I, 2004. "HIV/and the Workplace: Preventing Low Productivity among Personnel of Nigeria Prison Service." Paper Presented at the 15th International Conference on AIDS 2004, Bangkok, Thailand.
30. Johnson, R.L., W. Douglas, and A. Nelson, 1992. Sexual behaviors of African-American male college students and the risk of HIV infection. Journal of National Medical Association;84:864–868.
31. Joint United Nations programme on HIV/AIDS, 2006. Report on the Global AIDS Epidemic: A UNAIDS 10th Anniversary Special Edition. Joint United Nations Programme on HIV/AIDS, Geneva, pp: 24, ISBN: 9291735116.
32. Kagimu M, Guwatudde D, Rwabukwali C, Kaye S, Walakira Y, Ainomugisha D. 2012. Religiosity for HIV prevention in Uganda: a case study among Christian youth in Wakiso district. African Health Sciences 2012; 12(1): 17 - 25
33. Laah, J.G., and Ayiwulu, E., 2010. Socio-Demographic Characteristics of Patients Diagnosed with HIV/AIDS in Nasarawa Eggon. Asian Journal of Medical Sciences 2(3): 114-120
34. Landefeld, C.S., M.M. Chren, J. Shega, T. Speroff, and T. McGuire, 1988. Students' sexual behavior, knowledge, and attitudes relating to the acquired immunodeficiency syndrome. Journal of General and Internal Medicine; 3:161–165.
35. Lewis, J.E., R.M. Malow, and S.J. Ireland, 1997. HIV/AIDS risk in heterosexual college students. A review of a decade of literature. Journal of American College of Health; 45:147–158.
36. Longfield K, Glick A, Waithaka M, Berman J. "Cross-Generational Relationships in Kenya: Couples' Motivations, Risk Perception for STIs/HIV and Condom Use." Working Paper

No. 52. Washington, DC: PSI Research Division, 2002.
37. Macpherson, W.D., M. Zencorich and B.D. Gushulak, 2006. Emerging pediatric HIV Epidemic related to migration. Emerging Infectious Diseases, 12: 612-615.
38. Madani, T.A., Y.M.Yagob, J.H. Mohammed and N.S. Huzaim, 2004. Epidemiology of the Human immunodeficiency virus in Saudi Arabia; 18 years result and prevention from an Islamic perspective. BMC Infect Diseases, 4: 1186-1178.
39. Mbakwem-Aniebo C, Ezekoye CC, Okonko IO. 2012. Knowledge About HIV/AIDS, and Reported Risk Behaviours Among Freshmen of The University of Port Harcourt, Port Harcourt, Southern Nigeria. World Applied Sciences Journal 16 (8): 1093-1103
40. Mbakwem-Aniebo C, Ezekoye CC, Okonko IO. 2012a. Detection of HIV-1 and -2 Antibodies Among Freshmen of the University of Port Harcourt, Port Harcourt, Southern Nigeria. World Applied Sciences Journal 16 (8): 1087-1092
41. Middelkoop, K., L.G. Bekker, H. Liang, L.D.H. Aquino, E. Sebastian, L. Myer, and R. Wood, 2011. Force of tuberculosis infection among adolescents in a high HIV and TB prevalence community: a cross-sectional observation study. BMC Infectious Diseases, 11:156 doi:10.1186/1471-2334-11-156
42. Ministry of Health (MOH) Uganda and ORC Macro 2006. Uganda HIV/AIDS serobehavioral survey 2004-2005. Calverton Maryland USA: Ministry of Health ORC Macro.
43. Mitchell HS, Stephens E (2004). Contraception choice for HIV positive women. Sex. Transm. Infect. 80:167-173.
44. Motayo OB, Okonko IO, Uche LN, Onoja BA, Obiogbolu CH. 2009. The Seroprevalence of Human Immunodeficiency Virus (HIV) among Patients Attending the Special Treatment Clinic at University College Hospital, Ibadan, Nigeria. Nigerian Journal of Microbiology 23(1): 1904-1910
45. Musi SS, Monny LM, Ndjitoyap NEC, et al. 2004. Prevalence of transfusion transmitted infectious agents among healthy blood donors in Cameroon. International Conference on AIDS Report; July 11–16; 2004; p. 15.
46. National Population Commission and ICF Macro, 2009. Nigeria Demographic and Health Survey 2008. Abuja.
47. Ndiaye P, Diedhiou A, Ly D, Fall C, Tal-Dia A. HIV/AIDS Prevalence among the attendees at the center for voluntary and anonymous detection and support in Pekine/Guediawaye, Senegal. Medicin Tropicale 2008; 68(3): 277-82.
48. Nsagha DS, Njunda AL, Kamga HLF, Assob JCN, Bongkem EA. 2012. HIV-1/HIV-2 co-infection among voluntary counselling and testing subjects at a regional hospital in Cameroon. African Health Sciences 2012; 12(3): 276 – 281
49. Nwachukwu, N.C., and A. Orji, 2008. Sero Prevalence of Human Immunodeficiency virus among Some Fresh Nigerian Graduates, Research Journal of Immunology 1(2): 51-55.
50. Okonko IO, Adeniji FO, Okerentugba PO, Anugweje KC. 2012a. Detection of HIV 1 & 2 Antibodies among Intending Blood Donors. Nature and Science, 10(5):1-6
51. Okonko IO, Anugweje KC, Adeniji FO, Abdulyekeen RA. 2012b. Syphilis and HIV, HCV and HBsAg coinfections among Sexually Active Adults. Nature and Science; 10(1):66-74
52. Olaleye DO, Tekena OH, Odaibo GN (2006). The Virology and Dynamics of the Epidemic: In- AIDS in Nigeria: A Nation on the Threshold. Edited by: Olusoji Adeyi, Phyllis J. Kanki, Oluwole Odutolu, John A. Idoko. Havard Center for Population and Development Studies, 9 Bow Street, Cambridge, MA 02138 USA. pp. 37-66.
53. Olowosegun, T., J.A. Akangbe, O.M. Olowosegun, A.M. Sule, A.O. Sanni, and P.I. Ifejika, 2009. Knowledge, Attitude and Practices of HIV/AIDS in Selected Fishing Communities of Kainji Lake Basin. Nature and Science; 7(10):1-9
54. Oppong Asante K, Oti-Boadi M. 2012. HIV/AIDS knowledge among undergraduate university students: implications for health education programs in Ghana. African Health Sciences 2013; 13(2): 270 – 277
55. Oronsaye FE, Oronsaye JI. 2004. Prevalence of HIV-positives and hepatitis B surface antigen positives among donors in the University of Benin Teaching Hospital, Nigeria. Tropical Doctor; 34 (3):159-60.
56. Orubuloye, I.O., O.P. Omoniyi, and W.A. Shokunbi, 1995. Sexual Networking, STDs and HIV/AIDS in Four Urban Gaols in Nigeria. Health Transition 1995 Review, Supplementary to Volume 5 pp. 123-129.
57. Pennap GRI, Makut MD, Gyar SD, Owuna G (2006). Sero-prevalence of HIV/AIDS in Keffi and Environs. Nigerian Journal of Microbiology 20(3):1114- 1146.

58. Rogers, A.S., D. Futterman, L. Levin and L. D'Angelo, 1996. A profile of human immunodeficiency virus—infected adolescents receiving health care services at selected sites in the United States. Journal of Adolescent Health; 19(6): 401-408
59. Sule WF, Okonko IO, Yusuf OT, Donbraye E, Fadeyi A, Alli JA. 2010. HIV-1 and -2 Antibodies among Children in Anyigba, Kogi State, Nigeria. Asian Journal of Medical Sciences 2(4): 170-176
60. Taylor, S.E., C. Dilorio, T.T. Stephens, and J.E. Soet, 1997. A comparison of AIDS-related sexual risk behaviors among African-American college students. Journal of National Medical Association;89:397–403.
61. Temin MJ, Okonofua FE, Omorodion FO, Renne EP, Coplan P. Perception of sexual behaviour and knowledge about sexually transmitted disease among adolescents in Benin City, Nigeria. International Family Planning Perspective 1999; 25(4): 186-190.
62. Thomas, P.E., A.C. Voetsch, B. Song, D. Calloway, C. Goode, L. Mundey, J. Nobles, K. Sly, M.R. Smith, B. Williams, M. Shiloh, K. Patterson, S. Ward, P.S. Sullivan, and J.D. Heffelfinger, 2008. HIV Risk Behaviors and Testing History in Historically Black College and University Settings. Public Health Report; 123(Suppl 3): 115–125
63. Trinitapoli J, Regnems M. Religion and HIV risk behaviors among men. Initial results from a panel study in rural sub-Saharan Africa. Population research centre working paper series 2004-2005. No. 04-05-05.
64. Umolu PI, Okoror LE, Orhue P. 2005. Human immunodeficiency virus (HIV) seropositivity and hepatitis B surface antigenemia (HBsAg) among blood donors in Benin City, Edo state, Nigeria. African Health Sciences; 5(1): 55–58.
65. World Health Organization (WHO, 2004). AIDS epidemic update: Nigeria In: WHO Epidemiological Fact Sheets on HIV/AIDS and Sexually Transmitted Infections December 2004. World Health Organization: Geneva, p 87.
66. Zanchette N, Vigano P, Priuli GB, Ferrario MP, Zago M, Pagano A. HIV-1 and HIV-2 prevalence of seropositivity in a population of Western Africa. European Journal of Epidemiology 1990; 6(1): 71-75.

10/18/2013