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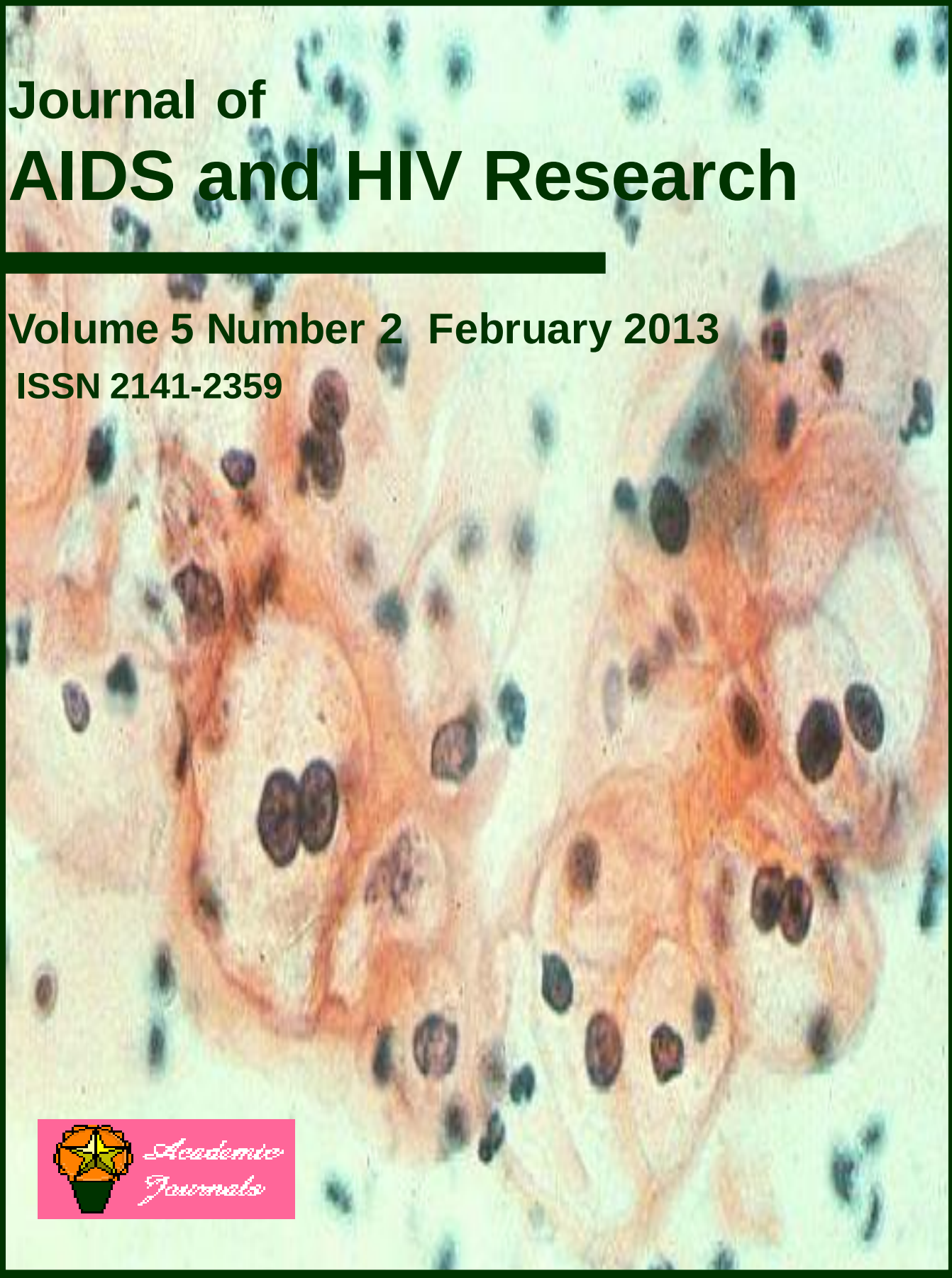

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Moran GJ, Amii RN, Abrahamian FM, Talan DA (2005). Methicillinresistant Staphylococcus aureus in community-acquired skin infections. Emerg. Infect. Dis. 11: 928-930.

Pitout JDD, Church DL, Gregson DB, Chow BL, McCracken M, Mulvey M, Laupland KB (2007). Molecular epidemiology of CTXM-producing Escherichia coli in the Calgary Health Region: emergence of CTX-M-15-producing isolates. Antimicrob. Agents Chemother. 51: 1281-1286.

Pelczar JR, Harley JP, Klein DA (1993). Microbiology: Concepts and Applications. McGraw-Hill Inc., New York, pp. 591-603.

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Journal of AIDS and HIV Research

Table of Contents: Volume 5 Number 2 February 2013

ARTICLES

Research Articles

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Full Length Research Paper

Nurses' level of knowledge on the human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), behavior and practices: A survey from Turkish Society

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Acquired immune deficiency syndrome (AIDS) is a syndrome for which no current treatment or prophylactic vaccine exists. It is caused by a virus called the Human immunodeficiency virus (HIV). Protection against this disease can be provided through a good understanding of the transmission routes. This study was conducted to determine nurses' level of knowledge on the HIV/AIDS disease. This study was performed as a descriptive trial designed to determine nurses' level of knowledge on the HIV/AIDS disease in a hospital located at the center of Erzurum, a city with a population of 985,389 in the east of Turkey. A total of 170 nurses participated in the study. A form on the socio-demographic characteristics and a survey form related to the transmission routes for HIV/AIDS, the sources of infection and the protective measures were used to collect the study data. Percentage distributions were used for data assessment. Based on the survey, results obtained from 170 nurses, of whom 45.3% were between 26 and 33 years of age (n:77), 170 nurses (100%) indicated that HIV/AIDS was transmitted through blood with high rates of transmission also through dentist, barber and hairdresser practices and circumcision tools; 97.6 and 99.4% of the nurses indicated that HIV can be found in the vaginal fluid and semen, respectively, while 91.2% of the nurses indicated that use of a condom/diaphragm was an effective measure for protection against HIV/AIDS. Post-graduate in-service training should be organized to fulfill the requirement for information that the nurses have.

Key words: Human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), nurse, level of knowledge, transmission routes.

INTRODUCTİON

The fact that AIDS progressively represents a significant hazard worldwide and the predictions that the mean lifespan will be lowered to below 30 years in under-developed countries, and primarily in Africa, render this disease a global cause. Based on the Global AIDS Report 2011 data, there are currently 34 million people suffering from AIDS worldwide. These include 30.1 million adults, 16.8 million women and 3.4 million children below 15 years of age (World AIDS Day Report, 2011). While a high level of consciousness and the development of therapeutic and prophylactic methods have resulted in a reduction in AIDS cases in certain regions, in other regions, the number of people suffering from AIDS has increased. Particularly, low- and middle-income countries are severely affect by AIDS. Accordingly, the number of individuals suffering from the HIV virus has increased by 250% since 2001 in Eastern Europe and Middle Asia Russia and the Ukraine account for around 90% of the prevalence in that area. South Africa is reported to have the largest population living with HIV (5.6 millions) (South African National HIV Prevalence, 2008).

Globally, 40 million people are currently known to be HIV positive with 95% living in developing countries. This disease, affecting 40 million people since its emergence in 1981 has resulted in the death of 29.6 million people. AIDS is particularly threatening for women and children

(Babayiğit and Bakır, 2004). Turkey may also be included in the category of countries under risk due to its geographic location and migration. Approximately 14 million international visitors come to our country within a year (http://www.unicef.org/turkey/dn/ah14.html). In addition, considering its population approaching 75 million, with this active structure associated with both natural and unnatural factors, and the young population, we can clearly see the importance of the HIV/AIDS issue for our country (http://sbu.saglik.gov.tr/tusp/turkce/yayinlar/pdf_dokumanlar/27_CYBE-HIV_DurumAnalizi.pdf 2007; Gökengin et al., 2003; http://europeandcis.undp.org/rhdr.aids2008/report/hiv_turkish_tr.pdf, 2008).

While the number of cases with HIV/AIDS infection reached 1,712 between 1985 and 2003 in Turkey (http://www.unicef.org/turkey/dn/ah14.html), this figure was reported to be 2,544 based on the 2006 records (623 AIDS patients, 1921 HIV carriers) (http://aids.about.com/od/dataandstatistics/qt/healthstats.htm. url: 15/02/2012). The reports indicate the current number of AIDS patients as 4,860 in our country and revealed a 1% AIDS prevalence among infants, with 3,436 males and 390 females having received HIV/AIDS treatment (Tümer, 2006). The disease is observed to have attained a chronic course nationwide. In Turkey, the reports reveal that women start treatment at the final stage of the disease and often do not seek medical help or attend regular follow-up visits due to various reasons such as common taboos and social oppression (Bedük et al., 2011).

The Human immunodeficiency virus (HIV) is a type of virus that slowly destroys the immune system in the human body. This virus attacks the immune system of the human body, thereby making the body fight against diseases and infections. Opportunist infections and the complications secondary to these infections may be fatal (Midilli, 2007). The most common route of transmission among healthcare workers is the pinprick (Özacar and Zeytinoğlu, 1996; Korkmaz, 2008). Regarding the most common route of transmission to healthcare workers, that is pinprick, in daily practice, 18, 70 and 12% of transmission cases occur during, before and after use, and during the disposal of the material, respectively (Clarke et al., 2002). Additionally, injuries from sharps contaminated by blood or the spreading of the infected blood or other body fluids to the mucosa represent the other routes of transmission (Ridzon, 1997).

The population bearing the highest risk for exposure to these conditions includes nurses and laboratory staff. Where and how nurses will encounter an AIDS patient is not known. Based on the global report on healthcare workers with AIDS, there are currently 5,378 nurses who have been exposed to the virus in relation to their occupation (http://aids.about.com/od/dataandstatistics/qt/healthstats.htm). Considering these figures, HIV/AIDS appears to threaten healthcare workers even if HIV isolation methods are used. Apparently, AIDS still remains a challenging condition for healthcare workers (Tümer, 2010). Nurses are responsible for obtaining the material required for establishing diagnosis and treatment, such as blood and urine, as well as remaining in constant contact with the patient. Nurses are also in charge of the medical and care requirements of HIV-infected and AIDS patients. In addition, carrier patients, who are not aware of their disease, always represent a risk (Özabacı, 1990).

An example of an established HIV transmission in the healthcare field is the disease being transmitted to 5 patients by a dentist (Leblebicioğlu, 1996). While the risk of HIV transmission during surgery varies between 1/42,000 and 1/420,000, this rate is 100-fold higher for hepatitis B Virus (HBV). The risk of transmission is 1/60,000 in HIV negative blood transfusion (Ridzon et al., 1997; Altıok et al., 2009).

While there are various trials conducted on different groups and healthcare workers worldwide and in our country, there is still a primary need to determine the current situation, considering the different training processes the nurses undergo. Determining the level of knowledge is considered to potentially lead the way in planning and providing more effective care for AIDS patients and their relatives who are rarely encountered in terms of the conditions of our country. In addition, since the fear of transmission is directly proportional to negative attitudes, such determination may help change these attitudes (Ayrancı, 2005; Hayyawi et al., 2010; Ay et al., 2006; Hatipoğlu et al., 2005; Altay et al., 2006).

This trial was designed and performed to evaluate the nurses' level of knowledge on the AIDS disease and its transmission.

METHODOLOGY

Through the Ataturk University Erzurum Health College, an application was submitted and legal consent obtained via written request including the purpose and the tools of the study. The nurses were provided with a verbal explanation of the content and the purpose of the trial before the survey was conducted; the nurses who gave consent to participate in the survey were included in the study. The trial was conducted at the Ataturk University Süleyman Demirel Medical Center Aziziye Research and Practice Hospital. While the trial population was designed to involve all the nurses working in internal diseases and surgery clinics, the nurses who were on leave at the time of the survey and those who refused to participate in the trial were excluded. The trial involved a total of 170 nurses.

Setting and sample

Measures: HIV/AIDS information form

The HIV/AIDS information form is a form designed to determine the level of knowledge on HIV/AIDS. This form has sections classified by the investigator, including the routes of transmission, the tools and materials harboring the virus, the body fluids containing the

virus and the effective protective measures, based on the relevant literature data. The questions created did not involve right or wrong statements. The questions related to the routes of transmission and the body fluids containing the virus included the choices of “yes”, “no” “I don’t know” while the questions related to the protective measures included the choices “it is effective”, “it is not effective” and “I don’t know”.

Data analysis

For data assessment, appropriate statistical methods were used as required by the individual survey questions, and package software such as SPSS11.0, Statistical 5.0 and Microsoft Excel 2000 numeric processors were used for analysis.

Ethical principles

All the permissions were legally obtained prior to initiation of the trial. In addition, the nurses working in the surgical clinics were provided with an explanation on the objective and the method of the trial. Any questions raised by the nurses during the administration of the survey were answered. The trial was completed with the nurses who participated on a voluntary basis.

Findings

The distribution of the nurses included in the trial by certain characteristics revealed the following: 32.4% of the nurses were between 18 and 25 years of age; 45.3% were between 26 and 33 years of age, 22.4% were ≥ 33 years old; 42.4% were medical high school graduates while 38.4% had bachelor’s degrees. Regarding duration of occupation, 47.6, 23.4, and 15.9% of the nurses had been nursing for 0 to 5 years, 6 to 10 years and ≥ 16 years, respectively. A total of 57.6% of the nurses were married (Table 1).

For ensuring protection against blood-borne infections, it is of great importance to be aware of the conditions relating to transmission. As can be seen in Table 2, reviewing the nurses’ opinions on the routes of HIV/AIDS transmission, all the nurses indicated that the virus was transmitted through blood, 84.7% indicated that it could be transmitted through tissue and organ transplant while 9.4% thought such transmission did not occur; 83.5% indicated that transmission occurred via unprotected sexual intercourse/anal intercourse while 93% pointed out the shared use of injectors and maternal transmission during pregnancy, and 62.4% indicated that transmission occurred through postnatal lactation of the infant by a mother with AIDS.

The nurses working at the clinic will carry out community health education as well as provide services as healthcare staff. The review of nurses’ level of information on the HIV/AIDS transmission through medical and non-medical tools used in healthcare service revealed the following (Table 3): 34.7% (n:59), 19.4% (n:33), 30% (n:51) and 3.5% (n:6) of the nurses indicated that the disease could be transmitted through the shared use of the tools such as towels, glasses, forks, spoons etc., through kissing, the shared use of toilet seats and social contact, including hugging, touching and shaking hands, respectively. A total of 91.2% of the nurses indicated that transmission could occur through dentist tools (n:155); 88.2% indicated (n:150) transmission could occur through barber tools; 87.6% mentioned transmission through manicure and pedicure tools; 90.6% (n:150) mentioned transmission through minor surgical procedures such as circumcision; with 35.9% (n:61) indicating that HIV transmission occurred through mosquito and insect bites.

One of the indicators of quality for the healthcare services is the application of universal isolation methods. In particular, it is inevitable for the nurse to come in contact with the patient while fulfilling care duties. Table 4 presents the nurses’ responses as to which body fluids contain the HIV virus. While semen ranks first at a rate of 99.4%, vaginal secretion ranks second at a ratio of 97.6%. It was revealed that 70.6, 56.5, 44.1, 43.5, 37.1 and 24.1% of the nurses indicated that HIV could be transmitted through breast milk, cerebrospinal fluid (CSF), sputum, urine and tears, respectively.

Table 5 presents the nurses’ opinions on contraceptive methods which are also used for protection against sexual HIV/AIDS transmission: the use of a condom ranked first as the most effective method at a rate of 91.2%. The use of foam/sponge was found to be effective by 24.7% of the nurses while 19.4, 15.3, 13.5, 12.4, and 7.1% of the nurses mentioned the use of intrauterine device, spermicides, contraceptives, tubal ligation and withdrawal, respectively as the most effective methods of contraception. While 92.4% of the nurses indicated that the calendar method was the least effective method, withdrawal, contraceptive methods and tubal ligation were indicated to be the least effective method for providing protection against HIV/AIDS by 87.6, 85.2 and 80.6% of the nurses, respectively.

DISCUSSION

Nurses are included in the high-risk group with respect to HIV. Universal isolation methods and protective measures may be used to avoid transmission. Most of the nurses are aware of the risk they bear while practicing their profession (Hassan and Wahsheh, 2011; Avcikurt et al., 2011). Poor understanding of the disease, prejudice, unreasonable fear, migration and poor economy are markedly involved in the HIV/AIDS epidemic (Ayrancı, 2005; Badahdah, 2010; Kalichman and Simbayi, 2003). A good level of knowledge on the transmission routes and considering any patient waste as a potential risk would significantly prevent the blood-borne transmission of HIV/AIDS to nurses and the associated risks (Lindan et al., 1991).

This trial evaluated nurses’ level of knowledge on HIV/AIDS in a university hospital in Erzurum. A very significant feature of AIDS is that the risk of transmission is highly reduced in cases where individuals are aware of the transmission routes. Approximately 40% of the nurses in this trial believed that the disease could be transmitted through a mosquito-insect bite and another 40% believed that the disease could be transmitted through urine. Even if the nurses have a basic knowledge of the disease based on the training they receive, they may still be influenced by some common prejudices and hesitations. This finding is similar to those obtained in the literature trials (Ayrancı, 2005; Brown et al., 2008).

In this trial, the rate of right answer to the questions related to HIV/AIDS is observed to be above 50% among the participating nurses. Studies investigating whether there is a difference between the nurses’ level of knowledge on HIV/AIDS report a high level of knowledge but reveal no significant difference (Hatipoğlu et al., 2005; Norman et al., 2009). The fact that the trial finding is in line with the literature data with a significant difference still existing may be attributed to the different levels of information the nurses received due to the different syllabuses of nursing programs.

Based on the survey results, approximately half of the

Table 1. Demographic characteristics of the nurses.

Identifying characteristics (N:170)	Groups			
	18-25 years of age	**26-33 years of age**	**≥ 33 years of age**	
Age	32.4 (n:55)	45.3 (n:77)	22.4 (n:38)	
Educational status	Medical high school	Associate degree	Bachelor's degree	
	42.4(n:72)	19.4(n:33)	38.4(n:65)	
Duration of work	0-5 years	6-10 years	11-15 years	≥ 16 years
	47.6 (n:81)	23.5 (n:40)	12.9 (n:22)	15.9 (n:27)
Marital status	Married N%	Single N%		
	57.6 (n:98)	42.4 (n:72)		

Table 2. Nurses' opinions on the routes of HIV/AIDS transmission.

HIV transmission routes	Yes		No		I don't know	
	n	**%**	**n**	**%**	**N**	**%**
Through blood and blood products (*p = 0.000)	170	100	0	0	0	0
Through tissue/organ transplant	144	84.7	16	9.4	10	5.9
Through unprotected sexual intercourse/anal intercourse	142	83.5	13	7.6	15	8.8
Shared use of injectors	159	93.5	0	0	11	6.5
Maternal transmission during pregnancy	159	93.5	8	4.7	3	1.8
Transmission through lactation	106	62.4	52	30.6	12	7.1

Table 3. Nurses' opinions on the tools causing HIV/AIDS transmission

Parameter	Yes		No		I don't know	
	N	**%**	**n**	**%**	**N**	**%**
Shared use of tools such as towels, glasses, forks, spoons etc.	59	34.7	98	57.6	13	7.6
Normal (simple) kissing	33	19.4	136	8.6	1	.6
hugging, touching and shaking hands	6	3.5	160	94.1	4	2.4
Dentist tools	155	91.2	7	4.1	8	4.7
Hairdresser tools	150	88.2	8	4.7	12	7.1
Manicure, pedicure tools	149	87.6	13	7.6	8	4.7
minor surgical procedures such as circumcision	154	90.6	13	7.6	3	1.8
Shared use of toilets/toilet seats	51	30.0	113	66.5	6	3.5
Mosquito and insect bites.	61	35.9	96	56.5	13	7.6

nurses could not give the right answer or stated that they did not know the answer to the questions evaluating HIV/AIDS transmission routes; this ratio was even higher for some questions. These findings reveal that while the nurses gave the right answers on the HIV/AIDS information form (HAIF), they still had missing or inaccurate information on the transmission of the disease. This finding is consistent with the literature reports indicating that healthcare workers have gaps in their knowledge on HIV/AIDS transmission (Hassan and Wahsheh, 2011).

In a trial conducted in Jordan, 81.4% of the nurses indicated that they found the sources of information on AIDS inadequate and 96.5% indicated that they were willing to work on this in cooperation with the relevant support groups. The same group of nurses also stated that they had an intense fear of the AIDS disease (96.2%). In the above mentioned study, the overall attitude in all 922 nurses participating was found to be negative at a rate of 84.3% with the attitudes being classified under five sub-groups as the fear of transmission, social stigma, a fatal disease outcome, direct care, and training requirement (Hassan and Wahsheh, 2011; Suominen et al., 2008).

In addition, in a study by Budakoğlu et al. (2006), 25.7%

Table 4. Nurses' opinions on the Body Fluids containing the HIV virus.

Body fluids containing HIV, leading to AIDS transmission	Yes		No		I don't know	
	n	%	N	%	n	%
Semen	169	99.4	1	.6	0	0
Vaginal secretion	166	97.6	4	2.4	0	0
Breast milk	120	70.6	35	20.6	15	8.8
CSF (Cerebrospinal fluid)	96	56.5	41	24.1	33	19.4
Sputum	75	44.1	73	42.9	22	12.9
Bronchial fluid, sputum	74	43.5	63	37.1	33	19.4
Urine	63	37.1	73	42.9	34	20.0
Tears	42	24.1	92	54.1	36	21.2

Table 5. Nurses' opinions on the contraceptive methods used for protection against HIV/AIDS.

Contraceptive methods used for protection against HIV/AIDS	Effective		Ineffective		I don't know	
	n	%	N	%	N	%
Condom/ diaphragm	155	91.2	15	8.8	0	0
Foam/sponge	42	24.7	113	66.5	15	8.8
Intrauterine device (coil)	33	19.4	137	80.6	0	0
Spermicides	26	15.3	134	78.8	10	5.9
Contraceptives	23	13.5	145	85.2	2	1.2
Tubal ligation	21	12.4	137	80.6	12	7.1
Withdrawal	12	7.1	149	87.6	9	5.3
Calendar method	7	4.1	157	92.4	6	3.5

of the nurses indicated that the disease could be transmitted through shared use of bathrooms and toilets, 41.9% indicated that HIV could be transmitted through mosquito bites while 25.4% stated that "they didn't know". A trial by Amosu et al. (2011) conducted in Nigeria, revealed that 84% of the healthcare workers described HIV/AIDS as an occupational risk, 97% indicated that the HIV virus was transmitted through blood and blood products, semen and vaginal secretion during unprotected sexual intercourse, tattoos, injury from sharps and maternal transmission during pregnancy or lactation, while 3% indicated no such transmission. A trial performed in our study on identified AIDS patients reported that the cases detected randomly during blood sampling (38.8%) were mostly at an advanced stage of the disease at the time of diagnosis (Kaya et al., 2011).

In the trial by Amosu et al. (2011), 84% of the participants reported that they believed the disease was transmitted through mosquito/insect bites from the same vessel. Additionally, 85% indicated that the virus was transmitted through hugging, social contact, coughing-sneezing, urine and feces. Also, 70% of the healthcare workers participating in the trial indicated they did not intend to participate in the labor of a pregnant woman with HIV/AIDS. A total of 89% of the responders in the same trial believed that homosexual individuals and those with multiple partners became infected with AIDS/HIV, while 73% indicated that such high-risk individuals could transmit the disease to others during any medical procedure. In another study conducted on civil servants, 37.9 and 36.8% of the participants indicated that shared use of personal items and kissing was less risky compared to the other routes of transmission, respectively (Tawfik and Kinoti, 2003). Almost all of the responders identified the virus as the risk factor for AIDS (98%), while 84% identified it as an occupational risk factor. A total of 89% of the participants in the same trial indicated that prostitution, homosexuality and the presence of multiple sexual partners were factors for high risk, while 73% indicated that a high risk for HIV/AIDS transmission existed among healthcare workers and their work environment (Tawfik and Kinoti, 2003).

A good understanding of the transmission routes has an almost completely preventive role in protection against HIV/AIDS. Based on the trial results, the sum of the number of nurses giving wrong answers or stating that they did not know the answer to the question as to whether use of the same objects (such as plates, forks, glasses, brushes etc.) could cause HIV transmission is close to the total number of nurses responding accurately. Based on this finding, we can conclude that the nurses are in need of information on the HIV transmission routes. In addition, the results are consistent with the literature data showing that nurses need infor-

mation on the HIV/AIDS transmission routes and that they have inaccurate information on the subject (Budakoğlu, 2006; Amosu, 2011). A trial performed on females revealed that women thought the AIDS virus did not represent a risk for them since they were heterosexual (Hobfoll et al., 1993).

In another trial performed in 2,285 young and more educated women, 4.6% indicated that they used a condom regularly, while 19.8% indicated use when required and 57.5% indicated they never used condoms since the males did not like it (Kapiga et al., 1995). A trial, which evaluated the opinions of nursing students on HIV/AIDS, revealed that these students thought HIV could be transmitted through social kissing, sharing the same plate, fork, spoons, glasses or brushes, the toilet or bathtub, coughing-sneezing or mosquito bites (Ay et al., 2006; Hatipoğlu et al., 2005). Having a good understanding of HIV/AIDS and the practice of preventive measures have a parallel correlation. The most significant preventive measure for protection against the sexual transmission of HIV is the use of a condom. In this study, 91.2% of the nurses indicated that using a condom prevented the transmission of the HIV virus. This result suggests that the written and visual media warnings on condom use are effective in preventing sexually transmitted diseases (Ateş et al., 2005; Kapiga, 1995). A trial conducted on tour guides in Turkey reported the presence of inaccurate beliefs on the transmission of the HIV virus (Avcikurt et al., 2011). The results of our trial are also in line with this data.

We observed that some of the information the nurses in our trial have on HIV/AIDS sources are inadequate. While semen and vaginal secretion rank first at an approximate rate of 100%, 70.6, 56.5, 44.1, 43.5, 37.1 and 24.1% of the nurses indicated that HIV could be transmitted through breast milk, cerebrospinal fluid (CSF), sputum, urine and tears, respectively. While HIV is isolated from the blood, semen, vaginal secretion, sputum, tears, urine, breast milk, cerebrospinal fluid and amniotic fluid, it can only induce infection in the blood and blood products, semen, vaginal discharge, donor organ tissue and breast milk. For example, HIV is rapidly inactivated in the sputum material and in fact, no transmission was reported, even after long-term direct skin contact. This finding suggests that nurses consider HIV/AIDS an infectious disease that can be transmitted by every means and that their information on the transmission routes is affected by certain social prejudices. This trial finding is consistent with those from other similar studies (Adefuye et al., 2011).

The nurses in our trial were included in the group of young adult individuals. In our country, reports reveal that individuals with HIV/AIDS are mostly between 20 and 49 years of age and in the period of young adulthood. In addition to the medical training they receive, some of the nurses' opinions on the disease also appear to be influenced by visual media (Hatipoğlu, 2005; Adefuye et al., 2009). Trials demonstrate that a parallel association exists between a good understanding of the HIV/AIDS disease and the application of preventive measures. In addition, the deficient information and capabilities of nurses who have an educative and guiding role in HIV/AIDS, result in lack of confidence and thus unfavorable attitudes of nurses towards patients and other individuals (Li et al., 2011).

CONCLUSION AND RECOMMENDATIONS

Since nurses represent a large portion of the healthcare workers and are in direct contact with the patient during care duty, it may be possible to reach larger populations through the training of nurses. In our trial, we detected the need for information in nurses on certain aspects of the HIV/AIDS disease although the level of knowledge was good. We believe that despite the presence of information on HIV/AIDS included in the nursing training syllabus, continuous training through all channels would be beneficial in increasing the current level of information, eliminating inaccurate attitudes and behaviors, and enhancing the level of consciousness. Considering that the presence of the hepatitis B virus and tuberculosis bacilli in the blood would represent a basis for AIDS development, the administration of HIV tests at regular intervals to carriers may be added to general health screenings.

The achievement of an adequate level of information on the transmission routes and protective measures for HIV would avoid the prejudices related to the disease and also help nurses change their negative attitudes towards AIDS patients. A good understanding of the methods for disposing of blood, blood products and virus-infected materials would help eliminate nurses' stigmatizing behaviors.

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Full Length Research Paper

Prevalence and predictors of willingness to care for relatives living with HIV/AIDS: Evidence from women of reproductive age in Nigeria

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Human immunodeficiency virus/Acquired immune deficiency syndrome (HIV/AIDS) constitutes threat to human life. Escalating number of HIV/AIDS cases in Nigeria demands for more relatives that will provide care for People Living with HIV/AIDS (PLWHA). Receiving care from relatives provides PLWHA the strength to confront life. Information on Willingness to Provide Care (WPC) for PLWHA is insufficient in Nigeria; hence, this study. This cross-sectional design study utilized Nigeria Demographic and Health Survey, 2008 dataset with focus on women of age 15 to 49 (n=27, 195). The dependent variable was WPC for Relatives Living with HIV/AIDS (RLWHA). Data was analysed using Chi-square and logistic regression models (α=5.0%). Mean age of the women was 28.79±9.4 years and the prevalence of WPC for RLWHA was 65.4% with urban women (70.8%) more WPC for RLWHA than their counterparts in the rural areas (61.9%) (p<0.0001). The percentage of women WPC for RLWHA increases with increasing level of education (p<0.0001). The identified predictors of WPC for RLWHA were the age, residence, religion, region, education, knowing someone who had died of HIV/AIDS, knowing someone denied of health services because of AIDS and believing that PLWHA should be ashamed of themselves. Majority of women in Nigeria were WPC for RLWHA. However, programmes that can improve WPC for RLWHA in Nigeria are indispensable.

Key words: Willingness to provide care, people living with human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), Nigeria.

INTRODUCTION

Human immunodeficiency virus (HIV) prevalence has been declining in recent time in Nigeria, falling from 5.8% in 2001 to 5.0% in 2003, 4.6% in 2007 (National Acquired Immune Deficiency Syndrome (AIDS) and Sexually Transmitted Infections (STIs) Control Programme, 2008) and 3.6% in 2012 (PRB, 2012). However, the present HIV prevalence is still high considering the huge Nigerian population (about 160 million) and the rate is higher than the sub-Saharan African estimate of 3.4% (PRB, 2012). With over 3 million People Living with HIV/AIDS (PLWHA) at the end of 2011, "Nigeria contributes the second highest HIV burden and is next to South Africa globally" (PRB, 2012; Monjok et al., 2011).

The cure for HIV/AIDS is yet to be discovered and over tens of millions of people worldwide are currently living with the disease (PRB, 2012; CDC fact sheet, 2011). People still contact HIV in Nigeria as new cases are reported daily; therefore, the spread of the disease is still a problem. As the number of PLWHA increases every day in Nigeria, care will be needed from relatives to enable the infected individuals to receive medical care, cope with the stress and trauma of the infection during all phases of their ill health (Sorsdahl et al., 2011).

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Right away from the ancient times, the Willingness to Provide Care (WPC) has always existed in every society. Willingness to care means cheerful compliance and readiness to help and it is an act of showing unconditional acceptance, love, kindness and concern through creating an environment that is supportive, protective and advances well-being of an individual. It consists of therapeutic factors that result in the satisfaction of certain human needs. People living with HIV/AIDS are human beings who must be cared for, respected, nurtured, understood and assisted. Effective caring helps to reconcile and mediate the inaptness of viewing the PLWHA holistically while at the same time attending to their needs. This assists the PLWHA to find the strength or courage to confront life and the disease. However, for the fear of being infected with the disease, PLWHA are often neglected and abandoned by their community and family members (Dinesh et al., 2011). Neglect and stigmatization against PLWHA are still common in Nigeria as the case in different parts of the world (Sayles, 2009).

Previous studies identified serious effect of lack of care resulting from neglect on the health of PLWHA and their ability to cope and manage the stress associated with the disease (Stutterheim, 2011; Ilebani and Fabusoro, 2011; Nicole et al., 2006; Bekker, 2006). “Stigma remains one of the major reasons why the AIDS epidemic continues to devastate societies around the world” (Ban Ki-moon, 2008). In Nigeria, as for some sub-Saharan African countries, primary emphasis and efforts have been focused on prevention; with less attention paid to how the family members are ready to provide care for PLWHA in the community (Tumushabe, 2006). Therefore, information on perception on WPC for PLWHA will be valuable to donors who channel their resources towards development and promotion of programs that make PLWHA live their normal life. However, such information is scarce in Nigeria; few studies were only conducted among health care workers (Amoran, 2011; Akani and Erhabor, 2006; Reis et al., 2005). Our study which examines prevalence and predictors of WPC for Relatives Living with HIV/AIDS (RLWHA) was designed to fill the gap.

Numerous factors have been investigated to be responsible for why people are not willing to care for PLWHA. The common believe particularly in developing countries is that HIV infection is often thought to be the result of personal irresponsibility such as; homosexuality, drug addiction, and promiscuity that are already stigmatised in many societies. The fact that having many people not WPC for PLWHA in developed countries such as America (Goosby, 2009) where treatment has been widely available for several years is an indication that it is a global phenomenon. For instance, an estimated 27.0% of Americans would prefer not to work closely with a woman living with HIV/AIDS (UNAIDS, 2008). In a study conducted in Southeast China among physicians' and physician assistants' only 40.4% were willing to provide healthcare services for PLWHA (Cai et al., 2007). Moreover, PLWHA Stigma Index in UK shows that 17% of PLWHA had been denied health care and that verbal harassment or assault had been experienced by 21% of respondents (UNAIDS, 2008; IPPF, 2009).

This study has attempted to examine how women of childbearing age in Nigeria would be WPC for relatives living with HIV/AIDS. The objectives of this study are to determine the prevalence of WPC for RLWHA, examine factors that are associated with woman WPC for RLWHA and identify which of the associated factors are predictors of women WPC for RLWHA in Nigeria.

METHODOLOGY

Data collection

The data utilized were extracted from measured DHS database available at the organization’s website (http://www.measuredhs.com/). The original data were collected by ICF Macro Calverton, Maryland, USA in conjunction with National Population Commission (NPC), Nigeria (Nigeria Demographic and Health Survey, 2008). During the survey, a stratified two-stage cluster design was used to select 33,385 women of childbearing age (15 to 49 years). The primary sampling unit (PSU), a cluster for the survey was defined on the basis of Enumeration Areas (EAs) from the 2006 census frame. A minimum requirement of 80 households for the cluster size was used in the design. A well structured questionnaire was designed for the survey and the interviewers were properly trained. Pilot study was conducted to test the reliability and validity of the study instruments.

A question on individual WPC for RLWHA was included in the questionnaire and the options to choose by the respondents are; Yes=1, No=2 and Don’t know=3. Those who chose option 3 were excluded from the data analysis, because their intention could not be ascertained and this can bias the study result. This reduces the number of study subjects to 27,195. To account for cluster sampling method used during data collection, the data was weighted before we began data analysis.

Data analysis

The outcome variable was “WPC for RLWHA”. The analysis began with cross tabulation of the outcome variable (willingness to give care to RLWHA) and selected socio-demographic factors using Chi-square (χ^2) test. Thereafter, logistic regression model was used to examine the strength of the associations between these variables and WPC for RLWHA. All analyses were carried out at 5% level of significant. The variable WPC for RLWHA was dichotomized into two by creating a dummy variable 0 (zero) for those who are not WPC for RLWHA and 1 (one) if otherwise. Here a reference category (Ref.) was created which was used as a basis for comparison between subgroup of the study sample.

The logistic regression model then specifies that the probability of WPC for RLWHA depends on a set of variables $x_1, x_2, x_3, \ldots, x_p$ in the following way;

$$
\begin{aligned}
p_x &= p(d = 1/x) \\
&= 1/\left\{1 + \exp\left[-\left(\beta_0 + \beta_1 x_1 + \beta_2 x_2 \ldots + \beta_p x_p\right)\right]\right\} \\
&= 1/\left\{1 + \exp\left[-\left(\beta_0 + \sum_{i=1}^{p} \beta_i x_i\right)\right]\right\}
\end{aligned}
$$

The variable d denotes either WPC for RLWHA $(d = 1)$ or

otherwise $(d = 0)$, and x denotes a set of p variables $x = (x_1, x_2, x_3, \ldots, x_p)$ which are potential predictors of WPC for RLWHA such as age, levels of education, religion, residence, wealth index, etc. The $\beta_1, \beta_2, \beta_3, \ldots, \beta_p$, are parameters that represent the effects of *x* on the probability of WPC for RLWHA.

Ethical approval

The ethical approval was obtained from the Federal Research Review Committee and informed consent was sought from the respondent by the data originators before the conduct of the survey.

RESULTS

The mean age of the respondents was 28.79±9.4 and the prevalence of women WPC for RLWHA was 65.0%. The respondents' age, place of residence, levels of education, wealth index, current marital status, region and religion were found to be significantly associated with WPC to RPLWHA. The proportion of urban women (70.8%) who were WPC for RLWHA was higher than their rural counterparts (61.9%) (p<0.0001). Willingness to give care for RLWHA increases with increasing levels of education. Similar pattern for education was also observed for levels of wealth index. Regional differences also existed in the percentage of women WPC for RLWHA with women living in South West (54.4%) and North Central (81.6%) constituting least and highest proportion of women WPC for RLWHA, respectively (p<0.0001). According to religion, Christian (72.7%) women are more WPC for RLWHA than their counterparts who either belong to Muslims (55.3%) or Traditional (54.3%) religious group (p<0.0001) (Table 1).

Among all the behavioural variables considered, only cigarette smoking (p=0.0066) does not show a significant association with WPC for RLWHA. The data depict those women who were WPC for RLWHA constitutes higher proportion of those who had sexually transmitted disease (STD) in the previous 12 months before the survey (76.8%) (p<0.0001). Eighty three percent of those who knew someone who has or died of AIDS were WPC to RLWHA as against 62.8% of women who did not (p<0.0001) (Table 2).

The identified predictors of WPC for RLWHA are the age (odd ratio (OR)=1.128: confidence interval (CI)=1.059 to 1.202, p<0.0001), place of residence (OR=0.814: CI=0.725 to 0.915, p=0.001), levels of education (OR=1.366: CI=1.276 to 1.461, p<0.0001) and wealth index (OR=1.182: CI=1.126 to 1.241, p<0.0001). Others include knowing someone who died of HIV/AIDS (OR=1.832: CI=1.587 to 2.115, p<0.0001), people with HIV/AIDS should be allowed to continue teaching (OR=1.319: CI=1.260 to 1.381, p<0.0001), knowing someone denied of health services because of AIDS in the last 12 months (OR=0.617: CI=0.487 to 0.781, p<0.0001), people with HIV/AIDS should be ashamed of themselves (OR=0.924: CI=0.884 to 0.967, p=0.001), region (OR=0.709: CI=0.686 to 0.732, p<0.0001) and religion (OR=0.604: CI=0.545 to 0.668, p<0.0001) (Table 3).

The result from the multiple logistic regression is as shown in Table 4. Women of age 25 to 34 and 35 to 49 years were 1.112 (CI=1.037 to 1.193, p=0.003) and 1.135 (CI=1.047 to 1.231, p=0.002), respectively more likely to be WPC for RLWHA than the younger women (15 to 24 years). Also rural women were less likely (OR=0.893, CI=0.826 to 0.966, p=0.005) to be WPC for RLWHA than their urban counterparts. The strength of WPC increases with increasing level of education, with women having higher education 1.701 (OR=1.701, CI=1.457 to 1.987) more likely to be WPC for RLWHA than those without any formal education. Table 4 shows the patterns of relationship between WPC for RLWHA and other socio-demographic variables. Detailed information on the differential in WPC for RLWHA is shown in Table 4.

DISCUSSION

This study finds that the prevalence of women WPC for RLWHA is high. Virtually all the socio-demographic and behavioural variables used in the analysis were significantly associated with WPC for RLWHA except cigarette smoking. In Nigeria, smoking is not common among women; therefore, very few women reported that they smoke, this can be the reason for insignificant.

Women who are WPC for RLWHA constituted a substantial proportion of those who had STD in the previous 12 months before the survey. Having experienced similar health problem in recent time could be a motivator to WPC for RLWHA. Also, higher proportions of women who knew someone who has or died of AIDS are WPC for RLWHA when compared with women who did not. Sympathy for having seen someone dying of AIDS and having known the stress that RLWHA victims undergo as a result of illnesses associated with the disease could be a reason for the finding. Also, women who disagreed that RLWHA should be ashamed of themselves are more WPC for RLWHA than those who agreed. This result is expected and in line with finding from previous study in Nigeria (Monjok et al., 2011).

Female youths were less likely to be WPC for RLWHA than older women. This is usual, as older women are more experienced and have passion for caring than the younger ones. This finding is consistent with outcome of earlier study conducted by Adeokun and Colleagues in Nigeria (Adeokun et al., 2008).

The strength of WPC increases with increasing level of education, with women having higher education about twice more likely to be WPC for RLWHA than those without formal education. This finding is not unexpected as it is widely believed that education serves as sources

Table 1. Percentage distribution of women by demographic characteristics according to willingness to provide care for relatives living with HIV/AIDS.

Demographic characteristic	Willingness to provide care for relatives living with HIV/AIDS		p-value	Total
	No	Yes		
Total	34.6 (9419)	65.4 (17776)		100.0 (27195)
Age				
15-24	34.4 (3481)	65.6 (6640)		100.0 (10121)
25-34	33.7 (3058)	66.3 (6014)	p=0.006	100.0 (9072)
35-49	36.0 (2880)	64.0 (5122)		100.0 (8002)
Mean Age (years)	28.9±9.6	28.74±9.2	p=0.182	28.79±9.4
Residence				
Urban	29.2 (3123)	70.8 (7567)	p<0.0001	100.0 (10690)
Rural	38.1 (6295)	61.9 (10209)		100.0 (16504)
Education				
None	44.6 (3668)	55.4 (4560)		100.0 (8228)
Primary	37.2 (2050)	62.8 (3454)	p<0.0001	100.0 (5504)
Secondary	29.8 (3178)	70.2 (7490)		100.0 (10668)
Higher	18.7 (522)	81.3 (2272)		100.0 (2794)
Wealth Index				
Poorest	42.5 (1815)	57.5 (2451)		100.0 (4266)
Poorer	40.4 (1848)	59.6 (2727)		100.0 (4575)
Middle	34.5 (1780)	65.5 (3381)	p<0.0001	100.0 (5161)
Richer	34.3 (2081)	65.7 (3994)		100.0 (6075)
Richest	26.6 (1894)	73.4 (5222)		100.0 (7116)
Current marital status				
Never married	28.9 (2092)	71.1 (5144)		100.0 (7236)
Married	37.1 (6811)	62.9 (11557)		100.0 (18368)
Living together	32.9 (132)	67.1 (269)	p<0.0001	100.0 (401)
Widowed	31.9 (200)	68.1 (427)		100.0 (627)
Divorced	36.8 (88)	63.2 (151)		100.0 (239)
Not living together	29.7 (96)	70.3 (227)		100.0 (323)
Region				
North Central	18.4 (641)	81.6 (2836)		100.0 (3477)
North East	31.7 (1048)	68.3 (2259)		100.0 (3307)
North West	42.2 (2599)	57.8 (3566)	p<0.0001	100.0 (6165)
South East	29.2 (1067)	70.8 (2584)		100.0 (3651)
South South	28.5 (1284)	71.5 (3214)		100.0 (4498)
South West	45.6 (2779)	54.4 (3318)		100.0 (6097)
Religion				
Christians	27.3 (4282)	72.7 (11380)		100.0 (15662)
Islam	44.7 (4950)	55.3 (6129)	p<0.0001	100.0 (11079)
Traditional	45.5 (130)	54.5 (156)		100.0 (286)

Table 2. Percentage distribution of women by their behavioural characteristics according to willingness to provide Care for relatives living with HIV/AIDS.

Socioeconomic characteristic	Willingness to provide care for relatives living with HIV/AIDS		p-value	TOTAL
	No	Yes		
Cigarette smoking				
No	34.7 (9401)	65.3 (17719)	p=0.066	100.0 (27120)
Yes	22.6 (12)	77.4 (41)		100.0 (53)
Had STD in the last 12 months*				
No	34.9 (9164)	65.1 (17089)	p<0.0001	100.0 (26253)
Yes	23.2 (128)	76.8 (423)		100.0 (551)
Know someone who died of AIDS*				
No	37.2 (8809)	62.8 (14881)	p<0.0001	100.0 (23690)
Yes	17.2 (577)	82.8 (2774)		100.0 (3351)
Can get HIV by supernatural or witchcraft means*				
No	32.7 (5390)	67.3 (11091)		100.0 (16481)
Yes	35.1 (1720)	64.9 (3175)	p<0.0001	100.0 (4895)
Don't know	39.6 (2271)	60.4 (3465)		100.0 (5736)
Persons with HIV/AIDS should not be allowed to teach in schools*				
No	55.8 (6470)	44.2 (5132)		100.0 (11602)
Yes	17.3 (2402)	82.7 (11487)	p<0.0001	100.0 (13889)
Don't know	32.3 (540)	67.7 (1131)		100.0 (1671)
Knows someone denied of health services because of AIDS in the last 12 months*				
No	26.6 (3159)	73.4 (8698)		100.0 (11857)
Yes	25.6 (220)	74.4 (638)	p<0.0001	100.0 (858)
Don't know	41.7 (6037)	58.3 (8435)		100.0 (14472)
Knows someone denied of social events because of AIDS in the last 12 months***				
No	26.7 (3241)	73.3 (8879)	p=0.032	100.0 (12120)
Yes	22.7 (131)	77.3 (446)		100.0 (577)
Knows someone verbally abused because of AIDS in the last 12 months*				
No	27.1 (3185)	72.9 (8564)	p<0.0001	100.0 (11749)
Yes	19.6 (185)	80.4 (758)		100.0 (943)
People with HIV/AIDS should be ashamed of themselves*				
Disagree	22.3 (2634)	77.7 (9191)		100.0 (11825)
Agree	45.3 (6342)	54.7 (7673)	p<0.0001	100.0 (14015)
Don't know	33.1 (435)	66.9 (879)		100.0 (1314)
People with HIV/AIDS should be blamed for bringing the disease to the community*				
Disagree	23.1 (2825)	76.9 (9416)		100.0 (12241)
Agree	44.8 (6150)	55.2 (7573)	p<0.0001	100.0 (13723)
Don't know	36.2 (440)	63.8 (776)		100.0 (1216)

*significant at 0.1%; **Significant at 1%; ***Significant at 5.0%.

Table 3. Ordinary logistic regression of women who are Willing to provide care for relatives living with HIV/AIDS according to background characteristics.

Background characteristic	β	Wald	p-value	Exp(β)	Lower	Upper
Age	0.121	13.980	0.000	1.128*	1.059	1.202
Residence	-0.205	12.001	0.001	0.814**	0.725	0.915
Levels of education	0.312	81.712	0.000	1.366*	1.276	1.461
Wealth index	0.167	45.785	0.000	1.182*	1.126	1.241
Current marital status	-0.002	0.002	0.963	0.998	0.936	1.065
Had STD in the last 12months	0.041	0.311	0.577	1.041	0.903	1.201
Know someone who died of AIDS	0.605	68.431	0.000	1.832*	1.587	2.115
Region	-0.345	435.279	0.000	0.709*	0.686	0.732
Religion	-0.505	94.979	0.000	0.604*	0.545	0.668
Can get HIV by supernatural or witchcraft means	-0.008	1.029	0.310	0.992	0.976	1.008
People with HIV/AIDS should be allowed to continue teaching	0.277	140.928	0.000	1.319*	1.260	1.381
Knows someone denied of health services because of AIDS in the last 12 months	-0.484	16.143	0.000	0.617*	0.487	0.781
Knows someone denied of social events because of AIDS in the last 12 months	-0.096	0.351	0.554	0.908	0.660	1.250
Knows someone verbally abused because of AIDS in the last 12 months	-0.126	0.883	0.348	0.882	0.678	1.147
People with HIV/AIDS should be ashamed of themselves	-0.079	11.835	0.001	0.924**	0.884	0.967
People with HIV/AIDS should be blamed for bringing the disease to the community	-0.044	3.652	0.056	0.957	0.915	1.001

*significant at 0.1%; **Significant at 1%

of enlightenment. Adequate and correct knowledge of HIV/AIDS is expected to reduce unfounded fears by the caregiver of contacting the infection. This finding is consistent with a Cambodian study which assessed older person's AIDS knowledge and WPC. The Cambodia study reported that the WPC is more closely associated with knowledge dealing with casual transmission than with other aspects of HIV/AIDS (Knodel and Zimmer, 2006).

The women in richest wealth quintile were more likely to be WPC for RLWHA than their counterparts in poorest wealth quintile. This is not surprising as the 2008 Nepal Demographic and Health Survey (NDHS) had reported that women in the richest wealth quintile were consistently likely to identify correct methods of preventing HIV/AIDS and reject misconception in comparison to women in the poorest wealth quintile (NDHS, 2008). Since wealthier quintile group would normally consist of more women with higher level of education than those in the poorer quintile (NDHS, 2008; Bekker et al., 2006), the differential observed in the WPC for RLWHA is plausible. These findings underscored the need for a continued improvement in AIDS knowledge especially among least-educated women, who most likely are also poor.

This study further showed that women from rural areas were less likely to be WPC for RLWHA when compared with women from urban areas. In actual fact, urban women usually have better access to HIV/AIDS information, characterized with highly educated women and better opportunity of seeing AIDS patients in hospital than their rural counterparts (NPC, 2006). All these can influence the perception of individuals on WPC for RLWHA. The result is consistent with the findings of a study carried out in Thailand (ATLIS, 2010), where it was concluded that rural people were more likely to perceive themselves to be at risk in taking care of AIDS patients than urban people.

The odd of WPC for RLWHA was lower among Muslim women than the Christians. Our finding that women residing in all regions in the Southern part of Nigeria were significantly less likely to be WPC for RLWHA than those in the North needs further investigation. This is because Southerners are predominantly Christians, more educated and have access to better health information than the Northerners (NPC, 2006; Knodel, 2006; NDHS, 2008; UNAID, 2008; Adeokun et al., 2008) and as such are expected to be more WGC to their relatives living with HIV/AIDS than their

Table 4. Multiple logistic regression of women who are willing to provide care for relatives living with HIV/AIDS according to background characteristics

Background characteristic	β	p-value	Exp(β)	Lower	Upper
Age group					
15-24(R.C)	R.C	R.C	1.000	R.C	R.C
25-34	0.107	0.003	1.112**	1.037	1.193
35-49	0.127	0.002	1.135**	1.047	1.231
Residence					
Urban(R.C)	R.C	R.C	1.000	R.C	R.C
Rural	-0.113	0.005	0.893**	0.826	0.966
Levels of education					
None(R.C)	R.C	R.C	1.000	R.C	R.C
Primary	0.192	0.000	1.212*	1.095	1.341
Secondary	0.426	0.000	1.532*	1.372	1.710
Higher	0.531	0.000	1.701*	1.457	1.987
Wealth index					
Poorest(R.C)	R.C	R.C	1.000	R.C	R.C
Poorer	0.008	0.884	1.008	0.909	1.117
Middle	0.032	0.560	1.033	0.927	1.151
Richer	-0.034	0.572	0.966	0.858	1.088
Richest	0.176	0.010	1.193***	1.042	1.366
Knows someone who has or died of HIV/AIDS					
No(R.C)	R.C	R.C	1.000	R.C	R.C
Yes	0.528	0.000	1.695*	1.477	1.945
Person with HIV/AIDS should be allowed to continue teaching					
No	R.C	R.C	1.000	R.C	R.C
Yes	1.521	0.000	4.576*	4.286	4.886
Don't know	0.959	0.000	2.609*	2.302	2.956
Knows someone denied of health services because of AIDS in the last 12 months					
No(R.C)	R.C	R.C	1.000	R.C	R.C
Yes	-0.651	0.000	0.521*	0.419	0.648
Don't know	-0.391	0.000	0.676*	0.633	0.723
People with HIV/AIDS should be ashamed of themselves					
Disagree(R.C)	R.C	R.C	1.000	R.C	R.C
Agree	-0.464	0.000	0.629*	0.588	0.672
Don't know	-0.062	0.413	0.940	0.811	1.090
Region					
North Central(R.C)	R.C	R.C	1.000	R.C	R.C
North East	0.030	0.683	1.030	0.894	1.187
North West	-0.316	0.000	0.729*	0.639	0.833
South East	-0.723	0.000	0.485*	0.424	0.556
South South	-0.798	0.000	0.450*	0.395	0.514
South West	-1.285	0.000	0.277*	0.245	0.313

Table 4. Contd.

Religion					
Christians(R.C)	R.C	R.C	1.000	R.C	R.C
Islam	-0.677	0.000	0.508*	0.463	0.558
Traditional	0.461	0.002	0.630**	0.472	0.843

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

Northern counterparts.

The findings of this study have a great implication for the psychosocial support needs of RLWHA. Nigeria is not only characterized by high prevalence of HIV/AIDS, but also by high level of poverty, weak health systems and poor access to health facility, particularly, those living in the rural areas. Therefore, most PLWHA in Nigeria would depend on informal care and support from their relatives, especially women who are the traditional caregiver in this setting. Apart from the physical care needed by PLWHA, the emotional support required by relatives cannot be overemphasized.

Conclusion

This research demonstrates that majority of women who participated in the study are WGC for PLWHA, but an increase in the prevalence can tremendously improve the health of PLWHA in Nigeria. Consequently, some variables identified in this study as having influence on WGC for PLWHA should be included in National Strategic Framework and Action Plan for PLWHA in Nigeria. In developing care and support programmes for PLWHA, there is need to intensify efforts to educate women, especially the less educated ones and rural dwellers on the need to be willing to give care to PLWHA.

LIMITATIONS

Secondary data was used for this study; therefore, problems associated with the use of such data cannot be overruled from our findings. However, the reliability and validity of research instruments were adequately tested by the data originators. During the survey, measures were taken to ensure that women give the right opinion on their WPC for RLWHA. However, people's opinion on willingness to care for RLWHA might change if they actually have relatives who are living with HIV.

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Full Length Research Paper

Sociosexuality, human immunodeficiency virus (HIV) susceptibility, and sexual behavior among African American women

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Psychosocial correlation of risky sexual behavior is important for the design and implementation of human immunodeficiency virus (HIV)-related prevention and intervention studies. Sociosexuality (individual differences in endorsement of casual sexual behavior) and perceived susceptibility to HIV were examined for their relationship to each other, and in predicting risky sexual behavior among adult, heterosexual African American women using web-based and in-person surveys. This study included 275 geographically diverse women (mean age = 33.60 years), with 81% reported having at least a college degree, and over 50% reported incomes over $45,000. Results indicate that sociosexuality was significantly associated with perceived susceptibility, and both higher levels of sociosexuality and perceived susceptibility were significantly related to engagement in riskier sexual behavior. Age at first voluntary intercourse emerged as an important covariate in predicting risky sexual behavior among the participants. The need to include psychosocial variables associated with risky sexual behavior in sexually transmitted infection (STI) and HIV-related health promotion and intervention studies was discussed.

Key words: Sociosexuality, human immunodeficiency virus (HIV), African American, sexual behavior, perceived susceptibility.

INTRODUCTION

Since human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) has been recognized, the face of the epidemic has changed in the United States (US). The rates are stabilizing and declining in many of the populations which were first impacted and affected, but is steadily increasing in other communities. In 2009, African American women accounted for an estimated 30% of new HIV infections among all African Americans (Centers for Disease Control [CDC], 2010). Of these new cases, 85% reported that they were infected via heterosexual transmission. Behavioral interventions, alone, have not shown the anticipated success in decreasing the health disparities seen with sexually transmitted infection (STI) and HIV rates among African American women. These grave disparities underscore the importance of considering culture, social norms, and situational factors that may affect sexuality, sexual decision-making, and sexual behaviors for this population.

Socialization processes reinforce sociosexual norms and standards of behavior for women, and these, in turn, set the tone for health-protective and health risk behaviors (Hynie et al., 1998). The main purpose of this study is to examine the relationships between two psychosocial variables (sociosexuality and perceived susceptibility) thought to be influential in the manifestation of risky sexual behavior among a diverse group of African American women. Although there are published studies examining the link between sociosexuality and sexual behavior, and perceived susceptibility and sexual behavior, there is a dearth of literature examining both together and their potential

contributions in predicting risky sexual behavior. The need to understand the psychological and social links to sexual risk behavior is important to inform future STI and HIV prevention and intervention efforts. This is especially true for African American populations that have been disproportionately affected by STIs and HIV.

Sociosexuality

Over four decades after Alfred Kinsey and associates identified the term sociosexual to describe individual differences in attitudes about sexual permissiveness and promiscuity, Simpson and Gangestad (1991) developed a scale to measure these attitudes and behaviors. The Sociosexual Orientation Inventory (SOI) identified sociosexuality as an individual difference variable believed to be associated with the extent to which one endorses sexual behavior outside of a relationship or without an emotional connection. They believed that a person either had restrictive or unrestrictive sexuality as measured by attitudes towards casual sex and actual sexual behavior. Individuals with a low (that is, restrictive) sociosexuality are thought to typically insist on commitment and intimacy in a relationship prior to engaging in sex with a partner. These individuals have been shown to have fewer lifetime sexual partners (Ostovich and Sabini, 2004), take more time before having sex with someone, and enact a long-term mating approach (Simpson and Gangestad, 1991).

Conversely, those who exhibit a high sociosexuality (that is, unrestricted) may feel relatively comfortable engaging in sex without commitment or emotional closeness. Unrestrictive individuals reported that they have engaged in sexual activities at a younger age (Yost and Zubriggen, 2006), are more likely to have concurrent sexual partners (Ostovich and Sabini, 2004; Yost and Zubriggen, 2006), and tend to implore short-term mating strategies, express less investment, and have weaker affectional ties (Westerlund et al., 2010). It is unclear if a woman is unrestricted in her endorsement of casual sexual liaisons, whether or not she may perceive her susceptibility to contracting HIV as low. The low perception of susceptibility to infection does not negate the fact that individuals may still engage in protective behaviors such as condom use and monogamy; however, it may indicate a leniency or willingness to engage in risky sexual behaviors such as one night stands or sex with multiple partners.

Perceived susceptibility to contracting HIV

A number of traditional cognitive behavioral change theories (e.g. theory of planned behavior, health belief model, and AIDS risk reduction model) posit that individuals who recognize that their behavior places them at risk for a disease or illness (perceived susceptibility) are more likely to adopt less risky behaviors than those who do not (Kowalewski et al., 1997; Mevissen et al., 2009). Although these theories acknowledge that perceived susceptibility to HIV is essential, the incorporation of other social factors that impact the accuracy of these perceptions are not often included (Kershaw et al., 2003). If a woman is not willing to personalize the risk of HIV, or inaccurately estimates the risk, she may be less likely to engage in protective behaviors. Although perceived susceptibility has been shown to operate similarly across populations; factors that influence the perception of susceptibility (or invulnerability) vary according to population. Many African American women may perceive their risk for contracting HIV to be low, when in fact many of the daily or even occasional behaviors that some engage in put them at extremely high risk (Darbes et al., 2008; Ford et al., 2006). Some of these behavioral choices may be influenced by age, economics, and/or relationship status.

Research on the relationship between one's perceived susceptibility to HIV and actual sexual behavior is mixed. Some studies indicate that perceived susceptibility is a primary motivator for the initiation of HIV precautionary behaviors (Ellen et al., 2002; Gerrard et al., 1996), while others (Dolcini et al., 1996; Parsons et al., 1997) show only a moderately significant correlation between the two. Perceived susceptibility is a key psychosocial factor that may strengthen or weaken the relationship between sociosexual norms and attitudes, and actual sexual behavior. A high perceived susceptibility of HIV infection, theoretically, should induce protective sexual behavior that protects against STIs, including HIV infection (van der Snoek et al., 2006). This study examines perceived susceptibility not only as a direct link to sexual behavior, but also as a potential moderator between sociosexuality and sexual behavior. Study hypotheses (Figure 1) predict:

1. Women with a more unrestricted sociosexuality will self-report higher perceived susceptibility than those with a more restricted sociosexuality;
2. Women with a more unrestricted sociosexuality would self-report more risky sexual behavior (as measured by the Sexual Behavior Index) than those with a more restricted sociosexuality;
3. Women with a lower perceived susceptibility will engage in more HIV-related risky sexual behavior; and
4. The relationship between sociosexuality and risky sexual behavior will be moderated by perceived susceptibility.

MATERIALS AND METHODS

Participants

To be eligible for the study, individuals had to self-identify as: African American, heterosexual, aged 21 and above, not knowingly pregnant, not knowingly HIV-positive, and sexually active (vaginal

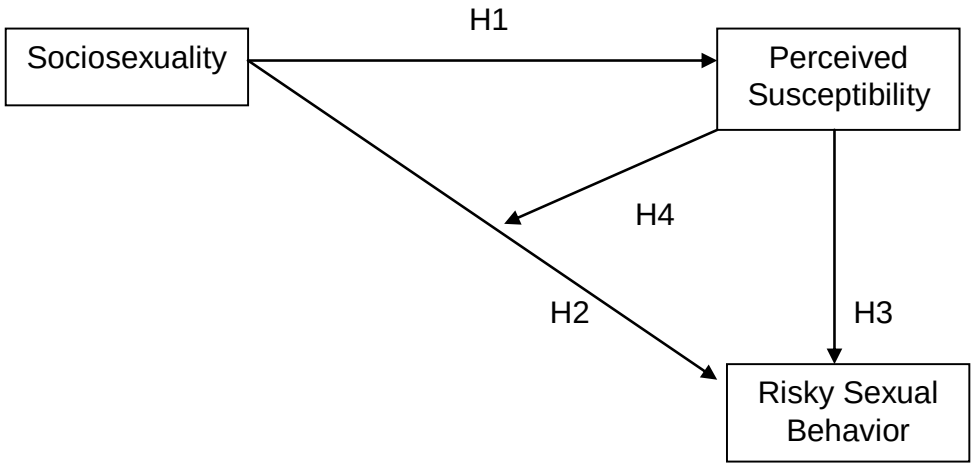

Figure 1. Study hypotheses.

or anal intercourse at least once in the past 12 months). Originally 278 women were recruited for the study. However, 3 women were excluded because there was a substantial positive skew in the sociosexual orientation data due in part to their responses. These scores were excluded from further analysis since they appear to be women drawn from a different population than the other respondents. Therefore, the final data set included 275 women.

Recruitment and procedures

Recruitment primarily took place online for this study; however, participants were also recruited in person. An Institutional Review Board (IRB) approved email was sent through various community-based organizations, institutes of higher education, listservs with high membership of African American women (e.g., sororities), and through personal contacts. The email provided information pertaining to the study (including the inclusion criteria and estimated time to complete) and contained a link to the Principal Investigator's survey. The link allowed participants to access the implied informed consent document as well. Once they accessed the survey website, they saw the cover letter which reinforced the purpose of the study, estimated time of completion, and inclusion criteria. Participants were asked to indicate that they understood the information and they met the inclusion criteria. If they agreed to participate in the study, they checked the assent button and an honor pledge which indicated that they had not taken the survey before and would not take it more than once. Participants could print the implied informed consent page for their records.

For those who participated via the Internet, a link was provided in the body of the study invitation which directed participants to the survey webpage. Participants for the web-based survey (via SurveyMonkey©) accessed a secure webpage that provided them with a cover letter which reinforced the purpose of the study, estimated time of completion, and inclusion criteria. Participants were asked to indicate that they understood the information and that they met the inclusion criteria. Implied consent was used because the survey was anonymous, and signatures were not obtained. A remote address (IP) was returned with submission of the survey responses and examined by the researcher to reduce the likelihood of multiple submissions from a single respondent.

In-person recruitment took place by posting IRB-approved fliers in various community-based organizations, public and private sector businesses, and public and private institutes of higher education in Southern California. There was a telephone number and an email address for potential participants to contact the researcher. After being contacted, each person answered questions to confirm eligibility. If she met the criteria, an appointment was scheduled for survey completion. Participants who completed the survey in-person were given a copy of the implied informed consent form. Completion and receipt of the survey indicated participant consent. The present study was part of a larger study so participants were given a packet of study instruments, and instructed to place the survey inside an unmarked manila envelope, which was not opened until the end of the data collection period. The researcher provided verbal confirmation of the confidentiality of responses and provided a copy of the informed consent form to participants. Ninety-two percent of the women responded to an online survey, while 8% chose face-to-face participation. There were no significant differences on main outcome measures based on mode of survey administration.

Measures

Sociodemographic information collected included year of birth, education, employment status, household income, geographic region, age at first voluntary intercourse, and relationship status.

Sociosexual orientation

This was assessed using the published seven-item SOI (Simpson and Gangestad, 1991), designed to measure individual differences in willingness to engage in casual, uncommitted sexual relationships. Two dimensions are assessed with this instrument: sociosexual behavior and attitudes. Three open-ended items asked respondents to report on aspects of their past and anticipated future sexual behavior. An example of a question is "How many sexual partners have you had in the past year?". Three items assessed attitudinal items evaluated on a Likert scale (1 = strongly disagree to 9 = strongly agree). An example of an item is "I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him." One final item, using the same Likert scale, assessed the frequency of sexual fantasies about someone other than current partner. This scale has shown a Cronbach's alpha of 0.77 in previous studies. All seven items were correlated and this scale was found to be appropriate for the current population with an alpha of 0.72. Higher scores reveal a more unrestricted sociosexual orientation.

Perceived susceptibility

The perceived susceptibility scale was utilized to assess perceived susceptibility to HIV/AIDS. This pre-existing five-item measure is a subscale of a larger sexual risks scale (DeHart and Birkimer, 1998) and asks participants to respond on a 5-point Likert scale (1 = strongly agree to 5 = strongly disagree). The published alpha is 0.84, but analysis with participants in the current study reveals a slightly lower alpha of 0.82. Higher scores indicate higher levels of perceived HIV risk and susceptibility.

Sexual behavior index

The main outcome was an author-developed composite sexual behavior index created by summing the number of lifetime risky behaviors reported by participants. There were six questions with dichotomous responses (yes/no), which included: (1) Have you ever felt obligated to have sex with your partner? (2) Have you ever had more than one sexual partner in a 30-day period? (3) Have you ever had sex with a partner you thought was having sex with someone else? (4) Have you ever had a one-night stand with someone you didn't know very well? (5) Have you ever had a sexually transmitted infection? and (6) Have you ever been tested for HIV? All 'yes' responses for questions 1 to 5 were given a '1' and a 'no' response was given a score of '0'. This pattern was reversed for the HIV testing question-participants received a '0' for 'yes' and a '1' for 'no'. The final question asked participants to indicate their age at first voluntary sexual intercourse (3 = "0 to 13," 2 = "14 to 16," and 1 = "17 and older)." The scores ranged from 1 (lowest) to 9 (highest). Due to the eligibility criteria, every participant had been sexually active in the past 12 months; therefore, the theoretical minimum is '1' and not '0.'

Data analysis

The analyses were conducted with Predictive Analytics SoftWare (PASW: version19.0 for Windows; SPSS Inc., Chicago, Illinois) statistical software. Descriptive analyses were computed for sociodemographic factors (Table 1) and the three scales of interest (Table 2). After descriptive analyses were conducted, a new variable, socioeconomic status variable (SES), was created by multiplying the education category by the income category to create a scale ranging from 2 to 48 (mean = 25.27, standard deviation [SD] = 12.70). Bivariate associations were conducted to identify which potential covariates were significantly associated with the sexual behavior index (outcome variable). Finally, analysis of variance (ANOVA) and multiple regression analyses were run to test any relationship between the sociodemographic variables and the three summed scales, and the hypothesized relationships.

RESULTS

Participants were 275 geographically diverse self-identified heterosexual adult African American women ranging in age from 21 to 61 (M = 33.60, SD = 8.89). All four geographical regions across the United States (US) were represented. Of the 275 women, 8.1% (n = 23) indicated they were not born in the US. The mean number of years in the US for these women was 22.3 (range 7 to 41 years). Eighty one percent of the sample had at least a college degree, and over half reported an income of at least $45,000 per year and no children. Table 1 shows the socio demographic information on all participants.

Preliminary analyses

Sociodemographic variables were analyzed for significant relationships with the three summed scales. Three variables, age, age at first voluntary intercourse, and relationship status revealed significant associations with variables of interest. Regression analyses revealed significant negative associations between age and both sociosexuality, $F(1, 271) = 8.16$, $p = 0.005$, and perceived susceptibility, $F(1, 271) = 5.51$, $p = 0.020$. Younger participants were more unrestricted in their sociosexuality and higher in their perceived susceptibility to STI/HIV. The participant's age at first intercourse was negatively associated with sociosexuality scores, $F(1, 272) = 7.93$, $p = 0.005$, indicating those who were younger when they first had voluntary intercourse reported higher sociosexuality scores (Table 3). An ANOVA revealed that relationship status was positively related to both sociosexuality, $F(2, 269) = 7.92$, $p < 0.001$, and perceived susceptibility, $F(2, 269) = 18.50$, $p < 0.001$.

Regression model

An initial regression model was run to test the idea that sociosexuality and perceived susceptibility would be predictive of risky sexual behavior (measured by the sexual behavior inventory (SBI). The overall model was significant, $F(2, 271) = 35.64$, $p < .001$, and the two predictors, together, explain 21% of the variance in the SBI. Sociosexuality explained most of this variance (change in $R^2 = 0.195$).

Potential covariates (age, employment, geographical location, relationship status, age at first voluntary intercourse, and SES) were examined in a bivariate analysis for relationships with the SBI. Only age at first voluntary intercourse was significantly related to the SBI ($r = -0.54$, $p < 0.001$). When the significant covariate was included in the regression model with sociosexuality and perceived susceptibility, the overall model was still significant, $F(3, 267) = 68.22$, $p < 0.001$ and the addition of age at first intercourse contributed an additional 22% (overall $R^2 = 0.434$). All three predictors were significantly related to SBI, with age at first voluntary intercourse contributing the most ($\beta = -0.48$, $t = -10.18$, $p < 0.001$), followed by sociosexuality ($\beta = 0.34$, $t = 6.95$, $p < 0.001$) and then perceived susceptibility ($\beta = 0.12$, $t = 2.60$, $p = 0.010$). The effect size attributable to adding the three predictor variables is large (Cohen's $f^2 = 0.75$). In summary, women who have a younger voluntary sexual debut would likely have higher (more unrestrictive) sociosexuality and slightly more perceived susceptibility to contracting HIV.

Hypotheses

The first hypothesis predicted that women who were

Table 1. Summary of select demographics.

Variable	Entire sample[a] (n = 275)	West (n = 84) 32.7%	East (n = 87) 33.8%	South (n = 56) 21.8%	Midwest (n = 30) 11.7%
Age	33.60	36.59***	33.32	30.84***	34.79
SD	8.89	9.59	7.89	7.51	9.44
Range	21-61	21-65	22-65	21-58	21-56
Educational level					
HSD/GED/Trade school	3%	6%	1%	0%	7%
Some college	16%	17%	13%	12%	23%
College graduate or higher	81%	77%	86%	88%	70%
Employed (%Yes)	95%	90%	99%	95%	97%
Income					
Under $45,000	44%	44%	40%	56%	43%
$45,000+	56%	56%	60%	44%	57%
Children (% Yes)	42%	46%	37%	30%	62%
Current relationship status					
Committed relationship	66%	65%	65%	64%	77%
Casual relationship	17%	16%	18%	16%	20%
Currently not involved in a relationship	17%	19%	17%	20%	3%
Sexual behavior descriptive					
	17.16	17.46	17.14	17.21	16.67
Age at 1st voluntary intercourse	2.91	3.17	3.09	3.26	1.73
	9-30	9-28	10-28	12-27	13-20

HSD/GED = High School Diploma/General Equivalency Diploma. [a]Missing demographic data for 18 participants; *p ≤ 0.05; **p ≤ 0.01 *** p ≤ 0.001.

Table 2. Means, standard deviations, and ranges for measures.

Variable	p	Overall	West	East	South	Midwest
Sociosexual orientation (M)		49.84	47.55	52.44	49.70	44.50
SD	0.322	25.48	22.39	24.07	26.85	23.33
Range		16-192	16-115	16-122	16-141	20-126
Perceived susceptibility (M)		9.43	9.18	9.54	10.28	8.63
SD	0.224	4.42	4.48	4.57	4.63	3.45
Range		5-25	5-21	5-25	5-24	5-16
Sexual behavior index (M)		5.08	5.01	5.19	4.97	5.00
SD	0.849	1.61	1.53	1.61	1.74	1.76
Range		1-9	2-8	2-9	1-8	1-8

No significant differences between respondents from the four regions.

more unrestricted in their sociosexuality would have higher perceived susceptibility to contracting HIV. The results showed a significant positive relationship, $F(1, 273) = 20.06$, $p < 0.001$. As the overall endorsement of casual relationship increased (more unrestricted), so did the women's perceived susceptibility.

Table 3. Significant associations with independent and dependent variables.

Dependent variable	Predictor variable	β	R^2
Sociosexual orientation inventory (SOI)	Age	-0.17**	0.03
	Age at first intercourse	-0.17**	0.03
	Perceived susceptibility	0.26***	0.07
Perceived susceptibility (PS)	Age	-0.14*	0.02
Sexual behavior index (SBI)	SOI	0.44***	0.20
	PS	0.23***	0.05

*p ≤ 0.05; ** p ≤ 0.01; ***p ≤ 0.001.

Secondly, the relationship between sociosexuality and risky sexual behavior was examined and was found to be positive, $F(1, 272) = 65.79$, $p < 0.001$. Women who endorsed sexual relationships without commitment also engaged in significantly more risky lifetime behaviors than those who did not. Contrary to the third hypothesized prediction that a negative relationship would arise between perceived susceptibility and risky sexual behavior, a significant positive association was found, $F(1,272) = 14.84$, $p < 0.001$. Women who had a higher perception of their HIV risk and susceptibility also engaged in more risky lifetime behaviors.

The final hypothesis examined the moderating effects of perceived susceptibility on the relationship between sociosexuality and sexual behavior. It was predicted that the positive relationship between sociosexuality and the SBI would become weaker as perceived susceptibility increased indicating that the personalization of risk plays a significant role in the enactment of risky and responsible sexual behavior (Figure 2). The Baron and Kenny (1986) method for testing moderators was used. The predictor and moderator variables (sociosexuality and perceived susceptibility, respectively) were centered to eliminate any multicollinearity effects between the two and the interaction term (sociosexuality X perceived susceptibility). The regression model was constructed as follows: (1) the SBI was entered as the dependent variable; (2) sociosexuality was entered into the first block; (3) perceived susceptibility was entered into the second block; and (3) the interactive term was entered into the last block. Although the predictor and moderator, independently, were significantly related to the SBI, the interaction term was not ($\beta = -0.046$, $t = -0.84$, $p = 0.401$). Therefore, perceived susceptibility was not shown to be a significant moderator of this relationship.

DISCUSSION

This study examined the psychosocial predictors of HIV-risk related sexual behavior among a geographically diverse sample of adult, heterosexual African American women. Demographically, the sample was fairly well educated and they reported low rates of STIs. Additionally, descriptive data revealed a sample where participants reported low levels of perceived susceptibility, and great variability in sociosexuality and sexual risk behavior. This study is novel in that it will help to fill the gap in existing literature on college-educated African American women and psychosocial predictors of risky sexual behaviors. Many previously published sexual behavior studies with African American women, in general, typically included only low income, inner city, drug abusing, or homeless populations (Dancy et al., 2002; Nyamathi et al., 1993; Quinn, 1993). Studies such as this are important, because only presenting data from lower socioeconomic status participants may convey the false perception that HIV-risk and risky sexual behavior is limited to these groups, when in fact, it may be related to other psychological, social, and contextual factors. Clearly, more attention to the diversity within the African American community is needed.

There were three major findings in this study. The first was that levels of sociosexuality (that is, unrestricted versus restricted) significantly predicted levels of perceived susceptibility and risky sexual behavior. Sociosexuality is an individual difference construct that is likely to fluctuate because the willingness to engage in casual sexual relations outside of commitment or strong emotional ties may change over one's lifetime. Psychological correlates such as sociosexuality are important to include in studies and interventions that examine sexual attitudes, decision-making, and behavior. Unfortunately, there has been few studies that examine sociosexuality among racial and ethnic minorities. One of the few studies found that used a primarily racial/ethnic population was Diaz-Loving and Rodriguez (2008). They examined sociosexuality and sexual behavior among 209 Mexican adults living in Mexico City and found great variability on the SOI (mean for women = 37.83). Overall results indicate that unrestricted sociosexuality was significantly related to increased sexual contact and increased number of sexual partners. Hall and Witherspoon (2011) examined sociosexual attitudes and sexual behavior of 57 African American college students attending a historically black college in the Southeast

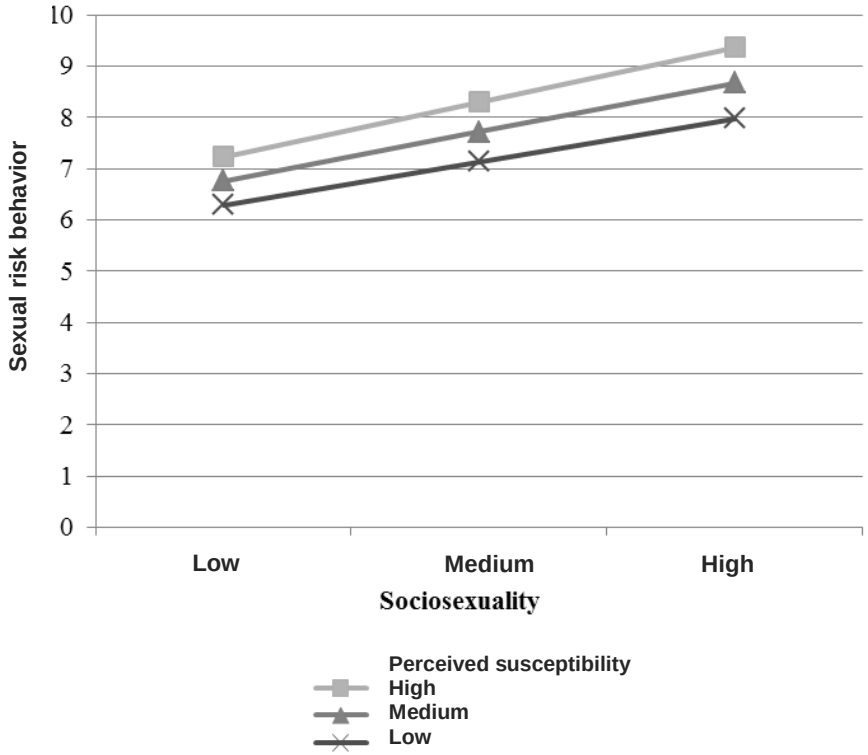

Figure 2. Moderating effect of perceived susceptibility on the relationship between sociosexuality and sexual risk behavior (n=275).

region of the United States. They found that sociosexuality (mean for women = 56.20) was significantly associated with engagement in riskier sexual behavior ($r = 0.28$, $p \leq 0.05$).

The second major finding was that the relationship between perceived susceptibility and risky sexual behavior was significant within our sample; however, it was not found to be a significant buffer between sociosexuality and risky sexual behavior. As previously reported, literature has been mixed on whether perceived susceptibility acts as a protective mechanism or not. Women in this study, with a higher perception of risk, also engaged in increased risky sexual behavior. This is contrary to previous studies examining perceived susceptibility (or perceived risk) among African American women (Corneille et al., 2008; Younge et al., 2010). In these studies, low SES women had low levels of perceived susceptibility, but engaged in risky sexual behaviors. This presents an interesting quandary, because it is not known if the perceived susceptibility of the women in this study was increased after engaging in risky behavior, therefore, the person 'learned' about the risk and is now more aware. An alternative explanation could be that participants are aware of their susceptibility and still decide to engage in risky sexual behavior. The disconnection between knowledge and behavior is not unique to the African American community or to HIV (Pichon et al., 2010); however, with the extremely high rates of STIs, including HIV, it is critical to begin to disentangle the relationship between knowledge and behavior to help understand why, even in the face of evidence and information, behaviors are not being tempered.

These findings have implications for theories used to explain preventative behavior and interventions used to prevent risky sexual behavior such as the Precaution Adoption Process Model (PAPM; Weinstein, 1988). The PAPM focuses on psychological processes within an individual, and posits people behave differently based on the specific point of risk personalization or behavior modification. The theoretical tenets of the PAPM may be used to explain why some of the women in the study consider themselves to be at fairly low risk, even when their behavior does not support this. One possibility is that some of the women may have an optimistic bias (a self-serving bias) in which they incorrectly underestimate their risk and overestimate the risk of others. This cognitive depersonalization of risk will not result in sustained attitude or behavior change. Some women may be accurate in their perception of risk, but have not progressed to the stage of action. Even if a woman has personalized the risk and is aware of the possible negative consequences, the costs involved in behavior modification may be too great to change. There may be other factors (cognitive, social, or financial) involved in a woman's decision to knowingly put herself at risk.

Finally, the covariate which emerged as an important construct in this study was age at first voluntary intercourse or sexual debut. Research indicates that an earlier sexual debut is associated with riskier sexual outcomes such as higher numbers of sexual partners, unplanned pregnancies, and a history of STIs (Bachanas et al., 2002; Kaestle et al., 2005). The relationship between sexual debut and riskier sexual outcomes must be interpreted with caution in this study. There are different cultural norms and expectations that may impact when and why participants engaged in voluntary sexual intercourse for the first time. Factors such as family dynamics, peer norms and influence may play a role in a role in sexual debut; however, these variables were not measured. Future prevention and intervention studies should examine sexual debut as it is possible that women who voluntarily engage in sexual intercourse at early ages may develop different sexual attitudes and beliefs that lay the groundwork for what types of behaviors and partners are appropriate.

As with all studies, there were a few limitations. The use of self-report data relies on the recall of each participant's interaction and situational decisions, and it is possible that they reported inaccurately. As with all non-experimental studies, predictive relationships can only be assessed. As such, causal statements about psychosocial correlates that predict sexual behavior cannot be made based on the associations established by this study. Finally, perceived susceptibility was tested as a moderator, but it is quite possible that it may act as an intermediary, or mediator, between sociosexuality and risky sexual behavior. This is something to include in future analyses.

One of the greatest strengths of this study is the representation of a geographically and socioeconomically diverse sample of African American women for the topical area of HIV-related sexual behavior. While some parts of the US were more represented than others, the issue of geographical diversity is important to HIV prevention and intervention planning efforts. Additionally, the use of web-based surveys to collect participant responses has significant advantages (e.g. such as low cost), especially with sensitive topics such as sexual attitudes and behavior, and HIV risk. Many of the samples that are presented in psychological research are those of "convenience" and not necessarily random. The web users are thought to be more diverse than university students or those from a community clinic. In addition, validity in web samples seems to be on par with those in traditional samples (Krantz ad Dalal, 2000) and issues of reliability are the same as those faced in traditional methods (Crano and Brewer, 2002).

Conclusion

Research gaps in the exploration of HIV behavioral risks and psychosocial factors such as sociosexuality has potential implications for future research and practice based on our findings. Although, prevention and intervention services in low-income communities is imperative (Denning, 2010; CDC, 2010), our data illustrates a continuum of sociosexual orientation coupled with self-reported sexual risk behaviors among a highly educated demographic of African American women. Interventions tailored to the needs of economically diverse African American women exhibiting a willingness to engage in casual, uncommitted sex would contribute substantially to the knowledge base. To the author's knowledge, this is one of the few studies to address the limited data on the role of sociosexuality and perceived susceptibility in predicting risk behavior. The inclusion of psychosocial individual difference variables such as sociosexuality and perceived susceptibility in STI and HIV prevention and intervention programs can help researchers gain a deeper understanding of the variability of attitudes, desires, and behaviors that manifest in participants. African American women are disproportionately affected by STIs, including HIV, and it is imperative that prevention efforts are grounded in not just theories that address cognitive and behavioral factors, but also the psychological and social context in which the women live.

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Full Length Research Paper

Adherence to highly active antiretroviral therapy and its challenges in people living with human immunodeficiency virus (HIV) infection in Keffi, Nigeria

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Adherence to highly active antiretroviral therapy (HAART) is pivotal in reducing viral transmission, preventing viral drug resistance and improving life expectancy of patients. A baseline cross-sectional survey of the level of adherence to ART and its challenges was carried out among adults accessing this service at Federal Medical Centre, Keffi, Nigeria. This was to assess the level of adherence and identify factors militating against it. Two hundred and fifty consenting human immunodeficiency virus (HIV) positive patients were recruited and interviewed using a structured questionnaire. The level of adherence to ≥ 95% of the prescribed medication within the 7 days preceding the interview in this population was 62.8% and only 31.2% of them in this category reported 100% adherence. Adherence was the highest (77.6%) and significantly associated with disclosure of HIV status to family members ($p \leq 0.05$) and similarly among those living with their families (85.8%) ($p \leq 0.05$). Neither the use an alarm, other people or self was found to be associated with better adherence to medication ($p > 0.05$). Common reasons for non-adherence were found to be forgetfulness (51.5%), avoiding drug side effect (14.5%), living far away from the medical centre (8.1%) and inability to afford the cost of transportation to the medical centre (6.5%). Patient's educational level, marital status and occupation were found to be significantly associated with adherence ART in this study ($p \leq 0.05$). On the whole, the level of adherence to HAART in this study population still needs improvement. The decentralization of HAART services to primary healthcare facilities and the intensification of patients' education and counseling are advocated.

Key words: Human immunodeficiency virus (HIV), antiretroviral therapy, adherence, non-adherence, Nigeria.

INTRODUCTION

The human immunodeficiency virus (HIV) has remained a public health burden especially in sub-Saharan Africa which habours 68% of the world infected population and Nigeria which carries 10% of the world burden (Bello, 2011).

In response to this pandemic, the highly active antiretroviral therapy (HAART) has been made available to those that require it. However, it has to be taken throughout life (Lal et al., 2010). An adherence level of ≥ 95% to this therapy is critical in obtaining its full benefits like maximum and durable suppression of viral replication, reduced destruction of CD4 cells, prevention of drug resistance, promotion of immune reconstitution, slow progression of disease and reducing transmission rates (Bangsberg et al., 2006; Chesney et al., 2006; Mills et al., 2006; Chabikuli et al., 2011). Adherence is the patient's ability to take drugs correctly, that is, in the right dose, with the correct frequency and at the right time daily (Bello, 2011). Although there is no gold standard for measuring adherence, the commonly used methods include: patient self report, pill counts, pharmacy refill records, electronic drug monitoring, biochemical markers, therapeutic drug monitoring and physician assessment

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(Monjok et al., 2010). However, the most common method used in resource-limited settings is self report or pharmacy refill records (Chesney et al., 2006). A notable reduction in HIV-related mortality and morbidity has also been reported to be associated with adherence to HAART (Hardon et al., 2007; Ukwe et al., 2010; Rachlis et al., 2011).

Adherence to HAART and barriers to adherence have been reported to vary from one country to another and even from one setting to another within the same country (Mills et al., 2006). The prevailing level for sub-Saharan Africa is 77% (Chabilkuli et al., 2010). Other studies have reported levels of 68% in Uganda (Byakika-Tusiime et al., 2005), 22% in Cote D' Ivoire (Eholie et al., 2007) and 71% in South Africa (Chabilkuli et al., 2010). In Nigeria, adherence of 49.2% has been reported in Kano (Nwanche et al., 2006), 85% in Sagamu (Idigbe et al., 2005) and 58% in Benin City (Erah and Arute 2008). Systematic reviews in developing countries have noted that factors militating against adherence include cost, stigma, alcohol abuse, pharmacy stock-out and distance from dispensing centers (Monjok et al., 2010).

Despite the importance of adherence as the fulcrum of the success of any HIV treatment initiative, it has some challenges for many patients in the different domains. The study is aimed at studying adherence to HAART and evaluating factors militating against it among adult infected patients accessing this healthcare service in a Federal Medical Centre in Nigeria. This is with a view to advice on the improvement of service delivery to this study population.

METHODOLOGY

Setting

This study was a cross-sectional study conducted in a Sexually Transmitted Disease clinic within a Federal Medical Centre in North Central Nigeria. The clinic provides healthcare for people living with HIV and other sexually transmitted infections and HAART is provided free of charge.

Study population and data collection

The study was carried out among 250 HIV positive consenting adults who had been enrolled for ART in the clinic for not less than 6 months. A structured interviewer administered questionnaire (designed for this study) with closed ended questions on general demography, self-reported adherence, and factors influencing adherence was used for the study.

Adherence was assessed by the self-reporting method of participants. It was defined as taking at least 95% of the prescribed medication in the preceding 7 days before the interview (Adoption of this short period was to avoid recall bias). The percentage adherence was calculated as the number of times the patient recalled to have taken medication (morning and evening) in the preceding week, divided by the total number of doses prescribed for the week, multiplied by 100 (Chabikuli et al., 2010).

Patients were classified as non-adherent if they missed more than 5% of their doses within the stated period. Using a checklist, participants also indicated the common reasons for skipping their medication.

Inclusion and exclusion criteria

Patients aged ≥18 years on HAART for more than 6 months and willing to take part in the study were eligible for inclusion. Pregnant women and diabetes patients were excluded.

Ethical approval

Approval for this study was granted by the Federal Medical Centre, Keffi Ethical Review Committee on Human Research.

Statistical analysis

Data was entered into Microsoft excel and analyzed using Statistical Package for Social Sciences (SPSS) 10.0. Chi square test was used to determine the degree of associations. A p value of ≤ 0.05 was considered significant.

RESULTS

A total of 250 people living with HIV and accessing healthcare in Federal Medical Centre, Keffi volunteered to participate in the study. Sixty-two percent of them were from outside Keffi town. There were more females (61.6%) than males (38.4%) and most of the participants were of age 25 to 34 (36.8%). About 70% of the volunteers had at least an elementary education and were into various endeavors (Table 1). The level of adherence in this study population was 62.8%, although among these only 31.2% had not missed taking their HAART in the one week preceding the study. More females missed their medication (65.7%) than their male counterparts (34.3%). Among those that had 100% adherence (never missed taking their drugs), 51.1% were males while 44.9% were females ($p \leq 0.05$) (Table 2).

Adherence was the highest (77.6%) among HIV positive patients who disclosed their status to members of their family ($p > 0.05$) while no particular method of reminder was related to a better adherence ($p \geq 0.05$) (Table 3). Table 3 also shows that participants living with their families were the most adherent to their treatment regimens while those that lived alone were the most non-adherent to HAART ($p \leq 0.05$).

The most common reason for non-adherence in this study population was forgetfulness (51.5%) and the least was inability to pay for transportation to the medical centre (Figure 1).

Occupation, educational level and marital status were found to be positive predictors to adherence ($p \leq 0.05$) while gender, age and place of aboard had no association with adherence ($p > 0.05$) (Table 4).

DISCUSSION

Of the 250 patients recruited for this study, only 62.8%

Table 1. Demographic characteristics of the study population.

Demographic characteristic	Sex		Total (%)
	Male (%)	Female (%)	
Age (years)			
18- 24	13 (13.5)	34 (22.1)	47 (18.8)
25- 34	33 (34.4)	59 (38.3)	92 (36.8)
35- 44	27 (28.1)	37 (24.0)	64 (25.6)
45- 54	18 (5.2)	17 (11.0)	35 (14.0)
≥ 55	5 (5.2)	7 (4.5)	12 (4.8)
Residence			
Keffi	39(40.6)	56 (36.4)	95 (38.0)
Out of Keffi	57 (59.3)	98 (63.6)	155 (62.0)
Marital status			
Married	57 (59.3)	79 (51.2)	136 (54.4)
Single	24 (25.0)	34 (22.1)	58 (23.2)
Divorced	0 (0.0)	20 (8.0)	20 (8.0)
Tertiary	15 (15.6)	21 (13.6)	36 (14.4)
Occupation			
Civil servants	18 (18.8)	23 (14.9)	41 (16.4)
Unemployed	16 (16.7)	19 (12.3)	35 (14.0)
House wife	0 (0.0)	65 (42.2)	65 (26.0)
Business	19 (19.8)	18 (11.7)	37 (14.8)
Labourer	25 (26.0)	0 (0.0)	25 (10.0)
Others	12 (12.5)	35 (22.7)	47 (18.8)
Level of education			
None	25 (26.0)	48 (31.2)	73 (29.2)
Elementary	19 (19.8)	37 (24.0)	56 (22.4)
Secondary	34 (35.4)	40 (26.0)	74 (29.6)
Widow	18 (18.8)	29 (18.8)	47 (18.8)

Table 2. Level of adherence to HAART among the study population.

Level of adherence	Sex		p value
	Male (%)	Female (%)	
< 95.0%	36 (38.7)	57 (61.3)	0.006
≥ 95.0%	60 (38.2)	97 (61.8)	
Have skipped medication	69 (34.3)	132 (65.7)	0.007
Have never skipped medication	27 (55.1)	22 (44.9)	

reported ≥ 95% adherence in the 7 days preceding the interview while 37.2% did not achieve this required level of adherence. The reported adherence to HAART of 62.8% in this study is similar to reports from Ibadan a city in Southern Nigeria (Olowoorekere et al., 2008) and among children in Kano a city in Northern Nigeria (Zubayr et al., 2011) where 62.9 and 65.6% were reported, respectively. Higher levels of adherence have been reported from other parts of Nigeria as 70.8% (Salami et al., 2010) and 73.3% (Bello, 2011) from Ilorin, 78.3% among pregnant women in Nnewi (Igwegbe et al., 2010), 86% in South-Eastern Nigeria (Ukwe et al., 2010) and 80% in Kano (Muktar-Yola et al., 2006). Similarly, 88 and 80% adherence has been reported during Ramadan

Table 3. Relationship between HIV status disclosure, method of drug reminder living companion and adherence among patients in Federal Medical Centre Keffi

Parameter	Adherence status		p value
	Adherent (%)	Non adherent (%)	
Disclosure status			
Family	173 (77.6)	50 (22.4)	
Friends	9 (50)	9 (50)	0.028
Did not disclose	6 (3.2)	3 (4.8)	
Method of reminder			
People	87 (76.3)	27 (23.7)	
Alarm	95 (74.4)	33 (25.8)	0.931
None	6 (75.0)	2 (25.0)	
Company			
Alone	18 (46.2)	21 (53.8)	
With Family	157 (85.8)	26 (14.2)	0.000
With others	13 (6.9)	15 (24.2)	

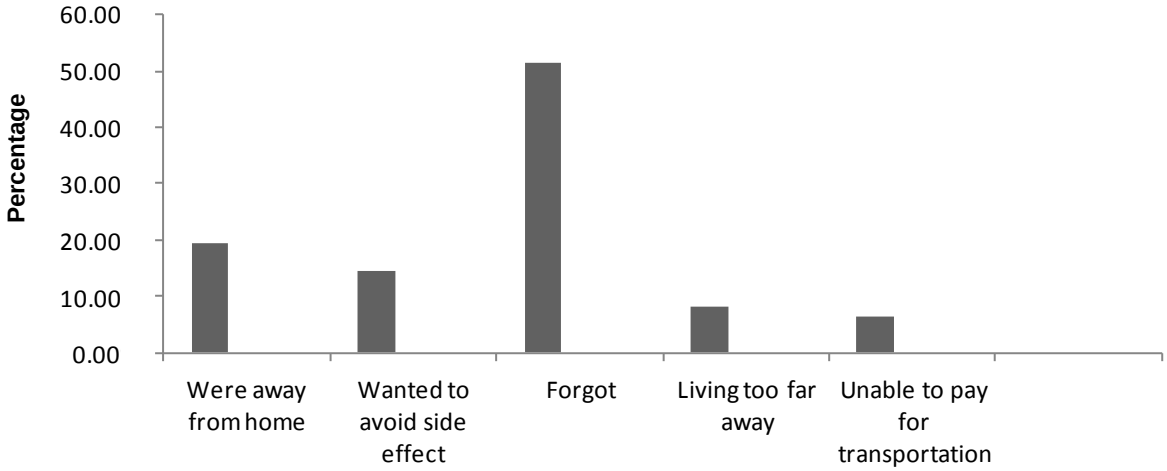

Figure 1. Reasons for non adherence by HIV positive patients accessing HAART in Federal Medical Centre, Keffi.

among non-fasting and fasting Muslims, respectively (Habib et al., 2009). A similar study among HIV patients without depressive disorder found an adherence level of 78.9% (Olisah et al., 2010). Some African countries have also reported levels higher than observed in this study. These include reports of 71% in Rustenburg, South Africa (Chabikkuli et al*.,* 2010) and 82% in Nairobi, Kenya (Wakibi et al., 2011). However, some studies in Nigeria have reported lower adherence as compared to what was reported in this study. There have been reports of 58% in Benin City (Erah and Arute, 2005), 44% in Ile-Ijesha (Afolabi et al., 2009), 49.2% in Niger-Delta (Nwauche et al., 2006) and 36.3% among patients with a depressive disorder (Olisah et al., 2010).

These various levels of adherence in different places might have been as a result of the fact that there is no gold standard in the measurement of this parameter. For example, different studies used different periods of recall time to determine adherence. Another important factor is the difference in healthcare service provided to the patients. For example, most of the studies failed to state whether or not ART was given free of charge to patients. This is an important information because Bello (2011) posited that an improvement in adherence in their study could be traced to the free health care service for their patients.

The prevalence of non-adherence in this study is similar to the 37.1 and 37.4% reported by Olooworeke et al. (2008) and Shaahu et al. (2008), respectively in Ibadan, Nigeria but higher than 21.7% reported among

Table 4. Influence of socio-demographic characteristics on adherence to HAART among PLWH accessing HAART in Federal Medical Centre, Keffi.

Demographic characteristic	Sex		Total (%)
	Male	Female	
Age (years)			
18- 24	13 (13.5)	34 (22.1)	47 (18.8)
25- 34	33 (34.4)	59 (38.3)	92 (36.8)
35- 44	27 (28.1)	37 (24.0)	64 (25.6)
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Unemployed	16 (16.7)	19 (12.3)	35 (14.0)
House wife	0 (0.0)	65 (42.2)	65 (26.0)
Business	19 (19.8)	18 (11.7)	37 (14.8)
Labourer	25 (26.0)	0 (0.0)	25 (10.0)
Others	12 (12.5)	35 (22.7)	47 (18.8)
Level of education			
None	25 (26.0)	48 (31.2)	73 (29.2)
Elementary	19 (19.8)	37 (24.0)	56 (22.4)
Secondary	34 (35.4)	40 (26.0)	74 (29.6)
Tertiary	18 (18.8)	29 (18.8)	47 (18.8)

*Significant ($p \leq 0.05$).

pregnant women in Nnewi, Nigeria (Iwegbe et al., 2010). In fact, even among the adherents, only 31.2% of them reported 100% adherence whereby they did not skip their medication in the 7 days preceding the study. More males achieved this feat than women. The reason for this is not very obvious.

This study was carried out in a facility where ART is given free of charge, therefore, the impediment to low uptake due to cost did not arise. The reason given by majority of the patients for not taking their medication was forgetfulness (51%). This is similar to reports from Ibadan (Olowookere et al., 2008) and Nnewi (Iwegbe et al., 2010). To forestall skipping their drugs, some patients in this study admitted using some form of reminder. Common among both adherents and non-adherents was the use of people (parents, children, friends) and an alarm. Paradoxically, in this study, 53.2% of non-adherents also reported the use of an alarm as a reminder. The problem with this is the fact that you need to be in a place where your attention can be drawn by the alarm otherwise the aim is easily defeated. Electronic devices and telephone support services have been effectively used in some parts of the world (Katz and Rice, 2009; West, 2012). However, these are not yet very effective in the study area, because of challenges emanating from the partial availability of the required social services. Iwegbe and colleagues (2010) also noted that the use of these technology supported services may not be feasible in the West African sub-region. It is pertinent to lay emphasis on the importance of adherence although patient's participation in treatment decision has been variously suggested (Nwauche et al., 2006) hoping this will also forestall forgetfulness. On the whole, there was no method of reminder that was related to better

adherence ($p > 0.05$) in this study.

Being away from home (19%), wanting to avoid the drug side effect (16%), living too far away from the service center (8%) and unable to afford getting to the service center (6%) were the other reasons affecting adherence in the study population. People who live far away from the service providing centers and those economically challenged are very likely to be inconsistent or even abandon treatment. In some cases, they may end up with traditional medicine which is usually within reach. Another likely scenario is that travel cost and time required to get to the service center may lead to borrowing of medication from other patients. And non-adherence by 16% of the participants just for wanting to avoid the drug side effect is worrisome. It is very important that medical personnel are encouraged to discuss possible side effects of administered drugs with patients. And ART service centers should be encouraged to float Pharmacovigilance Committees to monitor cases of drug adverse reactions among patients on HAART. Groh et al. (2011) posited that normally a patient will not stop taking the drug if he/she is aware of possible side effects.

The disclosure of HIV status to family members and also living with them were found to be positive predictors for adherence ($p \leq 0.05$). Studies have indicated that disclosing one's HIV status helps to reduce stress and isolation with a consequent increase in social support and adherence (Palva et al., 2011). Family members and friends can play the role of treatment partners and will usually be willing to provide moral and material support. It also helps negotiation for safer sex which impacts positively in controlling the spread of the HIV scourge. However, non- disclosure of HIV status has been reported from a meta-analysis in Africa as a predictor of poor adherence (Reda and Biadgiliga, 2012).

Marital status was significantly associated with adherence whereby married people recorded the highest level of adherence (81.6%) as compared to singles (69%), widows (69%) and divorcees (60%). A similar observation was reported by Nwauche et al. (2006). This might not be unconnected with the fact that having a partner especially one who is on the same medication or to whom your HIV status has been disclosed has an advantage, because you can remind each other. Also, some of these participants have children and feel they must do their best to live and remain healthy for the sake of the children (personal communication). In contrast, an earlier study in Nigeria had reported a non-association between marital status and adherence (Afolabi et al., 2009).

The literacy level of the participants was found to be significantly associated with adherence ($p < 0.05$). Adherence was found to be higher (82.6%) among literate participants than those of them that were not literate (61.7%). This difference was statistically significant ($p \leq 0.05$). Level of education is an important index in all spheres of public health (Adams, 2002; Feistein and Hammond, 2004; Cowell, 2005). This is because it is generally assumed that educated people have an added advantage of being able to source for information from various places and are more likely to make better informed decisions on their own. In fact Iwegbe et al. (2010) posited that education may impact on adherence in ways which consequently result in enhancing the implementation of the recommendations regarding adherence. In a study in Kano, patients with formal education were 4 times more likely to be adherent than those without formal education (Iliyasu et al., 2005). Similarly, low education level was also found to be associated with non-adherence (Nwauche et al., 2006; Iwegbe et al., 2010; Hegazi et al., 2010; Bello, 2011).

With respect to occupation, civil servants were found to be the occupational group with the highest adherence level (95.1%). This is probably because in the study area, the educated people are generally the civil servants. It was therefore not surprising that the degree of adherence was higher among them.

Age and sex were not positive predictors of adherence in this study and also in an earlier study by Afolabi et al. (2009). However, in a study in Ilorin being female and older age were reported as positive predictors of adherence (Salami et al., 2010).

Conclusion

The 37.2% non-adherence in this present study population is a cause for alarm. It also underscores the urgent need for any intervention that will improve adherence in these patients, because apart from the harm to themselves, the development of resistant viral strains is a major public health concern. Also, based on the reasons reported for failure to achieve adherence, it is imperative that the issue of decentralization of treatment centers to primary healthcare facilities which are usually within the communities be considered. Worthy of note also is the need for alternative regimens for patients experiencing adverse side effects. Re-strategizing on improving patient education and counseling will go a long way in improving ART adherence especially as it is free of charge in this study area. Adherence studies should be carried out from time to time even within the same group of patients especially after interventions to determine the success. There is also a need to develop a gold standard for methods of accessing adherence.

LIMITATION

There are limitations to our study, because of its cross-sectional design and the convenience of the sample used. Being an intended baseline study, we assessed only adherence to therapy at a single time point. This therefore makes it impossible to evaluate variations in

adherence over time for an individual.

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Full Length Research Paper

Effect of premarital sex on sexually transmitted infections (STIs) and high risk behaviors in women

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This research aimed to study the effect of premarital sex on sexually transmitted infections (STIs) and high risk behaviors among women in sub-Saharan Africa. It included 1,393 women randomly selected from the Moshi urban district of northern Tanzania. Participants' demographic and socio-demographic characteristics, alcohol use, condom use, number of partners, symptoms of STIs and age at first sex and marriage were obtained. Moreover, blood and urine samples were tested for human immunodeficiency virus (HIV-1), herpes simplex virus (HSV-2), syphilis, chlamydia, gonorrhea, trichomonas and *Mycoplasma genitalium* infections. The average duration of premarital sex in the study participants was 1.66 years (standard deviation (SD) of 2.61 years). Women with longer duration of premarital sex had higher odds of HIV-1, HSV-2 and other STIs. Moreover, women with longer duration of premarital sex were more likely to report multiple sexual partners. These findings highlighted the importance of a lengthy period of premarital sex as a public health issue. STIs prevention programs in sub-Saharan Africa should address factors leading to a longer period of premarital sex in women.

Key words: Premarital sex, high-risk behaviors, human immunodeficiency virus 1 (HIV-1), herpes simplex virus (HSV-2), sexually transmitted infections.

INTRODUCTION

Sub-Saharan Africa has been more devastated by human immunodeficiency virus/Acquired immune deficiency syndrome (HIV/AIDS) than any other region in the world. An estimated 22.9 million people infected with HIV, which is around two thirds of the global total, live in sub-Saharan Africa (UNAIDS, 2011). Around 1.2 million deaths from AIDS occurred in sub-Saharan Africa (UNAIDS, 2011). Less than a third of people living with HIV in sub-Saharan Africa have access to antiretroviral therapy (UNAIDS, 2010). In the absence of an effective vaccine and universal access to antiretroviral therapy, recognition and comprehensive control of risk behaviors that are associated with HIV transmission remains the most promising strategy to curb and reverse the spread of the epidemic in the sub-region.

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The age at first sex is an important risk factor for the acquisition of HIV. Individuals who start their sexual activity at a young age are more likely to report higher rates of STIs, drug and alcohol abuse, multiple sexual partners and to engage in unprotected sex (Dickson et al., 1998; Duncan et al., 1990; Greenberg et al., 1992; Manning et al., 2000). Several studies from sub-Saharan Africa reported a negative association between delaying sexual debut and HIV prevalence (Gregson et al., 2006; Stoneburner and Low-Beer, 2004). Age at marriage could also be another risk factor for HIV acquisition in the region. However, the relationship between age at marriage and the risk of HIV infection is not clear. Some studies suggested that late marriage is a risk factor for HIV infection (Bongaarts, 2007; Glynn et al., 2003). Bongaarts (2007) reported that late marriage after sexual initiation leads to a long period of premarital intercourse with multiple partners and facilitates the risk of acquiring HIV. However, other studies failed to report a positive association between late marriage and HIV acquisition,

and indicated that early marriage elevates the risk of HIV infection (Bruce and Clark, 2003; Clark, 2004). Marriage occurs at a young age for many women in sub-Saharan Africa (that is, first sex occurs at marriage for many sub-Saharan African women). However, the young women are often married to considerably sexually experienced older men, who are likely to have had more sexual partners; thus women are at increased risk of HIV acquisition. A study in Uganda reported that the risk of HIV infection in young married women whose husbands were 10 or more years older were doubled compared to young married women whose husbands were only up to four years older (Kelly et al., 2003). Further knowledge about the association between age at first marriage and acquisition of HIV-1 might have important public health implications for the prevention of HIV and other STIs in sub-Saharan Africa.

The present study examines the association between duration of premarital sex and the risk of acquiring STIs, including HIV-1 and HSV-2, among women in sub-Saharan Africa. We hypothesized that a longer gap between first sex and marriage is associated with higher risk of STIs. To test this hypothesis, we analyzed data from a community-based survey in the Moshi urban district of Tanzania. Moshi is the capital of the Kilimanjaro region of northern Tanzania. The Kilimanjaro region, located in northern Tanzania adjacent to the Kenyan border, is one of Tanzania's 20 regions. According to the 2002 Tanzania National Census, the population of the Moshi urban district was 144, 336 (National Bureau of Statistics (NBS), 2002). Tanzania has a population of 34.5 million people, with approximately 7% of adults infected with HIV (Tanzania Commission for AIDS (TACAIDS), 2005; National Bureau of Statistics (NBS), 2005; ORC Macro, 2005). In the Moshi district of northern Tanzania, the prevalence of HIV infection is about twice that of the national average.

METHODOLOGY

Study participants

The data set used in this paper comes from a cross-sectional survey conducted from November, 2002 to March, 2003 in the Moshi urban district of Tanzania. The rationale, organization, and recruitment of the survey have been described in detail elsewhere (Larsen et al., 2007). In brief, the survey involved a two-stage sampling procedure. In the first stage of sampling, a total of 150 clusters were selected using probability proportional to the number of women aged 20 to 24 living in the study area. In the second stage of sampling, 18 households were randomly selected from each cluster. A total of 2,019 women aged 20 to 44, who were residents of the selected households, were interviewed. Information was collected on fertility, marriage, sexual practices, symptoms of STIs, socio-demographic characteristics, and husband-wife relations, including domestic violence and alcohol use. Blood and urine samples were drawn to test for HIV-1, HSV-2, syphilis, chlamydia, gonorrhea, trichomonas and *M. genitalium* infections. The study was approved by the Harvard School of Public Health IRB (HSC Protocol #0108ACOM), University of Maryland IRB (Protocol #05-0031), Kilimanjaro Christian Medical Center Ethics Committee, Research and Ethical Clearance of the Tanzanian National Institute for Medical Research, the Centers for Disease Control and Prevention Institutional Review Board. Written informed consent for participation in the study was obtained from participants.

Study measures

Demographic characteristics including age (20 to 24, 25 to 29, 30 to 34, and 35+), education (pre-secondary, secondary and above), ethnicity (Chagga, Pare, other), and religion (Muslim/other, Catholic, Protestant) were considered. Moreover, STIs infections and symptoms, alcohol abuse, condom use in the last twelve months, and number of sexual partners they had in the last three years were considered. Alcohol abuse was measured by the Cut Down, Annoyed, Guilty and Eye Opener (CAGE) score (Mayfield et al., 1974). An STI symptom was defined as a positive response to at least one of the following questions: abdominal pain, abnormal genital discharge, foul smell in the genital area, excessive genital secretions, swellings in the genital area, itching in the genital area, burning pain on micturition, pain during intercourse, and genital ulcers. Blood and urine samples were tested for HIV-1, HSV-2, syphilis, chlamydia, gonorrhea, trichomonas and *M. genitalium*.

Statistical analysis

Two-sample T-tests and one way Analysis of variance (ANOVA) were used to compare duration of premarital sex between groups. Regression analyses were carried out using generalized linear mixed effects regression models to examine the association between duration of premarital sex, high-risk behaviors and STIs. More specifically, two-level mixed effects logistic regression models were used to examine the association of duration of premarital sex with STIs and high risk behaviors. Random intercepts were included in the logistic regression models to model the combined effect of all unobserved cluster-specific covariates. The regression analyses allowed for the two-level nested nature of the data, with women nested within geographic clusters, and were conducted using a generalized linear mixed models procedure, that is, PROC GLIMMIX, in SAS version 9.2 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Sixty percent (n = 1,218) of the sampled women were either married or were living with a cohabitating partner at the time of the survey. Almost 13% (n = 257) of the women were widowed, divorced or separated at the time of the survey. 27% (n = 543) reported they had never been married. Premarital sex was defined as the time from sexual initiation to age at marriage. The analysis included the participants who provided complete information on age at first sex and age at marriage. Participants who reported that they had never had sexual intercourse and participants with unknown age at first sex or marriage were excluded from the analyses.

Out of the 2,019 surveyed women, 70% (n = 1,414) provided their age at first sex and marriage. Out of the 1,414 participants with complete information, twenty-one women were excluded as their reported age at first sex was greater than their age at marriage.Thus, the analysis

was restricted to the 1,393 women who provided complete data on age at first sex and marriage. The average duration of premarital sex was 1.66 years (SD of 2.61 years). Table 1 display the distribution of premarital sex duration by socio-demographic characteristics, alcohol and condom use. The duration of premarital sex significantly varied among the different age groups ($p < 0.01$). Women aged 25 to 34 years reported longer duration of premarital sex compared to younger (< 25 years) or older (> 34 years) women. Women with secondary school education and above reported longer duration of premarital sex compared to women with no or lower than secondary school education ($p < 0.01$). Furthermore, duration of premarital sex was significantly associated with ethnicity ($p < 0.01$) and religion of the women ($p = 0.01$). Women who reported condom use in the previous twelve months had longer duration of premarital sex compared to women who reported no condom use ($p = 0.02$). However, there was no significant difference in duration of premarital sex between women who abused alcohol versus those who did not use alcohol ($p = 0.91$).

Table 1 also presents the distribution of premarital sex duration by STIs and number of sexual partners. The duration of premarital sex was significantly higher for women tested positive for HIV-1 ($p < 0.01$), HSV-2 ($p = 0.01$), and other STIs ($p = 0.02$). Moreover, women with multiple partners had longer duration of premarital sex compared to women with one partner ($p < 0.01$). Although it did not reach statistical significance, women with STIs symptoms reported longer duration of premarital sex ($p = 0.07$) compared to women with out STIs symptoms.

Figure 1 displays the odds of STIs and multiple sexual partners per 1 year increase in duration of premarital sex. The odds of HIV-1 (OR = 1.13; 95% CI = 1.07 to 1.21; $p < 0.01$), HSV-2 (OR = 1.06; 95% CI = 1.01 to 1.11; $p = 0.01$) and other STIs (OR = 1.07; 95% CI = 1.01 to 1.13; $p = 0.03$) increased by 13, 6 and 7%, respectively, for a 1 year increase in duration of premarital sex. Moreover, the odds of having multiple partners increased by 14% per 1 year increase in duration of premarital sex (OR = 1.14; 95% CI = 1.07 to 1.21; $p < 0.01$). Though women with longer premarital sex years reported higher odds of STIs symptoms, there was no significant association between premarital sex and symptoms of STIs (OR = 1.04; 95% CI = 0.99 to 1.09; $p = 0.07$).

Multivariate models were used to assess the association between duration of premarital sex and number of partners after adjusting for the effect of age, education, religion, tribe and condom use. The multivariate models used to examine the association between duration of premarital sex and STIs adjusted for the effect of multiple partners in addition to age, education, religion, tribe and condom use. The findings from both unadjusted and adjusted models were similar and were reported in Figure 1.

DISCUSSION

The primary focus of this study was to assess the relationship between duration of premarital sex, multiple sexual partners and the risk of acquiring STIs. Our study has revealed that time spent single after sexual debut was significantly associated with HIV and other STIs. We found higher odds of HIV-1, HSV-2 and other STIs among women with longer duration of premarital sex. Moreover, women with longer duration of premarital sex were more likely to report multiple sexual partners. These findings are consistent with previous studies from Tanzania and other sub-Saharan Africa countries (Bongaarts, 2007; Zaba et al., 2009). Bongaarts (2007) reported a positive association between late marriage after sexual initiation and HIV prevalence. In a study by Zaba et al. (2009), longer duration of premarital sex was associated with higher rates of partner acquisition. Our study differs from previous studies by reporting both symptoms of STIs at the time of interview and STIs confirmed by laboratory testing in a large community based sample.

The results of our study should be interpreted in light of the following limitation. First, the data set is ten years old and changes in prevention, treatment and management of STIs should be taken into account while interpreting our findings. The accuracy of the information regarding multiple partners, age at first sex, and age at marriage may be affected by respondent and recall biases. In most sub-Saharan Africa cultures, women are not permitted to have sex outside marriage and multiple sexual partners. Thus, the self-reported data on women's sexual behaviors could be an underestimation and may not be very reliable. Moreover, age at first sex and marriage were measured by self-report, which might have been affected by recall bias. Missing data is another limitation of the study. The analyses included only women who provided complete information on age at first sex, age at marriage, socio-demographic variables, high-risk behaviors, STIs and STIs symptoms. Analysis of the complete cases ignores the possible systematic difference between the women who provided information on these variables and those who did not. Finally, the use of recent number of partners' data as a proxy for lifetime partners is subject to bias. Despite these limitations, our study has several strengths, including a large sample size and a laboratory-confirmed STI diagnosis in a population based sample.

Our findings highlight the importance of long duration of premarital sex as a public health issue. These findings can be used to guide future HIV and other STIs preventive measures on late-marrying women in the region. Prevention programs should address factors leading to longer period between first sex and marriage, which may not be under the control of the woman. Further research is needed to identify the risk factors associated with longer period of premarital sex and to

Table 1. Distribution of premarital sex duration by socio-demographic characteristics, high-risk behaviors and sexually transmitted infections in Moshi women, Tanzania, 2002 to 2003.

Demographic characteristics	N	Mean (SD)	P-value
Study covariates			
Age in years			
20-24	291	1.05 (1.60)	<0.01
25-29	349	1.86 (2.43)	
30-34	310	2.12 (3.15)	
35+	441	1.58 (2.80)	
Ethnicity			
Chagga	670	1.91 (2.84)	<0.01
Pare	179	1.72 (2.61)	
Other	543	1.32 (2.26)	
Religion			
Muslim/Other	549	1.41 (2.42)	0.01
Catholic	498	1.83 (2.79)	
Protestant	346	1.82 (2.63)	
Education			
Pre-secondary	1066	1.48 (2.51)	<0.01
Secondary and above	327	2.24 (2.86)	
Alcohol Abuse			
No	642	1.96 (2.74)	0.91
Yes	106	1.99 (2.60)	
Condom use*			
Never	1086	1.57 (2.47)	0.02
Sometimes, often, always	236	2.09 (3.16)	
Study outcomes			
HIV-1			
No	884	1.56 (2.53)	<0.01
Yes	112	2.71 (3.54)	
HSV-2			
No	506	1.48 (2.51)	0.01
Yes	490	1.91 (2.85)	
Other STIs**			
No	909	1.58 (2.50)	0.02
Yes	158	2.12 (3.34)	
Symptoms of STIs			
No	1035	1.58 (2.57)	0.07
Yes	358	1.89 (2.73)	
Number of partners*			
1	1205	1.58 (2.54)	<0.01
2+	111	2.72 (3.11)	

*Number of partners in the last 3 years, **Condom use in the last 12 months, ***Syphilis, chlamydia, *Mycoplasma genitalium*, gonorrhea and trichomonas.

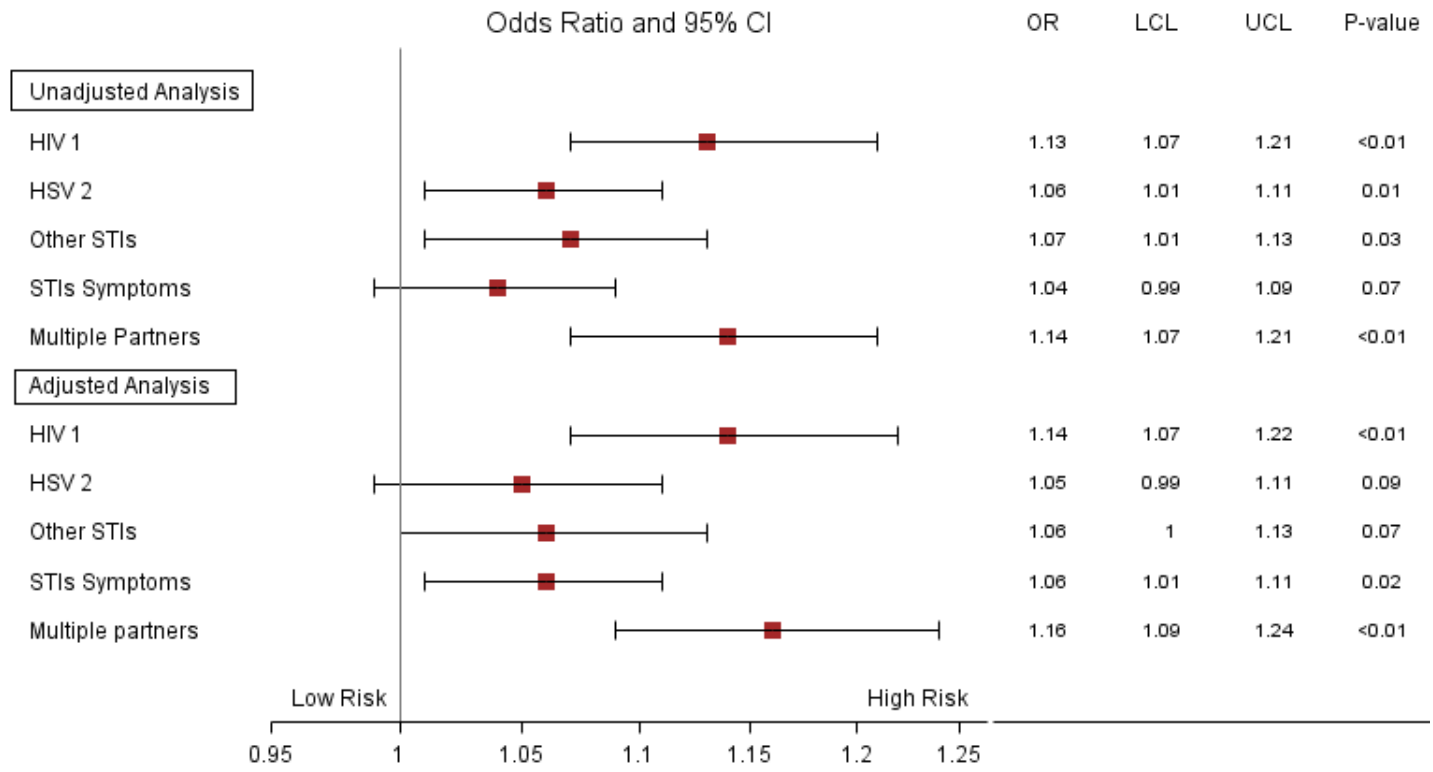

Figure 1. Odds of STIs and multiple sexual partners associated with 1-year increase in duration of premarital sex in Moshi women, Tanzania, 2002-2003. The adjusted analyses control for the effect of age, education, religion, tribe and condom use in the previous 12 months. Moreover, besides these variables, the adjusted analyses of STIs (HIV-1, HSV-2, other STIs, symptoms STIs) control for the effect of number of sexual partners

illuminate the association between premarital sex and STIs, which is of public health significance especially in sub-Saharan Africa where women are disproportionally affected by HIV and other STIs.

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UPCOMING CONFERENCES

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