

Factors associated with HIV counseling and testing and correlations with sexual behavior of teachers in primary and secondary schools in Addis Ababa, Ethiopia

Takele Menna
Ahmed Ali
Alemayehu Worku

School of Public Health, College
of Health Sciences, Addis Ababa
University, Addis Ababa, Ethiopia



Background: The HIV/AIDS pandemic is a global crisis that affects the lives of millions of people. Although HIV counseling and testing (HCT) serves as the entry point for HIV prevention, treatment, and care, it remains a low priority in many settings. The aim of this study, therefore, was to assess the factors associated with HCT and their correlation with the sexual behavior of primary and secondary school teachers in Addis Ababa.

Methods: A comparative cross-sectional study was conducted among primary and secondary school teachers in Addis Ababa, Ethiopia. A multistage sampling technique was used to select a representative sample of 1,136 teachers. HCT and sexual health behavior-related data were collected using a self-administered questionnaire. Binary logistic regression was employed to examine the relationships between HCT, sociodemographics, and risky sexual behavior-related variables.

Results: Of the 1,136 eligible study participants, 1,034 (91.0%) teachers completed the self-administered anonymous questionnaire. The proportion of teachers who had ever tested for HIV was 739/1,034 (71.5%; 95% confidence interval [CI] 69.1–74.2). Multivariate logistic regression analyses showed that being male (adjusted odds ratio [AOR] 0.63; 95% CI 0.44–0.90) was associated with a 37% decrease in odds of being ever tested for HIV compared with being female. Married teachers were less likely to have had HIV testing (AOR 0.30; 95% CI 0.19–0.47) compared with unmarried teachers. Being aged ≥ 45 years (AOR 4.05; 95% CI 1.82–9.03), having high HCT-related knowledge (AOR 3.56; 95% CI 1.73–7.32), and having a perceived risk of HIV (AOR 1.43; 95% CI 1.04–1.96) were positively associated with HCT. Moreover, regarding the correlation of HCT with the sexual behavior of teachers, those teachers who never had HCT were more likely to have multiple sexual partners than those who had ever had HCT (AOR 1.85; 95% CI 1.08–3.15). In contrast, teachers who had ever been tested for HIV were less likely to have used condoms consistently than those who had never been tested (AOR 0.55; 95% CI 0.32–0.96).

Conclusion: No significant differences were observed between primary and secondary school teachers regarding factors associated with HCT and its correlation with sexual behavior. Gender, age, marital status, knowledge of HCT, and perceived risk were found to be factors associated with HCT uptake. Correlations between being faithful to a partner, inconsistent use of condoms, and HCT uptake of teachers were also observed. Thus, strengthening the current practice of HCT services in the education sector with due emphasis on the observed factors could play a pivotal role in bringing about positive changes in the sexual behavior of school community.

Keywords: schools, teachers, human immunodeficiency virus, acquired immune deficiency syndrome, counseling and testing, factors, correlations

Correspondence: Takele Menna
School of Public Health, College of
Health Sciences, Addis Ababa University,
PO Box 33412, Addis Ababa, Ethiopia
Email admetakele@gmail.com

Introduction

The HIV/AIDS pandemic is a global crisis with consequences that will be felt for decades to come.¹ It is a critical development issue that affects the lives of millions of people.² Ethiopia is among the countries in the world that are most affected with HIV/AIDS, and the disease is one of the top ten causes of death in the country. The estimated number of people who were living with HIV/AIDS in 2013 was 793,700, including 200,300 children, according to the latest Spectrum/Estimation and Projection Package modeling.³ Moreover, there were estimated 45,200 AIDS-related deaths in 2013, and approximately 898,400 orphans in the same year.³⁻⁵ The HIV epidemic in Ethiopia is becoming more concentrated in urban areas and along major transport corridors. The higher prevalence in Addis Ababa and other large towns may be associated with labor migration to large urban areas.⁶

HIV/AIDS continues to be one of the top priorities on the health sector agenda for the Ethiopian government. To this end, the number of facilities providing HIV counseling and testing (HCT), prevention of mother-to-child transmission, and antiretroviral therapy services in the country is increasing annually. Of the total health facilities, 79% are providing HCT services, 57% prevention of mother-to-child transmission, and 24% antiretroviral therapy services.⁷

HCT is defined as the process by which an individual undergoes counseling enabling him or her to make an informed choice about being tested for HIV. It includes two complementary components, ie, client-initiated testing and provider-initiated testing. The former component refers to the well-known voluntary counseling and testing (VCT), while the latter provider initiates counseling and testing, and further includes testing in prevention of mother-to-child transmission and testing in other health care settings.⁸⁻¹¹

In Ethiopia, as a result of wide expansion of health facilities providing HCT services, a significant increase in HCT coverage has been achieved. For instance, more than 10 million people have been tested for HIV in 2014 (27% of HCT coverage among the adult population in 2014).⁷

Although the “ABC” rules are widely promoted as one of the HIV prevention strategies, the practice seems very poor and a lot still needs to be done, particularly among the young population segment, particularly in schools, students, and teachers.

Alarming, even though youth are knowledgeable about AIDS prevention measures, many of them do little to prevent it or to avoid other sexually transmitted diseases.¹² Studies in Ethiopia showed that youth both in school and out of school are indulging in risky sexual behavior. For example, a cross-

sectional study of youth in Ethiopia revealed that among those who had sexual intercourse, 58.5% reported using condoms and 32.6% underwent testing for HIV.¹³ Another cross-sectional study conducted among high school students in Gondar, north-west Ethiopia, showed that the prevalence of HIV and sexually transmitted infections was 1.1% and 10%, respectively. In this study, it was also shown that 17% of students had sex with casual partners and commercial sex workers.¹⁴

According to the Health Impact Evaluation conducted in Ethiopia in 2008, 48%, 50%, and 58% of women aged 15–24 years reported consistent condom use, limited sexual intercourse with one uninfected partner, and abstained from sex, respectively, as a means of preventing HIV infection.¹⁵

Need for strengthening of HCT in the education sector

Today, education sector is the most human intensive public sector in Ethiopia. Cumulatively, the sector has a total of 17,413,176 students, 314,524 teachers, and more than 80,000 non-teaching staff (constituting a total of more than 24% of the country's population).^{16,17} The fact that the sector deals with a large number of personnel (teachers, nonacademic staff, and students who are mainly young) makes it one of the sectors most affected by HIV/AIDS.¹⁸ It is widely argued that school teachers in Sub-Saharan Africa are badly affected by the HIV/AIDS epidemic, and heterosexual intercourse is considered as the major means of transmission of the disease in the region.^{18,19}

As in other Sub-Saharan countries, the education sector in Ethiopia is being severely compromised by the HIV pandemic. A 5% increase in death among teachers in Ethiopia has been noted between 1999 and 2001, some of which can be attributed to AIDS.²⁰ It is commonly suggested that teachers are more likely to engage in high-risk sexual behavior compared with the rest of the adult population. As the majority of teaching professionals in primary and secondary schools are relatively young, they are in the highest HIV prevalence age cohorts.^{21,22} It is also believed that some younger secondary school teachers have more exposure to risky sexual behavior or multiple sexual partners than their primary school counterparts because of potential sexual relationships with their female students. Furthermore, secondary school teachers are relatively well-off, especially when they are posted in rural areas. Hence, they have more chances to be involved in risky sexual practices, such as having multiple sexual partners and/or paid sex from nearby small towns.²²

On the other hand, primary schools have more female teachers when compared with secondary schools. As various studies and reports witnessed the HIV prevalence and HCT uptake are more prevalent among females compared with males mainly due to differences in some of the biological, social, and economic factors.²³ Hence, we can expect variation in the level of exposure to risky sexual behavior as well as in factors associated with HCT among primary and secondary school teachers. A study conducted among teachers in Tanzania on VCT utilization showed that, of 918 primary school teachers who participated in the survey, 80% had never tested their HIV status.²⁴ Another study conducted in the Harari region in Ethiopia on HCT utilization among teachers showed that 46.3% of the study participants were tested for HIV.²⁵ The odds of having tested for HIV increased with being female and being younger than 35 years.²⁵ A study conducted in Kenya among secondary school teachers indicated an HCT utilization rate of 30.5%.²⁶ Younger and less experienced teachers were more likely to utilize HCT services than their older and more experienced counterparts.²⁶

Although HCT service utilization among the general population is increasing from year to year, research in Ethiopia shows that utilization of voluntary HCT is low and its level of utilization varies among different segments of the population.^{27–29}

The national demographic and health survey conducted in Ethiopia in 2011 showed that 66% of women and 82% of men knew where to get an HIV test, but only 36% of women and 38% of men have ever been tested for HIV and received their test results.⁶ Never-married respondents who have ever had sex were more likely to have taken the test and received results (69% of women and 58% of men) than those currently or previously in a union. Overall, about six in every ten Ethiopians (61% of women and 59% of men) have never been tested for HIV.⁶

Nevertheless, knowledge of one's HIV status is vital for individuals to receive HIV-related health care.⁶ Currently, many people with HIV do not know that they are infected. Those who test late often start antiretroviral therapy when they are already significantly immune-compromised. This results in poor health outcomes and continuance of HIV transmission. The value of HCT depends on linking people to services that are acceptable, accessible, and effective.³⁰

According to the Demographic and Health Surveys conducted between 2007 and 2009, a median 33.6% of women and 17.2% of men in 18 low-income and middle-income countries had ever tested for HIV.³¹ In many settings, women have greater access to HCT services due to their more

frequent contact with health services than men.³¹ Gender has been found to be a significant predictor of VCT. Adult men are more likely to report psychological deterrents to utilization of VCT than their female counterparts.⁹

A study conducted in Ghana indicated that the effects of sociodemographic characteristics on acceptance of HIV were not statistically significant.¹⁰ A study conducted in Ethiopia on health professionals showed that subjective norm (what other people in the area think about the others), and attitude (individual's internal feelings) were strongly associated with the intention to go for VCT.¹¹ However, none of the sociodemographic factors showed statistically significant associations with intention to use VCT.¹¹ Another study reported that VCT acceptance was higher among currently married persons, but it was not significantly associated with age, gender, or perception of HIV risk.³²

Many studies have indicated a change in reported sexual behavior following HIV testing.^{33–35} For instance, in Uganda, utilization of HCT was responsible for changes in behavior with regard to condom use with casual partners. Studies of serodiscordant couples in several high prevalence African countries (Kenya, Rwanda, Democratic Republic of Congo, and Zambia) also showed that attending HCT leads to a consistent and significant reduction of risky sexual behavior and prevents transmission of HIV to negative partners.^{36–38} Nevertheless, another study done in rural Uganda reported no significant differences in risky sexual behavior or in incidence of HIV between acceptors and non-acceptors of VCT.³²

However, a meta-analysis of seven studies provided evidence in support of VCT as a moderately effective strategy for reducing risky sexual behavior in developing countries.³⁹ The available evidence also suggests that HCT can have an effect in terms of reducing episodes of unprotected sex and the number of sexual partners.^{40–42} As other studies revealed, although HCT did not have an overall effect on condom use, in most cases people who received HCT reported an increase in condom use compared with those who did not receive HCT.^{42,43} On the other hand, in a study conducted in Kenya, there was an increased likelihood of unprotected sex among women who had never been pregnant following HCT.⁴⁴ Another study in Ethiopia also showed that testing had no significant effect on condom use or abstinence.⁴⁵

Despite the fact that there is good evidence that HCT can be an effective strategy for behavior change in people infected with HIV, HCT remains a low priority in many places, including schools, where the most reproductive and productive segment of any population is found.⁴⁶ Further, as previous researchers have suggested, the uptake of VCT can

be influenced by numerous characteristics, including social factors, fear of stigma, and differing cultural contexts.^{24–32}

In general, the importance of HCT as the entry point for provision of medical care and psychosocial support is undeniable. Apart from providing the opportunity to prolong life, HCT also potentially facilitates prevention of the disease. However, there is some debate about the effects of HCT, and two questions dominate the research field: firstly, the question of whether HCT is helpful as a prevention strategy; secondly, the question of identification of factors that prevent people from seeking HCT. In addition, in light of the rapidly expanding and diversifying field of HCT, it is important to evaluate the potential predictors of HCT service utilization and its significance as an entry point into HIV prevention, care, and treatment.

The purpose of this study was to identify factors associated with HCT and its correlation with sexual behavior in teachers in Addis Ababa, Ethiopia.

Materials and methods

Study design and setting

This was a comparative cross-sectional study conducted in primary and secondary schools from March to June, 2013, in Addis Ababa, the capital city of Ethiopia. According to the national census of 2007, with an annual growth rate of 3.8%, the projected population of Addis Ababa for 2014 was 3,384,569, of which 52.4% were female.⁴⁷ The capital city is administratively divided into ten subcities (known as *kifle ketemas*) and 116 districts (known as *woredas*).⁴⁸ There were 745 primary and 163 secondary schools (both government and non-government) in Addis Ababa. The numbers of teachers for 2012/2013 were 14,893 (44.4% female) in primary schools and 5,651 (17.2% female) in secondary schools.²³

Sampling procedure

In this study, all ten subcities in Addis Ababa and their respective primary schools (grades 1–8) and secondary schools were included. In order to get a representative sample from the students and teachers, multistage and multiphase random sampling techniques with reasonable formulas of assumptions and 15% contingency were used in order to address all the five interrelated specific objectives of a PhD study.

Accordingly, the required number of schools from each of the ten subcities were selected proportionately, using systematic sampling techniques. Thus, 76 primary and 27 secondary schools were selected in phase 1. In phase 2, 30 schools (15 primary and 15 secondary schools) were randomly selected for this specific study. In phase 3, four

secondary schools were purposively selected for addressing a quasi-experimental study design.

Among all public primary and secondary schools in Addis Ababa that satisfied the inclusion criteria, 15 randomly selected primary and 15 randomly selected secondary schools from the different subcities participated in this comparative cross-sectional study, which assessed determinants for HCT and its effects on sexual behavior, using uptake of HCT by teachers as a major outcome variable. The required sample size was calculated using two population proportion formulas with a 5% type I error and 80% power, where n_1 is primary school teachers, n_2 is secondary school teachers, P_1 is the prevalence of HCT uptake by primary school teachers ($=0.20$, taken from a study in Tanzania),^{24,49} P_2 is the prevalence of HCT among secondary school teachers ($=0.31$ taken from a study in Kenya),²⁶ r is the ratio of $n_2:n_1$ ($=1$), and $P=(0.20+0.31)+2$ ($=0.26$). The result was then multiplied by a design effect of 2 ($D=2$) and after that 15% contingency was added for the possible nonresponse rate. Thus, the calculated sample size was $494+74=568$ teachers from each of the comparison schools, giving a total sample size of 1,136.

Moreover, in order to compare factors associated with HCT and its correlations with sexual behaviors among teachers, equal numbers of primary and secondary school teachers were selected for the study. This was done because of not only the differences in levels or subjects being taught (being from primary or secondary schools), but also due to the possible differences in their academic status. Today, in Ethiopia, all the teachers in secondary schools are expected to have at least first degree in their subjects to teach, unlike those in primary schools who might have a certificate or diploma level of academic background.

Selection criteria

All government-owned primary schools with complete first and second cycles (grades 1–8) and secondary schools in Addis Ababa established before 2005 and had at least 40 teaching staff during the 2010/2011 academic year were eligible for the study. Teachers in these schools during the study period who volunteered to participate were included. Teachers who were severely ill were not able to participate.

Data collection and quality control

The study data were collected using a self-administered questionnaire containing several sections dealing with various variables related to sociodemographics and sexual behavior. The questionnaire was prepared in English and then translated into the local official language, Amharic. The questionnaire

was pretested in two primary and two secondary schools that were not selected for the study. The necessary corrections were then made in language and content. The data were collected by 12 diploma graduate nurses under the supervision of two senior health professionals who were also working as instructors in health colleges.

Two days of training was given for the data collectors and supervisors by the principal investigator. The data quality was assured by giving training to data collectors and supervisors, pretesting the questionnaires, and conducting close, immediate, and daily supervision. The collected data were checked for completeness and consistency by the supervisors and the principal investigator every day.

Accordingly, the study participants responded mainly to the following HCT-related and sexual behavior-related variables: sex, age, religion, marital status, work experience, monthly income, HIV/AIDS-related knowledge, HCT-related knowledge, attitude toward “ABC” rules, history of sexual exposure, HCT uptake, and history of condom use and multiple sexual partners in the previous year. Further, the choice of variables included in bivariate analysis was based on theoretical knowledge and statistical significance ($P < 0.05$).

Ethical considerations

Ethical clearance was obtained prior to the study from the institutional review board of the College of Health Sciences at Addis Ababa University. An official letter of cooperation was written from the School of Public Health of Addis Ababa University to the Addis Ababa City Administration Education Bureau. The bureau wrote letters of cooperation to all concerned, including the selected study schools.

Written consent was obtained from individual participants after they had been fully informed about the purpose of the study and the procedure used for data collection. No names or other identifying information were included in the data collection to ensure confidentiality and anonymity. We adhered as far as possible to basic ethical principles, including respect for persons/autonomy, beneficence, and justice, and no ethical issues or challenges arose during data collection.

Data analysis

The data were entered and cleaned using Epi-Info software version 3.5.4 and then transported to Statistical Package for the Social Sciences version 20.0 software for analysis. Various study variables were chosen for statistical analysis. Descriptive statistics such as frequencies and proportions

were used to describe the study population in relation to relevant variables.

The dependent variables, ie, ever had HCT and willingness to go for it in the near future for those never tested, and the independent variables used for statistical analyses of this study were selected based on knowledge of theory and the statistical significance of the findings reported in previous studies.

In addition, in order to assess the correlations of HCT with sexual behavior of the study participants, ever being tested for HCT and some selected sociodemographic and sexual behavior related independent variables such as age, sex, and attitude towards ABC, rules were used with the dependent or outcome variables (the number of sexual partners and using condoms in previous 12 months).

Furthermore, bivariate analyses were conducted among sexual behavior related variables, such as exposure and history of having tested for HIV, and willingness to be tested in the near future as outcome variables. The sexual behavior related outcome variables (number of sexual partners and history of condom use) with some sexual behavior related and sociodemographic factors such as age, sex and attitude towards ABC rules, were also included in the bivariate analyses.

A stepwise multivariate logistic regression model was then used to assess the associations among the outcome variables and the suspected factors. The variables in the multivariate model were chosen based on the statistical significance found during bivariate analyses. Thus, variables found to have P -values less than 0.05 were considered to be statistically significant.

Further, for identifying factors associated with HCT uptake of primary or secondary school teachers, the variable level of school (being a primary or secondary school teacher) was adjusted for some of the selected sociodemographic factors like sex and age. In addition, for examining HCT correlations with reported number of sexual partners and consistent use of condoms, the variable, ever had HCT, was adjusted for some of the selected sociodemographic factors like age and sex too.

Results

Sociodemographic characteristics of study participants

Of the 1,136 eligible teachers, 1,034 (91.0%) completed the self-administered questionnaire (Table 1). Of the 568 teachers from primary schools, 515 (90.7%) completed the questionnaire, as did 519 (91.4%) of the 568 teachers from secondary schools.

Table 1 Sociodemographic characteristics of study participants from primary and secondary schools in Addis Ababa, Ethiopia, March to June 2013

Variable	Overall n=1,041	Primary school		Secondary school		χ^2 test P-values
	n (%)	n	%	n	%	
Sex						
Male	684 (66.2)	280	54.4	404	77.8	0.000
Female	350 (33.8)	235	45.6	115	22.2	
Age, years						
18–24	208 (21.3)	153	31.6	55	11.2	0.000
25–34	552 (56.6)	235	48.6	317	64.4	
35–44	95 (9.7)	39	8.1	56	11.4	
≥45	121 (12.4)	57	11.8	64	13.0	
Religion						
Orthodox	762 (73.7)	405	78.6	357	68.8	0.001
Protestant	165 (16.0)	68	13.2	97	18.7	
Muslim or other	107 (10.3)	42	8.2	65	12.5	
Ethnicity						
Amhara	572 (55.3)	309	60.0	263	50.7	0.008
Oromo	236 (22.8)	97	18.8	139	26.8	
Tigrie	110 (10.6)	55	10.7	55	10.6	
Other	116 (11.2)	54	10.5	62	11.9	
Marital status						
Single	662 (64.0)	332	64.5	330	63.6	0.60
Married	335 (32.4)	162	31.5	173	33.3	
Other	37 (3.6)	21	4.1	16	3.1	
Educational status						
Diploma and below	342 (33.1)	325	63.2	17	3.3	0.000
First degree	642 (62.1)	188	36.6	454	87.5	
Second degree and above	49 (4.7)	1	0.2	48	9.2	
Teaching experience, years						
≤5	111 (10.8)	69	13.5	42	8.1	0.000
6–10	398 (38.7)	205	40.0	193	37.4	
11–20	267 (26.0)	139	27.1	128	24.8	
≥21	252 (24.5)	99	19.3	153	29.7	
Monthly salary/income, birr						
≤1,500	178 (20.6)	147	35.0	31	7.0	0.000
1,501–2,500	516 (59.6)	232	55.2	284	63.7	
2,501–3,500	112 (12.9)	35	8.3	77	17.3	
≥3,501 birr	60 (6.9)	6	1.4	54	12.1	
Ever tested for HIV						
Yes	739 (71.7)	381	74.3	358	69.2	0.07
No	291 (28.3)	132	25.7	159	30.8	
Not ever tested, intention to test						
Yes	134 (46.5)	57	44.2	77	48.4	0.68
No	154 (53.5)	72	55.8	82	51.6	

Females constituted 350 (33.8%) of the total participants, and the majority 760 (73.3%) of teachers were in the most productive and reproductive age group (18–34 years, Table 1). The gender and age compositions of the teachers observed in this study were consistent with the annual reports from the Addis Ababa City Administration Education Bureau and Ministry of Education in Ethiopia.

In addition, 762 (73.7%) of the study participants were Orthodox Christian, 165 (16.0%) were Protestant, and 107 (10.3%) were Muslim, with the remainder following other

religions. Regarding ethnicity, 572 (55.3%) were Amhara, 236 (22.8%) were Oromo, 110 (10.6%) were Tigrie, and 116 (11.2%) were from other ethnic groups. With regard to marital status, 662 (64.0%) were single, 335 (32.4%) were married, and 37 (3.6%) belonged to categories (divorced, widowed, or separated). A total of 342 (33.1%) were certificate or diploma holders, 642 (62.1%) were bachelor's degree holders, and 49 (4.7%) were master's degree holders. Further, 519 (50.2%) had been teaching for more than 10 years and 694 (67.1%) were earning ≤2,500 birr per month (Table 1).

Factors associated with HCT

Among the study participants from primary and secondary schools, the proportion of lifetime undertaking of HCT was 739/1,034 (71.5%, 95% confidence interval [CI] 69.1–74.2). When teachers were classified by school level, the proportions undertaking HCT were 381/513 (74.3%) and 358/517 (69.2%) among primary and secondary school teachers, respectively (Table 1).

Of those teachers never tested for HIV until the survey, 134/288 (46.5%, 95% CI 40.1–52.2) showed interest to go

for testing in the near future. In addition, when teachers who had never had HCT were classified by school level, the proportions of reported willingness to go for HCT were 57/129 (44.2%) and 77/159 (48.4) among primary and secondary school teachers, respectively (Table 1).

Table 2 shows descriptive data for factors associated with HCT uptake among primary and secondary school teachers. The multivariate regression analyses in Table 2 show that male gender was associated with a 37% decrease in being ever tested for HIV compared with female teachers (adjusted

Table 2 Factors independently associated with HCT in primary and secondary school teachers in Addis Ababa, Ethiopia, March to June 2013

Factor	Ever tested for HIV n=1,034				Willing to go for HCT in next 2 months n=293			
	Yes n (%)	No n (%)	COR 95% CI	AOR 95% CI	Yes n (%)	No n (%)	COR 95% CI	AOR 95% CI
Schooling								
Primary	381 (74.3)	132 (25.7)	I	I	57 (44.2)	72 (55.8)	I	I
Secondary	358 (69.2)	159 (30.8)	1.28 (0.98–1.68)	1.09 (0.80–1.50)	77 (48.4)	82 (51.6)	0.84 (0.53–1.34)	0.73 (0.39–1.35)
Sex								
Female	277 (78.5)	76 (21.5)	I	I	41 (56.2)	32 (43.8)	I	I
Male	467 (68.3)	217 (31.7)	0.59 (0.48–0.80)	0.63 (0.44–0.90)	94 (43.3)	123 (56.7)	0.60 (0.35–1.01)	0.44 (0.22–0.90)
Age, years								
18–24	149 (72.0)	58 (28.0)	I	I	27 (46.6)	31 (53.4)	I	I
25–34	411 (74.3)	142 (25.7)	0.89 (0.62–1.27)	0.93 (0.61–1.41)	71 (50.7)	69 (49.3)	0.85 (0.46–1.56)	0.97 (0.44–2.17)
35–44	72 (74.2)	25 (25.8)	0.89 (0.52–1.54)	1.22 (0.57–2.62)	8 (32.0)	17 (68.0)	1.85 (0.69–4.96)	1.1 (0.28–4.31)
≥45	73 (59.8)	49 (40.2)	0.52 (0.29–0.93)	4.05 (1.82–9.03)	22 (45.8)	26 (54.2)	1.03 (0.48–2.22)	0.54 (0.12–2.57)
Religion								
Orthodox	539 (70.8)	222 (29.2)	I	I	108 (49.3)	111 (50.7)	I	I
Protestant	124 (73.8)	44 (26.2)	0.86 (0.59–1.26)	0.86 (0.57–1.31)	20 (45.5)	24 (54.5)	1.17 (0.61–2.24)	1.12 (0.46–2.71)
Muslim or other	81 (75.0)	27 (25.0)	0.81 (0.51–1.29)	0.67 (0.40–1.13)	7 (25.9)	20 (74.1)	2.78 (1.13–6.84)	2.57 (0.81–8.16)
Marital status								
Single	446 (67.4)	216 (32.6)	I	I	102 (47.2)	114 (52.8)	I	I
Married	268 (79.3)	70 (20.7)	0.54 (0.40–0.74)	0.30 (0.19–0.47)	30 (43.8)	37 (55.2)	1.10 (0.64–1.91)	0.82 (0.29–2.29)
Other	30 (81.1)	7 (18.9)	0.48 (0.21–1.11)	0.22 (0.07–0.63)	3 (42.9)	4 (57.1)	1.19 (0.26–5.46)	1.17 (0.13–10.33)
Work experience, years								
≤5	86 (77.5)	25 (22.5)	I	I	7 (28.0)	18 (72.0)	I	I
6–10	282 (71.2)	114 (28.8)	1.39 (0.85–2.28)	1.54 (0.90–2.63)	63 (55.8)	50 (44.2)	0.31 (0.12–0.80)	0.35 (0.11–1.07)
11–20	199 (74.5)	68 (25.5)	1.18 (0.70–1.98)	1.52 (0.84–2.74)	31 (46.3)	36 (53.7)	0.45 (0.17–1.22)	0.55 (0.17–1.86)
≥21	169 (66.8)	84 (33.2)	1.71 (1.02–2.87)	1.68 (0.77–3.67)	33 (39.8)	50 (60.2)	0.59 (0.22–1.57)	1.03 (0.23–4.67)
Knowledge of HIV/AIDS								
Low	4 (66.7)	2 (33.3)	I	I	1 (50.0)	1 (50.0)	I	I
High	740 (71.8)	291 (28.2)	1.27 (0.23–6.98)	0.29 (0.03–3.11)	134 (46.5)	154 (53.7)	0.87 (0.05–14.03)	
Knowledge of HCT								
Low	18 (46.2)	21 (53.8)	I	I	125 (46.6)	143 (53.4)	I	I
High	726 (72.7)	272 (27.3)	3.11 (1.63–5.93)	3.56 (1.73–7.32)	10 (45.5)	12 (54.5)	1.05 (0.44–2.51)	1.36 (0.47–3.96)
Perceived risk of HIV								
No	456 (70.0)	195 (30.0)	I	I	94 (48.5)	100 (51.5)	I	I
Yes	279 (74.6)	95 (25.4)	1.26 (0.94–1.67)	1.43 (1.04–1.96)	40 (43.0)	53 (57.0)	0.80 (0.49–1.32)	1.01 (0.54–1.90)
Fear of stigma, discrimination								
No					47 (57.3)	35 (42.7)	I	I
Yes					73 (44.2)	92 (55.8)	0.59 (0.35–1.0)	0.89 (0.43–1.86)
Fear of confidentiality								
No					40 (67.8)	19 (32.2)	I	I
Yes					84 (43.3)	110 (56.7)	0.36 (0.20–0.67)	0.51 (0.23–1.12)

Abbreviations: AOR, adjusted odds ratio; COR, crude odds ratio; HCT, HIV counseling and testing.

odds ratio [AOR] 0.63, 95% CI 0.44–0.90). Teachers aged 45 years and older were about four times more likely to have had HIV testing compared with their younger counterparts (AOR 4.05; 95% CI 1.82–9.03). Married (AOR 0.30, 95% CI 0.19–0.47) and other, ie, separated, divorced, or widowed (AOR 0.22; 95% CI 0.07–0.63) teachers were less likely to have undergone HIV testing compared with their unmarried counterparts. Moreover, teachers with high HCT-related knowledge and perceived risk of HIV were more likely to have undergone HCT compared with their less aware counterparts (AOR 3.56, 95% CI 1.73–7.32 and AOR 1.43, 95% CI 1.04–1.96, respectively, Table 2).

On the other hand, of the variables entered into the multivariate logistic regression model to determine factors associated with willingness to go for HCT, only being male (AOR 0.44, 95% CI 0.22–0.90) showed statistically

significant or negative associations. However, there was no follow-up done and this was based merely on self-reported intentions of study subjects (Table 2). Although fear of stigma and discrimination (OR 0.59, 95% CI 0.35–1.0) and fear of confidentiality of HIV test results (OR 0.36, 95% CI 0.20–0.67) showed statistically significant but negative associations with interest to go for HCT during bivariate logistic regression analyses, the variables lost their statistical significance during multivariate analyses.

Correlations between HCT and sexual behavior

Table 3 presents the results of multivariate logistic regression analyses of associations between being tested for HIV (adjusted for some selected sociodemographic and HIV/AIDS-related variables as explanatory variables) and risky

Table 3 Correlation between HCT uptake and sexual behavior of primary and secondary school teachers in Addis Ababa, Ethiopia, 2013 (n=739)

Factors	Multiple sexual partners in previous 12 months n (%)			Consistent condom use in previous 12 months n (%)		
	Yes	No	AOR 95% CI	Yes	No	AOR 95% CI
Ever had HCT						
Yes	81 (18.8)	351 (81.3)	1	117 (27.3)	311 (72.7)	0.55 (0.32–0.96)
No	44 (31.2)	97 (68.8)	1.85 (1.08–3.15)	64 (45.4)	77 (54.6)	1
Sex						
Female	18 (9.9)	163 (90.1)	0.42 (0.21–0.84)	27 (15.2)	151 (84.8)	1
Male	108 (27.5)	285 (72.5)	1	154 (39.5)	238 (60.7)	2.33 (1.2–4.39)
Age, years						
18–24	24 (30.4)	55 (69.6)	1	31 (39.2)	48 (60.8)	1
25–34	71 (23.3)	234 (76.7)	0.59 (0.31–1.12)	127 (41.1)	182 (58.9)	0.69 (0.36–1.32)
35–44	10 (15.4)	55 (84.6)	0.47 (0.15–1.46)	8 (12.5)	56 (87.5)	2.01 (0.61–6.57)
≥45	8 (8.6)	85 (91.4)	0.33 (1.0–1.15)	12 (13.5)	77 (86.5)	0.85 (0.26–2.76)
Religion						
Orthodox	96 (22.4)	332 (77.6)	1	149 (34.7)	280 (65.3)	1
Protestant	15 (16.5)	76 (83.5)	1.08 (0.52–2.23)	21 (24.1)	66 (75.9)	1.09 (0.53–2.24)
Muslim or other	15 (27.3)	40 (72.7)	1.64 (0.75–3.58)	11 (20.4)	43 (79.6)	1.83 (0.79–4.24)
Marital status						
Single	90 (35.0)	167 (65.0)	1	149 (57.8)	109 (42.2)	11.02 (5.99–20.27)
Married	30 (10.0)	269 (90.0)	0.34 (0.18–0.63)	27 (9.2)	267 (90.8)	1
Other	6 (33.3)	12 (66.7)	2.0 (0.49–8.27)	5 (27.8)	13 (72.2)	3.53 (0.79–15.76)
Monthly income, birr						
≤1,500	19 (21.6)	69 (78.4)	1	36 (40.9)	52 (59.1)	1
1,501–2,500	72 (26.2)	203 (73.8)	1.43 (0.72–2.87)	101 (36.7)	174 (63.3)	1.17 (0.61–2.26)
2,501–3,500	13 (17.8)	60 (82.2)	1.73 (0.59–5.09)	18 (24.7)	55 (75.3)	0.70 (0.25–1.94)
≥3,501	5 (9.4)	48 (90.6)	1.09 (0.26–4.62)	7 (13.5)	45 (86.5)	1.47 (0.37–5.78)
Attitude toward “ABC” rules						
Positive	120 (21.5)	439 (78.5)	1		376 (67.9)	1
Negative	6 (40.0)	9 (60.0)	1.80 (0.40–8.12)	3 (18.8)	13 (81.3)	3.32 (0.59–18.67)
Schooling						
Primary	58 (22.1)	205 (77.9)	1	79 (30.6)	179 (69.4)	1
Secondary	68 (22.1)	239 (77.9)	0.86 (0.50–1.46)	101 (32.7)	208 (67.3)	1.03 (0.61–1.75)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; HCT, HIV counseling and testing.

sexual behavior-related outcome variables (multiple sexual partners and consistent use of condom in the previous year). Thus, teachers who had never had HCT were more likely to have multiple sexual partners than those who had had HCT (AOR 1.85, 95% CI 1.08–3.15). However, female gender (AOR 0.42, 95% CI 0.21–0.84), age 45 years or older (AOR 0.33, 95% CI 1.0–1.15), and being married (AOR 0.34, 95% CI 0.18–0.63) decreased the odds of involvement in multiple sexual partnerships by 58%, 67%, and 66%, respectively, when compared with males, younger age groups, and unmarried teachers (Table 3).

Further, regarding using condoms consistently as one of the factors associated with HCT uptake, teachers ever tested for HIV (AOR 0.55, 95% CI 0.32–0.96) were less likely to have used condoms consistently during sexual intercourse compared with those who were never tested. However, male teachers were more likely to use condoms regularly than females (AOR 2.33, 95% CI 1.2–4.39, Table 3). Unmarried teachers were also more likely to have used condoms consistently than married teachers in the previous 12 months (AOR 11.02, 95% CI 5.99–20.27, Table 3).

Discussion

This comparative cross-sectional study was conducted among primary and secondary school teachers. It assessed factors associated with HCT and its correlation with sexual behavior. HCT uptake among teachers in Addis Ababa (71.7%) is significantly high when compared with the national prevalence of HCT in the adult population of Ethiopia.⁶ However, it is not in agreement with previous studies reporting a low prevalence of HCT utilization in many low-income countries, including Ethiopia.^{24–31} The proportion of HCT uptake was slightly higher among female study participants than their male counterparts. This could be explained in terms of women being more likely to contact health services for family planning and/or pregnancy-related issues. It is also consistent with the findings of Demographic and Health Surveys conducted in 18 low-income and middle-income countries.³¹

In this study, being ever tested for HIV was significantly associated with the gender, age, and marital status of teachers. Teachers aged 45 years or older were more likely to have had HIV testing compared with the younger age categories. However, this finding is not in agreement with that of similar studies.^{8,26}

Married, widowed, divorced, and/or separated teachers were less likely to go for HCT than unmarried teachers. This may be explained in terms of their probable current or perceived risk of contracting HIV and fear of the possibility

of being positive. However, our findings were not consistent with the findings of other studies conducted in different countries, including Uganda that had reported that no socio-demographic factor showed statistically significant associations with HCT uptake.^{10,11} Teachers with a high knowledge of HCT were more likely to use HCT services than those with low knowledge of HCT. This finding is in line with many previous reports.^{30,50,51}

Perceived risk of HIV also showed a positive association with being ever tested. This may be explained in terms of the role of better self-awareness among teachers for timely interventions for certain health-related challenges. Moreover, among the never tested teachers, males were less likely to go for HCT in the 2 months following this study. This finding is in agreement with another report.⁹ However, it is not in agreement with the findings of studies reporting no relationship between sociodemographic factors and intention of HCT uptake.^{11,32}

Further, this study examined correlations of HCT with change in the sexual behavior of primary and secondary school teachers, and found a significant association between being never tested for HIV and having multiple sexual partners in the previous 12 months. This finding could be explained by the fact that those who tested negative for HIV may have developed more confidence to perform unprotected sexual intercourse, and also may have decided to practice the rule of being faithful as one of the important methods of HIV prevention. This was also reported in previous studies conducted in Ethiopia and Kenya, where the likelihood of having sexual intercourse increased among those who tested negative and the prevalence of unprotected sex increased among non-pregnant women following HCT.^{44,45}

The low level of condom use by women after collecting HIV-negative test results could be explained in terms of low awareness about the possibility of being infected by the virus in the future and considering being negative as a license for unprotected sex or it might be due to individual's decision to practice the rule of being faithful to a partner and enjoying sex without a condom.⁴⁵

Over 81% of teachers who were ever tested for HIV reported that they had only one sexual partner in the 12 months prior to the survey. This indicates that a very significant number of teachers tested for HIV were faithful to their partners. This finding is in agreement with those of studies conducted in Nigeria and other countries.^{33–39,42} However, it is not in agreement with other studies that reported no or little change in risky sexual behavior following HCT.^{32,44,45} Of the teachers who had ever had HCT, females were more

likely to have limited themselves to only one sexual partner during the year preceding the study.

Further, the findings of this study showed that using condoms consistently during sexual intercourse was less likely among teachers who were ever tested for HIV compared to those who were never tested. However, this result is consistent with those of studies conducted previously in Kenya and Ethiopia that reported an increase in numbers of people having unprotected sex following HCT.^{44,45} Nevertheless, male teachers and unmarried teachers were more likely to use condom consistently after having HCT compared with their respective counterparts. These findings are also consistent with those reported previously.^{36–38,42,43}

The strengths of this study are: using multistage sampling technique that covered all the ten sub-cities and their respective districts in the capital city (Addis Ababa); large sample size of over 1,130 teachers with proportionate allocation of number of study participants to the size of teaching staff in each randomly selected school during the study period; study participants being from both the primary and secondary schools; teachers being more educated comparing with other population segment; and data collectors and supervisors being health professionals with diploma and above educational background.

Limitations of the study

Given that the information for this study was self-reported, with no way of cross-checking for validity, the observed relationships should be evaluated further. Since most of the variables were related to sexual behavior and thus sensitive, some degree of recall and/or social desirability biases are likely to have occurred during self-reporting. Also, considering that the study subjects were teachers with better educational status when compared with the general population, the generalizability of our results may be limited.

Conclusion

This study provides some insight into the determinants and effects of HCT among primary and secondary school teachers. As the findings suggest, a very encouraging number of study participants experienced lifetime HCT. Gender, age, marital status, knowledge of HCT, and perceived risk of HIV were significantly associated with being ever tested for HIV and intention to attend for a test. Further, being tested for HIV was correlated with limiting the number of sexual partners to one. In contrast, the observed high proportion of inconsistent condom use among those teachers who ever had HCT was its unintended outcome. In general, findings related to more positive sexual behavior were observed among the study participants, although no statistically significant

differences were found between teachers in primary and secondary schools regarding factors associated with HCT and its correlation with sexual behavior.

Although teachers are expected to play a key role in the campaign against HIV and to be role models for their students and the community they live in, approximately 30% of them were not tested for HIV until the survey. Therefore, due emphasis should be given to strategies for increasing HCT coverage by government and non-governmental organizations involved in the education sector of the country. Further, strengthening the current practice of HCT intervention in the education sector with due emphasis on its observed factors and correlations could play pivotal role in bringing about positive changes in the sexual behavior of the school community in general and that of teachers in particular. Finally, in order to assess further the effects of HCT, studies that include nationally representative samples and have strong cohort and longitudinal designs are recommended.

Acknowledgments

The authors would like to express their heartfelt thanks to the St Paul's Hospital Millennium Medical College and Addis Ababa University for their financial and material support. They acknowledge the Addis Ababa City Administration Education Bureau, along with the respective subcity education departments, school directors, deputy directors, and study participants for their interest in our study and their unreserved cooperation in its success.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Gillespie S, Kadiyale S. HIV/AIDS and food and nutrition security: from evidence to action. Washington, DC, USA: International Food Policy Research Institute; 2011. Available from: <http://www.ifpri.org/sites/default/files/publications/pv07.pdf>. Accessed April 20, 2015.
2. De Cock KM, Bunnell R, Mermin J. Unfinished business: expanding HIV testing in developing countries. *N Engl J Med*. 2006;354:440–442.
3. Centers for Disease Control and Prevention. HIV/AIDS. Factsheet. Impact in Ethiopia. 2013. Available from: <http://www.cdc.gov/globalhealth/countries/ethiopia/pdf/ethiopia-2013.pdf>. Accessed April 20, 2015.
4. Ethiopian Public Health Institute. HIV related estimates and projections for Ethiopia –2012. Available from: <http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/data-and-analysis/tools/spectrum/Ethiopia2012report.pdf>. Accessed April 20, 2015.
5. Federal Republic of Ethiopia/UNAIDS. Country Progress report on HIV/AIDS response, 2014. Available from: http://www.unaids.org/sites/default/files/country/documents/ETH_narrative_report_2014.pdf. Accessed April 20, 2015.
6. Central Statistical Agency. Ethiopia Demographic and Health Survey 2011. Available from: <http://dhsprogram.com/pubs/pdf/FR255/FR255.pdf>. Accessed April 20, 2015.

7. World Health Organization/Centers for Disease Control and Prevention. HIV/AIDS progress in 2014: update epidemiology in Ethiopia. Available from: http://www.unaids.org/sites/default/files/country/documents/ETH_narrative_report_2014.pdf. Accessed April 20, 2015.
8. Gage A, Ali D. Factors associated with self-reported HIV testing among men in Uganda. *AIDS Care*. 2005;17:153–165.
9. Sherr L, Lopman B, Kakowac M, et al. Voluntary counseling and testing uptake: impact on sexual behaviour, and HIV incidence in a rural Zimbabwean cohort. *AIDS*. 2007;21:851–860.
10. Kwofie GS. Acceptance of HIV counselling and testing among pregnant women in the Kumasi metropolis (MPH thesis). Kumasi, Ghana: Kwame Nkrumah University of Science and Technology; 2008. Available from: <http://datad.aau.org/handle/123456789/4095?show=full>. Accessed April 20, 2015.
11. Fira A, Ameyu G, Eshetu G. Intention to voluntary HIV counseling and testing (VCT) among health professionals in Jimma zone, Ethiopia: the theory of planned behavior (TPB) perspective. *BMC Public Health*. 2013;13:140.
12. King AJC, Beazley RP, Warren WK, et al. *Canada Youth and AIDS Study*. Kingston, Canada: Social Program Evaluation Group, Queen's University; 1988.
13. Alemu H. Assessment of factors contributing to voluntary counselling and testing (VCT) utilization among youth in Dire Dawa Administrative Council (MPH thesis). Addis Ababa, Ethiopia: Public Health, Addis Ababa; 2008.
14. Andargie G, Kassu A, Moges F, et al. Low prevalence of HIV infection, knowledge, attitude and practice on HIV/AIDS among high school students in Gondar, North west Ethiopia. *Ethiop J Health Dev*. 2007;21:179–182.
15. Ethiopian Health and Nutrition Research Institute. Health impact evaluation: impact evaluation of Ethiopia's national response to HIV/AIDS, tuberculosis and malaria, Addis Ababa, Ethiopia; Ethiopian Health and Nutrition Research Institute; 2008. Available from: catalog.ihnsn.org/index.php/catalog/165/download/29213. Accessed April 20, 2015.
16. Federal Ministry of Education. Education Sector Annual Abstract. Addis Ababa, Ethiopia: Ministry of Education; 2008. Available from: www.moe.gov.et/English/Resources/Documents/esaa02.pdf. Accessed April 20, 2015.
17. Federal Ministry of Education. The education sector policy and strategy: responding to the challenges of HIV/AIDS in Ethiopia. Addis Ababa, Ethiopia; Federal Ministry of Education; 2009. Available from: <http://info.moe.gov.et/pdf/hivap.pdf>. Accessed April 20, 2015.
18. Joint United Nations Programme on HIV/AIDS. Guide to the strategic planning process for a national response to HIV/AIDS, 1997. Available from: http://data.unaids.org/Publications/IRC-pub05/JC431-StratPlan4_en.pdf. Accessed April 20, 2015.
19. Bongaarts J, Buether T, Heilig G, Pelletier F. Has the HIV epidemic peaked? *Popul Dev Rev*. 2008;34:199–224.
20. Ministry of Education. Impact of HIV in Ethiopia, 2003. Available from: <http://www.etharc.org/oromia/resources/kit/ARTInfotoolkit.pdf>. Accessed April 20, 2015.
21. Ministry of Education and Sports. Combating HIV/AIDS in Uganda: work place projects in Arua, Butaleja and Mpigi, 2007.
22. Ministry of Education and Sports. Education and Sports Sector HIV prevention strategic plan 2011–2015. Available from: <https://www.k4health.org/sites/default/files/National%20HIV%20Prevention%20Action%20Plan%20Uganda%202011.pdf>. Accessed April 20, 2015.
23. Ethiopian Federal Ministry of Education. Education Statistics. Annual Abstract Ministry of Education; 2013. Available from: <http://www.moe.gov.et/English/Resources/Documents/eab05.pdf>. Accessed April 20, 2015.
24. World Bank. The World Bank policy choices in secondary education in Africa: challenges seen from different perspectives in an African country: a case study of Tanzania mainland as seen by Tanzania teachers' union (TTU). Available from: www.lins.no/events/NPEF06Presentations/Ezekiah%20luoch-1.doc. Accessed April 20, 2015.
25. Shemshedin O. Utilization of HIV counseling and testing service and predictors of intention to use it among teachers of Harari Region. Addis Ababa, Ethiopia: Addis Ababa University; 2009. Available from: <http://etd.aau.edu.et/dspace/bitstream/123456789/.../Shemshedin%20Omer.pdf>. Accessed April 20, 2015.
26. Marita EO, Keraka MN, Mwanzo I. Determinants of HIV-VCT utilization among secondary school teachers in Thika district. *East Afr J Public Health*. 2011;8:258–262.
27. Zeytu G. Knowledge, attitude towards practicing of voluntary HIV counseling and testing and the determinants of VCT uptake: a case study in Debre Birhan students training college. Pretoria, South Africa: Statistics South Africa; 2007. Available from: www.biomedcentral.com/1471-2458/13/243. Accessed April 20, 2015.
28. Nebiyu H. Assessment of factors affecting HIV voluntary counseling and testing uptake among Bahir dar university students, Bahir dar town. Addis Ababa, Ethiopia: Addis Ababa University; 2008. Available from: web.dmu.edu.et/test-dmu-site/downloads/Health%201_a74ad.pdf. Accessed April 20, 2015.
29. Alemayehu B. Attitude and practice of voluntary counseling and testing for HIV among university students, Tigray, Northern Ethiopia. *Momona Ethiopia Journal of Science*. 2010;2:108–118.
30. World Health Organization. Service delivery approaches to HIV testing and counseling: a strategic HTC programme framework. 2012. Available from: http://apps.who.int/iris/bitstream/10665/75206/1/9789241593877_eng.pdf. Accessed April 20, 2015.
31. World Health Organization. Progress report: Global HIV/AIDS response, 2011. Available from: http://www.who.int/hiv/pub/progress_report2011/en/. Accessed April 20, 2015.
32. Joseph K, Matovu B, Ronald H, et al. Voluntary HIV counseling and testing acceptance, sexual risk behavior and HIV incidence in Rakai, Uganda. *AIDS*. 2005;19:503–511.
33. Higgins D, Galavotti C, O'Reilly K, et al. Evidence for the effects of HIV antibody counseling and testing on risk behaviors. *JAMA*. 1991;266:2419–2429.
34. Wolitski R, MacGrown R, Higgins D, Jorgensen C. The effects of HIV counseling and testing on risk related practices and help-seeking behavior. *AIDS Educ Prev*. 1997;9:52–67.
35. Coenen T, Lundgren J, Lazarus J, Matic S. Optimal HIV testing and earlier care: the way forward in Europe. *HIV Med*. 2008;9:1–5.
36. Weinhardt L, Carey M, Johnson B, Bickman N. Effects of HIV counseling and testing on sexual risk behavior: a meta-analytic review of published research, 1985–1997. *Am J Public Health*. 1999;89:1397–1405.
37. Jackson H. *AIDS Africa: Continent in Crisis*. Harare, Zimbabwe: Southern Africa HIV and AIDS Information Dissemination Service; 2001.
38. Family Health International. *Voluntary Counseling and Testing*. 2003. Available from: http://www.unicef.org/eapro/HIV_handbook.pdf. Accessed April 20, 2015.
39. Denison J, O'Reilly K, Schmid G, Kenndy C, Sweet M. HIV voluntary counseling and testing and behavioral risk reduction in developing countries: a metaanalysis, 1990–2005. *AIDS Behav*. 2008;12:363–373.
40. Allen S, Meinzen-Derr J, Kautzman M, et al. Sexual behavior of HIV discordant couples after HIV counseling and testing. *AIDS*. 2003;17:733–734.
41. Arthur G, Nduba V, Forsythe S, Mutemi R, Odhiambo J, Gilks C. Behaviour change in clients of health center-based voluntary HIV counseling and testing services in Kenya. *Sex Transm Infect*. 2007;83: 541–546.
42. Wusu O, Okoukoni S. The role of HIV counselling and testing in sexual health behavior change among undergraduates in Lagos, Nigeria. *Tanzan J Health Res*. 2011;13:27–32.
43. Borgsund C, Andersson R. Decreased sexual risk behavior after testing HIV positive and no increase after start of antiretroviral treatment. Available from: <http://www.vgregion.se/upload/skas/fou/hivtreatment.pdf>. Accessed April 20, 2015.
44. Caroline WK, Nancy L, Chimaraoko O, Eliya MZ. The correlates of HIV testing and impacts on sexual behavior: evidence from a life history study of young people in Kisumu, Kenya. *BMC Public Health*. 2010;10:412.

45. Beliyu AH. Promoting HIV testing and safe sexual behavior: evidence from a field experiment in Ethiopia. Job Market Paper. Department of Economics, Columbia University; 2011. Available from: <http://www.csae.ox.ac.uk/conferences/2011-edia/papers/390-haile.pdf>. Accessed April 20, 2015.
46. Fairall T, Bachmann M, Louwagie G, van Vuuren C. Effectiveness of antiretroviral treatment in a South African program: a cohort study. *Arch Intern Med*. 2008;168:86–93.
47. Ethiopian Central Statistical Agency. The 2007 Ethiopian Census. Available from: <http://www.csa.gov.et/index.php/2013-02-20-14-51-51/2013-04-01-11-53-00/census-2007>. Accessed April 20, 2015.
48. Addis Ababa City Administration Finance and Economic Development Bureau. Socio-economic profile of Addis Ababa for the year 2011/12. Available from: <http://www.aabofed.gov.et/Documents/Addis%20Ababa%20Profile%20%202004%20E.pdf>. Accessed April 20, 2015.
49. Kakoko DCV. Voluntary HIV counselling and testing service uptake among primary school teachers in Mwanza: assessment of socio-demographic, psychosocial and socio-cognitive aspects. Available from: <https://bora.uib.no/handle/1956/1902>. Accessed April 20, 2015.
50. World Health Organization. Guidance on provider-initiated HIV testing and counseling in health facilities. Geneva, Switzerland: World Health Organization Press; 2007. Available from: http://www.who.int/hiv/pub/guidelines/9789241595568_en.pdf. Accessed April 20, 2015.
51. Cohen M, Chen Y, McCauley M. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med*. 2011;365:493–505.

HIV/AIDS - Research and Palliative Care

Dovepress

Publish your work in this journal

HIV/AIDS - Research and Palliative Care is an international, peer-reviewed open-access journal focusing on advances in research in HIV, its clinical progression and management options including antiviral treatment, palliative care and public healthcare policies to control viral spread. The journal welcomes original research, basic science,

clinical & epidemiological studies, reviews & evaluations, expert opinion & commentary, case reports & extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <http://www.dovepress.com/hivaid---research-and-palliative-care-journal>