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Sexually transmitted infections associated with alcohol use and HIV infection among men who have sex with men in Kampala, Uganda

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Abstract

Objectives—Few studies have been conducted in Africa to assess prevalence of sexually transmitted infections (STIs) and risk factors among men who have sex with men (MSM). We report findings from the first behavioural survey to include STI testing among MSM in Kampala, Uganda.

Methods—Respondent-driven sampling (RDS) was used to recruit MSM for a biobehavioural survey. Eligible participants were men who reported anal sex with another man in the previous 3 months, were 18 years or older, and resided in Kampala. Information was collected on demographics, sexual behaviour, alcohol and drug use, and STI symptoms. Blood, urine and rectal specimens were tested for syphilis, HIV, rectal and urethral gonorrhoea, and chlamydia. Analyses weighted for RDS were conducted to assess associations with STI diagnosis.

Results—A total of 295 MSM participated in the survey. Almost half (weighted percentage: 47.3%) reported STI symptoms in the last 6 months and 12.9% tested HIV-positive. Prevalence of non-HIV STI was 13.5%; syphilis prevalence was 9.0%. Adjusting for age and education, STI was associated with HIV (adjusted OR (AOR)=3.46, 95% CI 1.03 to 11.64), alcohol use before sex (AOR=4.99, 95% CI 1.86 to 13.38) and having sold sex in the last 3 months (AOR=3.17, 95% CI

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1.25 to 8.07), and inversely associated with having anonymous sex partners (AOR=0.20, 95% CI 0.07 to 0.61).

Conclusions—We observed high levels of self-reported STI symptoms and STI prevalence associated with alcohol use and HIV among MSM in Kampala. Public health interventions supporting MSM are needed to address STI risk and facilitate access to diagnosis and treatment services.

Introduction

Sexually transmitted infections (STIs) such as syphilis, gonorrhoea and chlamydia cause significant global morbidity and mortality and have been associated with increased risk of HIV transmission.[1] It is estimated that 340 million new cases of curable STIs occur every year among men and women aged 15–49 years throughout the world. Of these, an estimated 4 million new cases of syphilis occur in sub-Saharan Africa, a third of the 12 million new syphilis cases estimated worldwide.[2] Similarly, of 92 million new cases of chlamydia and 62 million new cases of gonorrhoea globally, sub-Saharan Africa accounted for 16 million (17.4%) and 17 million (27.4%), respectively. The 2011 Uganda AIDS Indicator Survey reported a syphilis prevalence of 1.8% among men in the general population aged 15–49 years. The same survey found that 20.6% of sexually active men reported having had a STI or STI symptoms in the previous year.[3]

Men who have sex with men (MSM) have been studied as a key population at higher risk for HIV and STIs; however, few studies have been conducted among MSM in Africa. Homosexuality and same-sex sexual behaviours are illegal and highly stigmatised in Uganda, presenting substantial challenges to public health surveillance and intervention efforts among the MSM population. In 2004, a study was conducted in Kampala that demonstrated the existence of a local MSM population and observed sexual risk behaviours in this group.[4] The study found high rates of unprotected receptive anal intercourse and commercial sex, with low perception of risk for HIV infection; however, no biological testing was conducted to assess prevalence of HIVor STIs.

A follow-up study conducted in 2008–2009 was the first behavioural survey to include STI and HIV testing among MSM in Kampala.[5] The objective of this study was to establish a periodic HIV surveillance system that would inform and evaluate the impact of interventions for MSM and other key populations. We present here findings on STI prevalence and associated risk behaviours from this first round of biobehavioural surveillance among MSM.

Methods

Respondent-driven sampling (RDS) was used to recruit MSM in Kampala, Uganda between May 2008 and April 2009. RDS is a type of chain referral sampling that adjusts for recruitment patterns and social network size to arrive at population-level estimates.[6,7] Eligible participants were men who reported having anal sex with another man in the previous 3 months, were aged 18 years or older, spoke English or Luganda, and resided in greater Kampala.

We started sampling with eight diverse seeds purposively selected by age, HIV status and geographical location (Division) in Kampala; all were socially well networked, defined as having extensive social networks and being able to distribute coupons to a large number of peers. However, rates of recruitment were low throughout the study. Study recruitment was interrupted twice due to arrests of MSM in Kampala during the study period. In addition, six seeds were added in the course of the survey to improve sampling rates. A total of 455 coupons (26.7%) were redeemed out of 1706 coupons issued. Of these, 281 recruits and 14 seeds were eligible and participated in the survey. The longest recruitment wave was 11, and equilibrium for syphilis was reached after wave 4. The average degree size was 11.3.

Survey procedures are described in detail elsewhere.[3] In brief, screened, eligible and consented participants responded to a standardised audio-computer assisted interview. The survey collected information on demographics and sexual behaviour in the 3 months preceding the interview. Sexual behaviour with male and female partners was queried by primary, steady, casual, anonymous, one-night stand, sex worker and client partner types. The survey also collected data on alcohol and drug use, violence and STI symptoms.

Blood specimens were collected from participants to test for syphilis; urine and rectal specimens were collected to test for gonorrhoea and chlamydia. Only 4 of the 295 participants (1.4%) refused to provide rectal specimens, and no participants refused to provide urine. Antisyphilis IgG ELISA (Biotec Laboratories, Suffolk, UK) was used to screen plasma for lifetime exposure to *Treponema pallidum* (TP), and the Rapid Plasma Reagin Syfacard-R Test (Murex Biotech, Dartford, UK) was used to detect current TP infection. The presence of *Neisseria gonorrhoeae* (NG) and *Chlamydia trachomatis* (CT) DNA was tested in urine specimens and rectal swabs using Cobas Amplicor or Amplicor PCR (Roche Diagnostics, Branchburg, New Jersey, USA). A parallel testing algorithm using Vironostika HIV Uniform II plus O2 (bioMeriéux, Marcy l'Etoile, France) and Murex HIV Ag/Ab Combination (Abbott Laboratories, Abbott Park, Illinois, USA) was used to test for HIV antibodies. HIV 1/2 STAT-PAK rapid test (Inverness Medical, Princeton, New Jersey, USA) was used to resolve discordant results. Laboratory tests were conducted at the STD Unit of Mulago Hospital, Kampala and the US Centers for Disease Control and Prevention laboratory in Entebbe, Uganda. Participants were asked to return after 2 weeks to receive their results; 61% of participants returned for a second visit. During these visits, participants received counselling for all biomarkers, were provided treatment for STIs and, if HIV-positive, were referred to care and treatment providers.

Weighted univariate and bivariate analyses were conducted in RDS Analysis Tool (RDSAT) V.5.6 (http://www.respondentdrivensampling.org). Individual STI sampling weights were generated in RDSAT and exported to SAS V.9.2 (SAS Institute, Cary, North Carolina, USA) to perform additional bivariate and multivariate analyses. Missing data were dropped from analysis. Bivariate associations with STI diagnosis were assessed using survey-weighted Wald tests. Multivariate analysis was conducted using survey-weighted logistic regression with variables associated with positive STI diagnosis. Variables considered in the modelling process were those associated with STI diagnosis at a level of $p \leq 0.2$ in bivariate analysis. Other variables were included based on a conceptual framework incorporating previous

knowledge of association with STI risk. The final model was adjusted for age and education and those variables that were significantly associated with STI diagnosis.

Survey participation was anonymous: informed consent was obtained verbally and no personal identifiers were collected.

Results

A total of 295 MSM were included in the analysis. The majority of participants were under 25 years of age: 19.8% were 18–20 years old and 42.9% were 21–25 years old (table 1). Most participants reported drinking alcohol every day or at least once a week (17.9% and 43.8%, respectively), and 47.2% reported alcohol use before sex. Nearly a third of MSM (32.0%) reported having had an anonymous sex partner in the past 6 months, and 29.5% had sold sex in the 3 months prior to the survey.

A total of 47.3% reported any genital or anal STI symptoms in the last 6 months (table 1). Self-reported genital discharge and ulcer symptoms were common (29.5% and 31.6%, respectively). In addition, 25.0% reported anal ulcers and 12.6% reported anal discharge in the past 6 months. The majority of those reporting symptoms stopped having sex during symptom occurrence (61.2%).

Overall, 13.5% of participants were diagnosed with syphilis, rectal or urethral chlamydia, or rectal or urethral gonorrhoea (table 1). Prevalence of syphilis was the highest of the three infections (9.0%), while prevalence of chlamydia and gonorrhoea (rectal or urethral) ranged from 1.1% to 1.8%. Prevalence of HIV was 12.9%.

Table 2 shows weighted bivariate associations between select risk factors and laboratory-confirmed STI diagnosis of syphilis, gonorrhoea, or chlamydia. Reported alcohol use before sex was positively associated with STI diagnosis (OR=2.99). None of the STI symptoms reported in the last 6 months were significantly associated with STI diagnosis. HIV infection was positively associated with STI diagnosis (OR=2.76).

Results of the multivariate analysis are shown in table 3. Adjusting for age and education, STI diagnosis remained positively associated with alcohol use before sex (adjusted OR (AOR)=4.99), selling sex in the last 3 months (AOR=3.17) and HIV infection (AOR=3.46). Having anonymous partners in the last 3 months was inversely associated with STI diagnosis (AOR=0.20).

Discussion

We found a high combined prevalence of STI diagnoses among MSM in Kampala, and very high rates of self-reported STI symptoms. Though few studies have been conducted to assess burden of STI among MSM populations in sub-Saharan Africa, our findings are consistent with levels of STI prevalence ranging from 2.6% to 23.7% found among MSM in Kenya, Tanzania and Senegal.[8–12] Compared with the population in Uganda, prevalence of syphilis among MSM in this study was over four times that of the general male population aged 15–

49 years in 2011.[3] Overall, MSM in Kampala had a higher burden of STI than the general population.

MSM also reported higher levels of STI symptoms in the previous 12 months, two times the amount reported by men in the general population; 18.4% of men aged 15–49 years reported STI symptoms in the 12 months prior to the 2011 Uganda AIDS Indicator Survey.[3] Though laboratory-confirmed diagnoses did not precisely match self-reported symptoms, some infections may have been missed due to the cross-sectional design of the survey. We also did not find significant associations between any self-reported symptom and STI diagnosis. Finally, a significant proportion of those with STI diagnoses did not report any symptoms, suggesting that syndromic surveillance and diagnostic approaches may not be effective in this population. Still, given the prevalence of STI and the frequency of self-reported STI symptoms in this population, STI prevention and treatment programmes as well as routine STI surveillance should specifically support MSM and other high-risk groups and provide guidance on recognising urethral and rectal STI symptoms. To detect asymptomatic infections, routine STI testing should be provided to MSM based on reported risk behaviours and healthcare workers should be trained to provide STI services in a non-stigmatising environment.[13] MSM should be educated to seek treatment if they experience symptoms of STI, and messages regarding preventive behaviours to reduce transmission to partners should be reinforced. Given the association between STI and HIV infection, HIV care and treatment services should also provide comprehensive counselling and screening for STI.

Overall, regular alcohol use among MSM was common, and nearly half reported using alcohol before sex, which was significantly associated with STI. This association has been reported in other populations, including female sex workers and the general population.[14–16] Though our study did not find significant interactions between unprotected sex and alcohol use, alcohol use has been linked to sex work and other risky sexual behaviours such as unprotected sex.[1718] The use of alcohol before sex may lead to loss of inhibition, thus increasing risk-taking behaviours. Alcohol may also increase susceptibility to HIV and other infections and worsen disease course by impairing immunity.[19] Counselling messages for this population should incorporate harm reduction material regarding the risks associated with alcohol use with sex.

We found that participants who reported having anonymous sex partners in the 6 months before the survey were less likely to be diagnosed with a STI than those who did not have anonymous partners. It is possible that MSM recognise higher infection risk with anonymous partners and are more likely to practice preventive behaviours with these partners, such as using condoms.[20] However, risk behaviours have also been found to be associated with having anonymous partners.[21] Our study may have been limited in assessing confounders in the relationship between STI and having anonymous sex partners. This association should be examined further using qualitative and quantitative methodologies.

This study had a number of limitations. Levels of stigma and discrimination of MSM in Uganda are high, and harassment of MSM, while unrelated to this study, adversely affected study participation. Though RDS is designed to capture a representative sample of the target population, RDS is based on a number of assumptions that may not have been met because

this discrimination may have biased recruitment towards a certain subgroup of MSM. Thus, the findings of this study may not represent the larger MSM population in Kampala. Given the limitations of the data, it is difficult to ascertain whether the assumptions of RDS, specifically that respondents recognise each other as members of the population, respondent networks are linked and form a single component, and the sampling fraction is small, were fulfilled.[22] In addition, the survey design was cross-sectional, limiting our ability to determine causal associations between risk factors and STI diagnoses. While study findings on multivariate associations were significant, CIs were wide due to the small sample size. STI symptoms and other risk behaviours were self-reported for the previous 3 months, 6 months or 12 months, while laboratory-confirmed diagnoses of STIs only reflected infection at the time of testing. With regards to PCR testing for NG and CT, we cannot rule out the possibility of some false-positive results, though the estimated prevalence was relatively low. Further, the assay we used is not approved for use on rectal specimens without further confirmation of positive test results. Finally, syphilis and rectal and urethral infections of NG and CTwere combined for our outcome variable. Although these infections are all current and reflect bacterial illness, it is possible that the epidemiology of each type of infection differs from one another.

This first round of biobehavioural surveillance among MSM in Kampala demonstrated the feasibility of conducting surveys with biological testing and the public health need related to STI and HIV infection in this highly stigmatised key population. We observed high prevalence of syphilis, NG and CT, and found high levels of self-reported STI symptoms. Our findings support the need for public health interventions specific to MSM to address risk behaviours related to alcohol use, STI transmission, identification of STI through symptom screening and testing, STI surveillance, and STI treatment-seeking behaviours. Finally, contextual factors including cultural perceptions and government policy in Uganda should be addressed to improve public health outcomes in this population.

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Key messages

- Levels of self-reported STI symptoms and STI prevalence among MSM were high.
- STI among MSM was associated with HIV and risky sexual behaviours, including alcohol use before sex and selling sex.
- Public health interventions are needed to address STI risk and facilitate access to diagnosis and treatment services among MSM.

Table 1

Sociodemographic and behavioural variables and sexually transmitted infections (STIs) among men who have sex with men in Kampala, Uganda

	n (unweighted)	Sample % (unweighted)	Estimated population proportion % (weighted)	95% CI
Age (years)				
18–20	52	18.1	19.8	12.9 to 27.4
21–25	111	38.5	42.9	32.9 to 49.0
26–30	70	24.3	22.9	17.0 to 32.0
>30	55	19.1	14.5	9.6 to 21.6
Education				
None	22	7.8	7.9	4.5 to 11.9
1–7 years	72	25.4	28.3	20.3 to 36.0
8–11 years	58	20.4	23.7	17.2 to 31.4
12 or more years	131	46.5	40.2	31.3 to 49.5
Drink alcohol, past 30 days				
About every day	53	18.5	17.9	11.1 to 25.8
At least once a week	124	43.4	43.8	36.8 to 51.2
Less than once a week	24	8.4	10.2	5.1 to 16.5
None	85	29.7	28.1	21.4 to 35.2
Sexual orientation				
Gay/homosexual	162	56.3	54.2	47.5 to 62.6
Bisexual	113	39.2	38.8	30.8 to 45.4
Straight/heterosexual	13	4.5	7.0	2.6 to 12.9
Alcohol use before sex				
Yes	123	43.2	47.2	38.5 to 56.0
No				
Had anonymous sex partner in the past 3 months				
Yes	107	37.3	32.0	24.8 to 40.1
No	180	62.7	68.0	59.9 to 75.2
Ever sold sex				
Yes	128	44.4	39.3	29.5 to 46.2
No	160	55.6	60.7	53.8 to 70.5
Sold sex in the past 3 months				
Yes	94	31.8	29.5	21.9 to 35.8
No	179	60.5	70.5	64.2 to 78.1
Used condom during insertive anal sex in the past 3 months				
Yes	173	65.8	66.5	58.2 to 74.3
No	90	34.2	33.5	25.7 to 41.8
Used condom during receptive anal sex in the past 3 months				

	n (unweighted)	Sample % (unweighted)	Estimated population proportion % (weighted)	95% CI
Yes	140	60.1	62.4	53.7 to 70.1
No	93	39.9	37.6	29.9 to 46.3
STI symptoms in the past 12 months				
Genital discharge				
Yes	86	30.6	29.5	21.9 to 37.3
No	195	69.4	70.5	62.7 to 78.1
Genital ulcers				
Yes	93	33.6	31.6	23.6 to 39.3
No	184	66.4	68.4	60.7 to 76.4
Anal ulcers				
Yes	79	28.7	25.0	18.7 to 32.6
No	196	71.3	75.0	67.4 to 81.3
Anal discharge				
Yes	45	16.3	12.6	8.3 to 18.1
No	232	83.8	87.4	81.9 to 91.7
Anal warts				
Yes	57	21.4	16.6	11.1 to 22.2
No	210	78.7	83.4	77.8 to 88.9
Any STI symptom				
Yes	143	51.8	47.3	39.3 to 56.0
No	133	48.2	52.7	44.0 to 60.7
Stopped having sex with symptoms				
Yes	73	54.1	61.2	49.8 to 73.1
No	62	45.9	38.8	26.9 to 50.2
Lab results				
Syphilis				
Positive	30	10.3	9.0	5.5 to 13.3
Negative	260	89.7	91.0	86.7 to 94.5
Rectal chlamydia				
Positive	3	1.1	1.1	0 to 2.7
Negative	283	99.0	98.9	97.3 to 100.0
Urethral chlamydia				
Positive	3	1.0	1.2	0 to 2.9
Negative	285	99.0	98.8	97.1 to 100.0
Rectal gonorrhoea				
Positive	5	1.8	1.8	0.2 to 4.2
Negative	281	98.3	98.2	95.8 to 99.8
Urethral gonorrhoea				
Positive	4	1.4	1.4	0.2 to 3.0
Negative	284	98.6	98.6	97.0 to 99.8

	n (unweighted)	Sample % (unweighted)	Estimated population proportion % (weighted)	95% CI
Any STI				
Positive	42	14.8	13.5	9.2 to 19.3
Negative	242	85.2	86.5	80.7 to 90.8
HIV serostatus				
Positive	39	13.5	12.9	7.2 to 19.5
Negative	251	86.6	87.1	80.5 to 92.8

Table 2

Sociodemographic and behavioral variables by sexually transmitted infection (STI) diagnosis among men who have sex with men in Kampala, Uganda

	Any STI diagnosis		No STI diagnosis			
	n	Estimated population proportion % (95% CI)	n	Estimated population proportion % (95% CI)	OR	p Value
Age (years)						
18–20	8	18.4 (7.6 to 30.8)	43	18.3 (11.0 to 24.5)	Ref.	
21–25	10	38.9 (21.3 to 56.2)	99	43.3 (34.6 to 51.6)	0.64 (0.20 to 2.07)	0.452
26–30	11	20.3 (8.7 to 34.3)	57	24.5 (17.8 to 33.6)	0.78 (0.25 to 2.47)	0.670
>30	13	22.3 (8.4 to 40.0)	41	13.9 (8.2 to 20.4)	1.49 (0.47 to 4.67)	0.495
Years of schooling						
None	6	9.6 (2.0 to 18.9)	16	8.0 (4.0 to 12.2)	Ref.	
1–7 years	9	27.7 (11.6 to 47.3)	59	27.0 (17.1 to 34.5)	0.91 (0.23 to 3.61)	0.898
8–11 years	6	19.5 (4.4 to 34.9)	52	24.4 (16.8 to 32.5)	0.64 (0.15 to 2.72)	0.547
12 or more years	20	43.2 (26.0 to 62.8)	110	40.5 (32.5 to 52.8)	0.85 (0.26 to 2.84)	0.794
Alcohol use before sex						
Yes	26	68.3 (50.5 to 85.8)	94	42.7 (33.6 to 52.1)	2.99 (1.28 to 6.96)	0.011
No	15	31.7 (14.2 to 49.5)	144	57.3 (47.9 to 66.4)	Ref.	
Had primary sex partner in the past 3 months						
Yes	39	89.5 (79.0 to 100.0)	198	79.3 (72.2 to 86.1)	2.58 (0.70 to 9.44)	0.153
No	3	10.5 (0 to 21.0)	42	20.7 (13.9 to 27.8)	Ref.	
Had anonymous sex partner in the past 3 months						
Yes	14	19.5 (7.6 to 34.5)	90	34.3 (25.2 to 42.4)	0.53 (0.22 to 1.26)	0.151
No	27	80.5 (65.6 to 92.4)	150	65.7 (57.6 to 74.8)	Ref.	
Ever sold sex						
Yes	26	50.7 (36.3 to 71.6)	97	34.8 (26.5 to 43.4)	1.22 (0.53 to 2.81)	0.634
No	15	49.3 (28.4 to 63.7)	125	65.2 (56.6 to 73.5)	Ref.	
Sold sex in the past 3 months						
Yes	17	35.2 (19.1 to 55.4)	79	28.3 (19.2 to 33.9)	1.57 (0.66 to 3.74)	0.306
No	24	64.8 (44.6 to 80.9)	161	71.7 (66.1 to 80.8)	Ref.	

	Any STI diagnosis		No STI diagnosis			
	n	Estimated population proportion % (95% CI)	n	Estimated population proportion % (95% CI)	OR	p Value
Used condom during insertive anal sex in the past 3 months						
Yes	25	64.8 (48.5 to 85.8)	137	64.6 (57.4 to 74.9)	1.01 (0.39 to 2.63)	0.983
No	10	35.2 (14.2 to 51.5)	77	35.4 (25.1 to 42.6)	Ref.	
Used condom during receptive anal sex in the past 3 months						
Yes	19	60.7 (39.2 to 79.2)	111	60.9 (52.2 to 70.3)	0.97 (0.40 to 2.39)	0.951
No	12	39.3 (20.8 to 60.8)	77	39.1 (29.7 to 47.8)		
STI symptoms in the past 12 months						
Genital discharge						
Yes	19	42.3 (24.8 to 63.2)	65	27.2 (19.3 to 35.0)	2.19 (0.95 to 5.04)	0.067
No	22	57.7 (36.8 to 75.2)	169	72.8 (65.0 to 80.7)	Ref.	
Genital ulcers						
Yes	19	40.4 (21.5 to 59.8)	70	29.1 (21.0 to 37.4)	1.59 (0.69 to 3.67)	0.282
No	21	59.6 (40.2 to 78.5)	161	70.9 (62.6 to 79.0)	Ref.	
Anal ulcers						
Yes	15	33.6 (17.0 to 50.3)	61	22.8 (15.6 to 30.3)	1.44 (0.61 to 3.44)	0.406
No	25	66.4 (49.7 to 83.0)	168	77.2 (69.8 to 84.4)	Ref.	
Anal discharge						
Yes	9	21.4 (7.9 to 35.3)	34	10.7 (6.1 to 16.1)	2.09 (0.80 to 5.48)	0.135
No	31	78.6 (64.8 to 92.1)	197	89.3 (83.9 to 93.9)	Ref.	
Anal warts						
Yes	11	26.7 (12.1 to 41.6)	45	15.3 (9.7 to 20.9)	1.70 (0.66 to 4.39)	0.274
No	28	73.3 (58.4 to 87.9)	177	84.7 (79.1 to 90.3)	Ref.	
Any STI symptom						
Yes	26	38.0 (20.4 to 57.7)	113	56.5 (47.3 to 65.1)	1.94 (0.81 to 4.70)	0.140
No	15	62.0 (42.4 to 79.6)	116	43.5 (34.9 to 52.7)	Ref.	
HIV status						
Positive	10	27.6 (10.4 to 45.1)	29	13.2 (6.6 to 19.8)	2.76 (0.98 to 7.80)	0.055
Negative	32	72.4 (54.9 to 89.6)	213	86.8 (80.3 to 93.4)	Ref.	

Table 3

Factors associated with sexually transmitted infection among men who have sex with men in Kampala, Uganda (n=257)

	Unadjusted ORs (95% CI)	Adjusted ORs (95% CI)
Age (years)		
18–20	Ref.	Ref.
21–25	0.64 (0.20 to 2.07)	0.36 (0.11 to 1.15)
26–30	0.78 (0.25 to 2.47)	0.29 (0.07 to 1.24)
>30	1.49 (0.47 to 4.67)	0.85 (0.22 to 3.22)
Years of schooling		
None	Ref.	
1–7 years	0.91 (0.23 to 3.61)	0.82 (0.16 to 4.20)
8–11 years	0.64 (0.15 to 2.72)	0.52 (0.08 to 3.63)
12 or more years	0.85 (0.26 to 2.84)	0.88 (0.18 to 4.42)
Had anonymous sex partner in the past 3 months		
Yes	0.53 (0.22 to 1.26)	0.20 (0.07 to 0.61)
No	Ref.	Ref.
Alcohol use before sex		
Yes	2.99 (1.28 to 6.96)	4.99 (1.86 to 13.38)
No	Ref.	Ref.
Sold sex in the past 3 months		
Yes	1.57 (0.66 to 3.74)	3.17 (1.25 to 8.07)
No	Ref.	Ref.
HIV status		
Positive	2.76 (0.98 to 7.80)	3.46 (1.03 to 11.64)
Negative	Ref.	Ref.