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Increasing HIV prevalence and injection drug use among men who have sex with men in Ho Chi Minh City, Vietnam

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Abstract

Vietnam has been conducting HIV/sexually transmitted infection (STI) integrated bio-behavioral surveillance surveys on men who have sex with men (MSM) as well as other key populations since 2005. Although HIV prevalence in the Vietnamese general population remains below 1%, it is expected to be much higher among MSM.

Data on HIV prevalence and sexual and drug use behaviors were collected from MSM in Ho Chi Minh City (HCMC) in 2006 (n = 397), 2009 (n = 399) and 2013 (n = 350) using respondent-driven sampling. Eligible participants were males, aged 15 years who reported having manual, oral, or anal sexual activity with males in the past year and lived, worked or socialized in HCMC.

HIV seroprevalence among MSM was 5.8% in 2006, 16.1% in 2009 and 12.1% in 2013 and prevalence of at least one STI (syphilis, gonorrhea and/or chlamydia infection) was 11.4% in 2006 and 15.6% in 2009 (no data for 2013). Significant, but small, increasing trends were found for MSM who reported ever testing and receiving results for HIV and for HIV prevalence. No significant changes for condom use, injecting and non-injecting drug use, or and receipt of free condoms were observed.

Although a small percentage of MSM reported injecting drugs, HIV was positively associated with ever injecting drugs. Programs targeting MSM should include screening and treatment for injection drug use to most effectively control the HIV/AIDS epidemic among MSM in HCMC.

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Keywords

Men who have sex with men; HIV/AIDS; respondent-driven sampling; injection drug use; sexually transmitted infections; Vietnam

Introduction

Sampling men who have sex with men (MSM) for surveys of HIV prevalence and related behaviors in Vietnam, as in most parts of the world, is challenging due to the level of stigma and discrimination towards this population. Nevertheless, numerous countries gather data from MSM to monitor HIV epidemic trends, assess the impact of interventions, and inform appropriate investment and resource allocation for prevention, care, and treatment programs. Because MSM are difficult to recruit into surveys and do not always have sampling frames, few sampling methods are useful for providing reliable data that can be compared over consecutive years. One proven and effective sampling method used to conduct HIV prevalence and behavioral surveillance in many hard-to-reach populations, including MSM, is respondent-driven sampling (RDS).[1–3] The Vietnam Ministry of Health has utilized RDS since 2006 to sample MSM, and other hard-to-reach populations, as part of its national strategy on HIV/AIDS Prevention and Control.[4]

HIV prevalence in the Vietnamese general population is estimated to be 0.18%[5] but expected to be much higher among MSM. A convenience sample of 600 MSM conducted in 2004 in Ho Chi Minh City (HCMC) found HIV prevalence to be 8%.[6] Qualitative and quantitative surveys have found that MSM in Vietnam engage in high-risk sexual behaviors, including low condom use and sex with multiple partners, but that few use drugs.[6–8] HIV prevalence among MSM is estimated to be about 7%, compared to 10% among people who inject drugs (PWID) and 2% among female sex workers (FSWs); the overall prevalence of HIV among MSM is expected to increase as is the proportion of all new infections in Vietnam that are attributed to MSM.[9] HIV sentinel surveillance shows that HIV prevalence is very high in HCMC (up to 17% in 2017) and is increasing among MSM in the last 5years in Vietnam (from 6.7% in 2014 to 11.4% in 2018).

HCMC is Vietnam's largest city and key commercial center with an estimated 50,000 MSM.[10] The HIV epidemic in HCMC, as in the rest of Vietnam, is concentrated in key populations such as PWID, FSWs, and MSM, resulting in significant investments in HIV-related services by the Government of Vietnam and donors such as The President's Emergency Plan for AIDS Relief (PEPFAR). In addition, the number of people living with HIV (PLHIV) in HCMC accounts for more than 22% of all PLHIV in the country.[5]

To better understand HIV transmission among MSM, three rounds of the HIV/STI integrated bio-behavioral surveillance (IBBS) surveys were conducted in HCMC from 2006 to 2013 to measure the trends in prevalence of HIV and other sexually transmitted infections (STIs) and trends in sexual and drug use risk behaviors. The objectives of this analysis are to report prevalence of HIV, syphilis, *Neisseria gonorrheae* (NG) and *Chlamydia trachomatis* (CT), and behavioral risk factors among MSM in HCMC. These findings are being used to inform

design of policy and programming responses and interventions for this key population in HCMC, Vietnam.

Methods

In 2006, 2009 and 2013, IBBS surveys were conducted among MSM in HCMC using RDS. Although HIV prevalence data were collected in all three years, budgeting only allowed for the testing for other STIs in 2006 and 2009. Eligible participants were males, aged ≥15years who reported having manual, oral, or anal sex with a male in the past year and lived, worked or socialized in HCMC.

Recruitment for each survey began with three to six purposefully-selected eligible members of the target population, referred to as “seeds”. Seeds were selected through non-governmental organizations based on having diverse characteristics and large social networks. After completing the standard screening, enrollment, and study procedures (described below), seeds were provided up to three coupons to use in recruiting eligible MSM peers. Potential recruited non-seed participants were screened for eligibility, provided informed consent, completed an interviewer-administered questionnaire (conducted by trained staff in Vietnamese) in day-time in a private place at study sites located in health facilities, and had blood collected for HIV and syphilis testing and urine and a rectal swab collected for other STIs (only in 2006 and 2009 due to limited budget). Each enrolled seed and non-seed participant who completed the survey steps were given up to three coupons to recruit other MSM. This process continued until the target sample size was attained.

Measures.

The questionnaire included basic demographic characteristics (age, education, employment, and marital status), sexual preference (males, females or no preference), partner types, condom use, drug use and prior HIV testing and access to services. No personal identifying information was collected; questionnaires and test results were linked with a unique number.

For drug use measurement, 11 types of drug are listed in questionnaire to guide the interviewer to record the responses from participants. If other types of drug were reported then the interviewer recorded as other and noted the specific drug names.

Laboratory methods.

Participants provided 5ml of blood for HIV and syphilis testing and urine and rectal specimens for NG and CT testing. HIV was tested according to national algorithms (one rapid test using immunechromatography followed by two enzyme-linked immunosorbent assay [ELISA] tests). Ten percent of negative samples and five percent of positive samples were randomly selected and retested for quality assurance at the National Reference HIV laboratory in HCMC. Syphilis serologic testing was performed with rapid plasma reagin (RPR) and confirmed with treponema palladium hemagglutination assay (TPHA). One was diagnosed as positive for syphilis if both the tests were reactive. Urine and rectal samples were tested for NG and CT using polymerase chain reaction (PCR). Participants were provided with an appointment card to return for test results and post-test counseling at the survey site within two weeks of providing specimens. Those testing positive for HIV were

provided a voucher for additional confirmatory testing and follow-up care and management at a government health facility.

Statistical methods.

Adjusted estimates and 95% confidence intervals (CI) were derived by using RDS Analyst (www.hpmrg.org) with the successive sampling estimator using a mid-point population size estimation of 25,000; the successive sampling estimator accounts for the fact that RDS recruitment occurs without replacement.[11] Data were adjusted for the probability of selection based on participants' self-reported social network size, according to responses to the question: "How many people do you know, whose name you know and they know yours, aged ≥15years who have had manual, oral, or anal sexual activity with males in the past year and whom you have seen in the past two weeks?" For rounds 2 and 3, the time frame during which a participant saw their peer was in the past month. The change in time frames for the network size question in rounds 2 and 3 do not impact the final estimates given that the network size question remains consistent within each survey.

Average adjusted changes and tests for unequal proportions and for directional change in proportions across the three sample years were performed on a set of key variables with significance set at $p \leq .05$.[12]

Bi- and multivariable regression analyses were performed on aggregate data from all three years to assess factors associated with HIV prevalence. The rationale for data aggregation was based on findings of little significant ($p \leq 0.05$) linear change in most independent variables and relatively stable network sizes across all years. In order to account for the non-significant (and few significant) variations over time, data were controlled by survey year and weighted with successive sampling estimator[11] weights. Variables from the bivariate analysis with $p \leq 0.10$ or known correlates of HIV infection were candidates for entry in the final multivariate model; the final model retained only those variables significant at the $p \leq 0.05$ level.[13] Logistic regression on a network is not yet validated.[14] In the absence of such validated network analysis methods, we exported successive sampling weights to conduct weighted logistic regression analysis which does not take into account the dependence between participants and cannot compute RDS-specific bootstrapping for the confidence intervals.[11]

The protocol for these surveys was reviewed and approved by Institutional Review Boards of the US Centers for Disease Control and Prevention (CDC), FHI 360, the Vietnamese National Institute of Hygiene and Epidemiology (NIHE). Participants also received an incentive equivalent to about U.S. $1. In addition, participants received around U.S. $2 in all survey rounds for each person they recruited who successfully enrolled in the survey.

Results

MSM samples reached a maximum of five waves in 2006 (n=397), a maximum of 15 waves in 2009 (n=399), and a maximum of eight waves in 2013 (n=350).

Estimates

Overall, about half of MSM were below the age of 25years in all three sampling rounds (Table 1). Most MSM (49.3% in 2006, 65.1% in 2009 and 51.6%) had less than a 10^{th} grade education. Few (<11% in each year) men reported having ever been married and over 60% reported having a sexual preference for men. Most (>65%) MSM reported having their first sexual experience with a man when they were aged ≤19years.

Eighty-five percent of MSM in 2006, 47.5% in 2009 and 72.1% in 2013 reported having had anal sex with a non-commercial male partner in the past month. Forty-one percent in 2006 and 53% in 2009 reported selling sex to a male client in the past month whereas 22.5% reported doing so in 2013. Few (1.8 to 8.1%) MSM reported buying sex from a man in the past month. In the first two survey years, nearly half reported having vaginal or anal sex with a female in the past year, however, in 2013, only 14.2% reported doing so. Under 45% of MSM reported always using a condom with non-commercial and under 60% reported always using a condom with any male partner.

Drug use behaviors remained stable among MSM over the three rounds of sampling: between 20 and 25% reported ever using drugs and around 5% reported ever injecting drugs.

MSM who reported any prior HIV testing was consistently below 32%. In each survey round, less than half (38.5% – 47.4%) reported receiving free condoms in the past six months and the percentage of MSM who reported receiving safe sex counseling decreased from 66.1% in 2006 to 15.3% in 2013.

HIV seroprevalence among MSM was 5.8% in 2006, 16.2% in 2009 and 12.1% in 2013. Syphilis, NG, and CT testing were conducted in 2006 and 2009 with relatively stable findings (overlapping CI) between survey years. Roughly 2% of MSM tested positive for syphilis in both survey years, 7.2% in 2006 and 4.6% in 2009 tested positive for NG, and about 3% tested positive for CT in both survey years. In 2006, 11.4% and in 2009, 15.6% tested positive for at least one of the three STIs (syphilis, NG or CT).

Trend analysis

Key variables for sexual risk behaviors, drug use, service access and HIV prevalence were tested for trends (Table 2). There was a significant decreasing trend with an average change of −8.5% for MSM reporting receiving safe sex counseling in the past 6 months (p=0.001). There was a significant, but small, increasing trend for MSM who reported any prior HIV testing and receiving results (p=0.001; change of 0.8%) and for HIV prevalence (p=0.001; change of 1.1%). No significant changes were found for condom use, injecting and non-injecting drug use and for receiving free condoms.

Logistic regression

In the bivariate analysis, (Table 3) HIV seropositivity was positively associated with being older than 20years, having vaginal or anal sex with a female, and ever using or injecting drugs. In multivariate analysis, controlled by survey year, HIV seropositivity was positively associated with being 25year or older and ever injecting drugs and negatively associated

with having anal sex with a non-commercial male partner and buying sex from a man in the past month.

Discussion

Using RDS across three time points, we estimated that HIV prevalence is relatively high among MSM in HCMC. We found that there was a small but significant increase in HIV prevalence across the three survey rounds as has been seen in other surveys in the region.[15] Specifically, HIV prevalence was 5.8% in round one (2006) and more than doubled in the 2009 and 2013 survey rounds. In addition, 11.4% in 2006 and 15.6% in 2009 (no data for 2013) of MSM were infected with syphilis, NG or CT. This high HIV prevalence coupled with the finding that MSM have low condom use with their male sex partners and relatively high prevalence of syphilis, NG or CT indicates a scenario where HIV prevalence could continue at these high levels or even potentially increase in the future.

In addition, between 20 and 25% of MSM reported ever using illicit non-injection drugs and roughly 5% had ever injected drugs. Drug use has been found to impair safe sex decision making; needle sharing among people who inject drugs is an extremely efficient mode of HIV transmission and is a key risk factor for acquiring and transmitting HIV.[16,17] HIV seroprevalence was found to be significantly associated with both drug use (at the bivariate level) and injection drug use (at the bivariate and multivariate level). Overlapping risks (male-to-male sex and drug use) indicate a sub-group that is at increased risk of acquiring and transmitting HIV and other STIs and requires specific intervention focus.[18,19,20]

HIV testing among MSM, a critical ‘gateway’ to HIV services, was found to have increased over the survey years, but is still much lower than the national testing goals: 50% and 80% of MSM tested for HIV and knowing their results by 2015 and 2020 respectively.[4] In this analysis, there appears to be a leveling over time of the proportion of MSM who have received free condoms. One explanation may be that condom use is becoming “normalized” and that MSM who are using them are accessing them in other way. This may be due to the fact that donors, such as PEPFAR, have phased out their support of free condoms in lieu of condoms that are distributed via socially marketed or open-market systems. It is, however, unclear as to why there is a significant decrease in the proportions of MSM who reported receiving safe sex counseling in the past six months.

It is concerning that the proportion of MSM that reported consistent condom use in the past month with ‘any’ male partner(s) appears to be decreasing slightly over time to levels similar to those recorded prior to program expansion in 2006. This could either be explained by a shift in population behaviors to potentially high-risk behaviors or that programs have not effectively conveyed either risk-reduction messaging or reached the higher risk networks among the MSM population. Since 2006, Vietnam has expanded services targeting MSM in key locations where MSM are believed to be concentrated, such as large urban settings, including HCMC. These services include peer-education and harm reduction, increased condom and lubricant distribution, and access to HIV counseling and testing. Ongoing population surveillance and additional evaluation of these programs is recommended to determine whether they are appropriately designed and implemented for

the MSM population, especially in light of the funding decrease from external donors such as PEPFAR and the Global Fund.[9] In general, external funders are exploring the process and timelines for reducing their funding for direct services that will be transitioned more fully to internal Government of Vietnam support.

There was a decrease in reported commercial sex among MSM over the three survey rounds. Buying sex from a male was found to be protective for HIV, and selling sex was found to have no association with HIV infection. It is possible that those buying sex are more likely to be insertive partners and therefore at a lower relative risk than receptive partners or that men paying for sex are more likely to use a condom due to known risks of having sex with high risk partners. This level of sexual profile detail is not available in this analysis and may require additional research to more completely understand. Non-commercial anal sex was also found to be protective for HIV. Bivariate analysis indicated that 89% of MSM in all survey rounds who reported non-commercial anal sex reported always using condoms in the past month, which may explain partially why non-commercial anal sex is protective.

There are several important limitations in the implementation of these surveys that may have impacted the findings. The first survey among MSM conducted in HCMC in 2006 only had five waves of RDS recruitment and was likely biased by the purposeful selection of initial seeds. Additional recruitment waves would have likely resulted in accessing a broader, more representative, network of MSM in HCMC. Although the importance of having long recruitment chains was ensured for the second and third survey rounds, the survey in 2009 had a recruitment site (not used in 2006) in an area with a large network of male sex workers which may account for a higher percentage of men who sold sex (53% in 2009 vs 40.7% in 2006 and 22.5% in 2013). In addition, it might be some uncertainty of the self-report behavior measurement. Therefore, data from this year should be interpreted with caution. Additionally, using only three survey rounds to get an accurate picture of proportional changes and trends may be insufficient to accurately assess trends useful for guiding HIV program planning. It should be noted that numerous countries are completing three rounds of IBBS surveys on key populations at higher risk of HIV transmission and, based upon the resulting data, similarly important HIV programming and funding decisions will be made. Donors and decision makers should continue to collect additional and comparable data points to monitor the direction of the HIV epidemic and the potential impact of intervention programs and services in Vietnam as well as other locations.

Conclusions

This analysis provides results from three rounds of cross-sectional surveys over an eight-year time span to examine HIV and related behavior trends among MSM in HCMC. It is the first trend study using RDS-derived data in Vietnam. These findings provide a clear indication about the relatively high burden of HIV among MSM in HCMC and also highlights the need for increased provision and evaluation of key HIV prevention and care services, including HIV testing and referral, STI screening and management, and treatment for injection drug use.

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Table 1.

Population estimates of demographic and risk behavior variables and prevalence of infection and drug use among MSM, HCMC, Vietnam, 2006, 2009 and 2013.

	2006 (n = 397)		2009 (n = 399)		2012 (n = 350)	
Variable	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**
Sociodemographics						
Age						
<20 years	113	27.4 (21.2, 33.6)	86	20.9 (14.2, 27.6)	66	17.8 (12.4, 23.1)
20–24 years	116	31.0 (24.3, 37.6)	119	27.2 (21.0, 33.5)	113	32.9 (25.1, 40.6)
25–29 years	53	13.9 (8.9, 18.8)	87	25.2 (17.8, 32.5)	63	18.8 (12.8, 24.7)
≥30 years	111	27.8 (20.3, 35.2)	105	26.7 (19.8, 33.6)	107	30.6 (21.8, 39.4)
Education level						
No schooling	11	2.0 (0.2, 3.7)	17	3.2 (1.3, 5.2)	7	2.8 (0.1, 5.8)
Grades 1 to 9	185	47.3 (40.2, 54.4)	236	61.9 (54.2, 69.6)	158	48.8 (4I.5, 56.1)
Grades 10 to 12	142	33.0 (25.9, 40.2)	104	26.2 (19.2, 33.1)	114	30.1 (23.4, 36.7)
University Ever married	48	17.7 (10.7, 24.7)	40	8.7 (4.3, 13.0)	70	18.3 (12.3, 24.3)
Ever married						
No	371	94.8 (91.2, 98.4)	353	89.6 (85.8, 93.2)	310	89.2 (84.6, 93.7)
Yes	21	5.2 (1.6, 8.8)	44	10.4 (6.8, 14.1)	36	10.9 (6.3, 15.4)
Sexual preference						
Males	286	66.6 (60.1,73.2)	256	63.9 (54.6, 73.3)	268	72.8 (65.4, 80.2)
Females	75	22.7 (16.7, 28.6)	67	19.4 (9.7, 29.2)	52	17.5 (11.3, 22.7)
No preference	32	10.7 (6.1, 15.4)	74	16.6 (11.0, 22.2)	25	9.8 (4.9, I4.5)
Age at first sex with a man						
≤ 15 years	100	22.2 (16.6, 27.8)	33	7.3 (3.9, 10.8)	50	12.1 (7.3, 17.8)
16 to 19 years	213	54.8 (47.3, 62.2)	231	58.1 (50.2, 66.1)	206	55.5 (47.6, 63.4)
≥20 years	78	23.1 (l6.4, 29.7)	ll25	34.5 (26.2, 42.8)	87	32.4 (25.ll, 39.7)
Sexual behaviors						
Anal sex with non-commercial male partner in past month						
No	57	15.1 (9.7, 20.5)	183	52.5 (44.2, 60.8)	98	27.9 (20.3, 35.6)
Yes	333	84.9 (79.5, 90.3)	212	47.5 (39.2, 55.7)	251	72.1 (64.4, 79.8)
Sold sex to a male client in past month						
No	225	59.3 (52.4, 66.1)	190	46.9 (39.6, 54.4)	262	77.5 (71.1, 84.0)
Yes	168	40.7 (33.9, 47.6)	209	53.0 (45.6, 60.5)	87	22.5 (16.0, 28.9)
Bought sex from a man in past month						
No	351	91.9 (88.7, 95.1)	379	98.2 (97.2, 99.1)	341	97.5 (95.4, 99.4)
Yes	42	8.1 (4.9, 11.3)	18	1.8 (0.9, 2.7)	8	2.5 (0.4, 4.6)
Vaginal/anal sex with female in past 12 months						
No	258	57.4 (49.6, 65.1)	217	54.8 (45.7, 63.9)	307	85.8 (80.7, 90.9)
Yes	134	42.7 (34.9, 50.4)	180	45.2 (36.1, 54.3)	42	14.2 (9.1, 19.3)
Always used condom with non-commercial male partner in past month						
No	162	63.1 (54.8, 71.3)	106	66.1 (54.7, 77.5)	177	55.6 (48.1, 63.1)

	2006 (n = 397)		2009 (n = 399)		2012 (n = 350)	
Variable	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**
Yes	99	36.9 (28.7, 45.2)	46	33.9 (22.5, 45.3)	134	44.4 (36.9, 51.8)
Always used condom with any male partner in past month						
No	185	50.2 (42.9 , 57.4)	207	40.2 (32.2, 48.3)	144	58.9 (49.8, 67.9)
Yes	204	49.8 (42.5 ,57.1)	142	59.8 (51.7, 67.8)	126	41.1 (32.1, 50.2)
Drug use behaviors						
Ever used drugs						
No	308	79.9 (74.0, 85.9)	296	79.3 (73.4, 85.3)	268	80.3 (74.9, 85.6)
Yes	85	20.1 (14.1,26.0)	l0l	25.5 (14.7, 26.6)	8l	19.7 (14.4, 25.1)
Ever injected drugs						
	376	95.1 (92.3,97.9)	365	94.9 (92.7, 97.3)	331	94.8 (91.2, 98.3)
Yes	17	4.9 (2.1, 7.7)	32	5.0 (2.7, 7.3)	18	5.2 (1.6, 8.8)
Service access						
Ever tested for HIV and received results						
No	281	72.8 (66.7, 78.9)	320	86.8 (82.6, 91.1)	207	68.2 (60.9, 75.4)
Yes	112	27.2 (21.1, 33.3)	77	13.2 (8.8, 17.4)	l42	31.8 (24.6, 39.1)
Received free condoms in past 6 months						
No	225	61.5 (54.4, 68.7)	211	62.7 (55.5,69.6)	186	58.2 (50.9, 65.6)
Yes	168	38.5 (31.3, 45.6)	186	47.4 (40.4, 54.5)	163	41.8 (34.4, 49.1)
Received safe sex talk in past 6 months						
No	127	34.0 (27.0, 41.0)	180	52.6 (45.5, 59.6)	288	84.7 (78.7, 90.8)
Yes	266	66.1 (59.0, 73.1)	218	47.4 (40.4, 54.5)	61	15.3 (9.2, 21.3)
Sexually transmitted infections						
HIV						
No	363	94.2 (91.3, 96.9)	337	83.8 (78.2, 89.5)	310	87.8 (83.4, 92.2)
Yes	30	5.8 (3.0, 8.5)	58	16.2 (10.5, 21.8)	39	12.1 (7.7, 16.6)
Syphilis						
No	377	97.6 (96.1,99.1)	385	98.2 (96.6, 99.9)		–
Yes	13	2.2 (0.7, 3.7)	11	1.8 (0.1, 3.4)		–
Gonorrhea						
No	365	92.8 (88.7, 96.8)	368	95.4 (93.0, 97.7)		–
Yes	28	7.2 (3.2, 11.3)	29	4.6 (2.3, 6.9)		–
Chlamydia						
No	378	97.1 (95.0, 99.2)	373	96.7 (94.8, 98.8)		–
Yes	15	2.8 (0.8, 5.0)	22	3.3 (1.1, 5.1)		–
Syphilis, gonorrhea or chlamydia						
No	341	88.6 (84.9, 92.3)	315	84.4 (79.8, 90.0)		–
Yes	52	11.4 (7.7, 15.1)	84	15.6 (11.0, 20.2)		–

Table 2.

Trends for sexual risk, drug use, service access and HIV prevalence among MSM, HCMC, Vietnam, 2006, 2009, and 2013.

Variable	Annual % change	P value for equal proportions^	P value for increasing or decreasing trend^^
Always used condom with any male partner in past month	−2.7	0.270	0.100
Ever used drugs	−0.1	0.980	0.650
Ever injected drugs	0.0	0.990	0.610
Ever tested for HIV and received results	0.8	0.001	0.001
Received free condoms in past 6 months	0.6	0.620	0.320
Received safe sex talk in past 6 months	−8.5	0.001	0.001
HIV	1.1	0.002	0.001

^Test for trend in proportions; reject null hypothesis (conclude proportions are unequal) if $p < 0.05$.

^^Directional test for trends in proportions; reject null hypothesis (conclude increasing [positive annual change] or decreasing [negative annual change] trend in proportions) at $p \leq 0.05$.

Table 3.

Correlates of HIV sero-prevalence among MSM, HCMC, Vietnam, 2006, 2009 and 2013.

	HIV (n = 127)			
Variable	**OR**	**(95% CI)**	**AOR**	**(95% CI)**
Age (ref. <20 years)				
20–24 years	3.71*	1.02, 13.49	3.02	0.75, 12.16
25–29 years	10.71***	3.03, 37.89	9.67***	2.52, 37.14
≥30 years	4.34*	1.22, 15.44	3.95*	1.01, 15.50
Education level (ref. no schooling)				
Grades 1 to 9	1.63	0.33, 7.93	–	–
Grades 10 to 12	1.87	0.42, 8.28	–	–
University	1.17	0.25, 5.43	–	–
Ever married (ref. no)				
Yes	0.56	0.24, 1.3	–	–
Sexual preference (ref. men)				
Women	1.43	0.77, 2.67	–	–
No preference	1.26	0.58, 2.73	–	–
Sexual behaviors				
Age at first sex with a man (ref. < 15 years)				
16 to 19 years	1.23	0.57, 2.68	–	–
≥20 years	0.78	0.32, 1.89	–	–
Anal sex with consensual male partner in past month (ref. no)				
Yes	0.63	0.37, 1.06	0.44**	0.24, 0.83
Sold sex to a male client in past month (ref. no)				
Yes	1.06	0.64, 1.75	–	–
Bought sex from a man in past month (ref. no)				
Yes	0.22	0.06, 1.07	0.20*	0.04, 0.97
Always used condom with non-commercial male partner in past month (ref. no)				
Yes	0.89	0.44, 1.81	–	–
Always used condom with any male partner last month (ref. no)				
Yes	1.22	0.69, 2.17	–	–
Vaginal/anal sex with female in past 12 months (ref. no)				
Yes	1 99**	1.18, 3.34	–	–
Condom use with any female sex partner in past 12 months (ref. no)				
Yes	0.73	0.38, 1.41	–	–
Ever used drugs (ref. no)				
Yes	2 12**	1.22, 3.69	–	–
Ever injected drugs (ref. no)				
Yes	3.65***	1.69, 7.9	3.07**	1.24, 7.64
Ever tested for HIV and received results (ref. no)				

	HIV (n = 127)			
Variable	**OR**	**(95% CI)**	**AOR**	**(95% CI)**
Yes	0.68	0.35, 1.34	–	–
Received free condoms in past 6 months (ref. no)				
Yes	1.11	0.67, 1.83	–	–
Received safe sex talk in past 6 months (ref. no)				
Yes	1.11	0.65, 1.88	–	–

Note: Odds ratios (ORs) and adjusted ORs (AORs) with 95% confidence intervals (CI).

±Weighted by degree and recruitment weights.[11]

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$.

–Not used in the final model.