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HIV Self-Testing Among Online MSM in China: Implications for Expanding HIV Testing Among Key Populations

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Abstract

HIV self-testing offers an alternative to facility-based testing that could expand HIV testing among MSM. We organized an online survey of MSM in China to better understand the frequency and correlates of HIV self-testing. A total of 1342 individuals completed the survey. 20.3% of MSM reported prior HIV self-testing. Self-testing was correlated with being married, having six or greater male anal sex partners in the past three months, and having HIV tested within 12 months in the multivariable analysis. Our study suggests that HIV self-testing may be able to reach sub-groups of high-risk MSM and enable more frequent HIV testing.

Keywords

MSM; HIV; self-testing; rapid testing; China

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Introduction

HIV testing is critical to surveillance and control of the HIV pandemic. However, an estimated twenty million individuals living with HIV around the world do not know their serological status.¹ Despite the growth of voluntary counseling and testing services in many countries, a large number of individuals do not seek facility-based testing due to inconvenience,² lack of privacy and confidentiality,³ and stigma associated with HIV testing.^{4,5} Self-testing, in which an individual collects his or her own oral fluid or blood specimen and conducts a rapid point-of-care test, may increase HIV test uptake.^{3,5,6} HIV self-testing allows users to choose the time and location of testing, providing an opportunity for a new decentralized testing model.^{4,7}

Low and middle income nations bear the greatest HIV burden and may benefit from decentralized HIV testing.⁸ More specifically, HIV self-testing may be useful in China where many HIV service delivery systems are centralized at clinics, public health authorities, and other formal facilities.⁹ In addition, China's relatively permissive regulatory and legal environment¹⁰ expands opportunities for self-testing programs. According to the World Health Organization, China does not restrict the sale of HIV self-test kits.¹¹

Among key populations, defined as groups most likely to be exposed to or transmit HIV,¹² most HIV self-testing research has been conducted in high-income nations,⁶ where there is a lower prevalence of HIV infection.⁸ The HIV prevalence among Chinese MSM is approximately 5.3% (95% CI 4.8%–5.8%), based on data from mostly urban research studies.¹³ Few studies of HIV self-testing have examined routine implementation among key populations,^{14,15} increasing the need for implementation research on HIV self-testing. This study examines correlates of HIV self-testing among men who have sex with men (MSM) in South China recruited through two large web-based platforms.

Methods

Two study team members conducted 84 interviews with MSM and stakeholders in order to inform development of the online survey. We also interviewed 13 key informants specifically about conducting an Internet survey for MSM in China. To enhance survey completion rate and address community concerns, the draft survey guide was reviewed by the following individuals sequentially: 1) six local MSM who had completed online surveys in the past; 2) four local community-based organization (CBO) leaders and staff who organize online surveys; 3) two Chinese gender studies sociologists; 4) five physicians responsible for STD prevention programming.

We partnered with two large MSM CBOs in Guangdong and Chongqing, both of which run popular MSM websites. The CBOs provide sexual health services, including HIV and syphilis rapid testing and counseling, and linkage to care (accompaniment to clinical services for infected individuals).

We piloted the survey online with 201 volunteer MSM. We also conducted key informant and focus group interviews to solicit feedback on question wording and interpretation. This pilot data was not included in the final analysis. The purpose of this extensive formative

research was to ensure that the online survey was simple to complete and consistent with our written survey content.

Eligibility and Recruitment

We implemented an online survey with the largest MSM web portals in Guangdong and Chongqing in May 2013. Participants were recruited exclusively through a banner link on the web portal home page. Interested participants who clicked on the link were then directed to the survey with a description of its contents and an online informed consent form. To be eligible for the online survey, participants must have stated that they were born biologically male, had anal sex with men at least once during their lifetime, and were at least 16 years of age (age of consent in China). No personal identifying information or IP addresses were collected from participants.

Measures

We defined self-testing as an individual administering an HIV test to himself either orally or by finger-prick (see supplemental text #1). Information was gathered about self-testing history, amount paid for self-test, and methods that individuals obtained their self-tests. Participants were asked how much they had paid for their most recent self-test, and given five price ranges from approximately under 8 USD to over 50 USD, with a write-in option.

In measuring outcome variables such as self-testing history, several predictor variables were assessed. Socio-demographic characteristics included participants' age, highest level of education completed, current employment status, income, marital status, sexual orientation, and sexual orientation disclosure. Behavioral variables included history of STI testing (including HIV), location of HIV testing, time elapsed since last HIV test, number of male anal sex partners in the past three months, sex with women, unprotected anal intercourse, and recreational non-injection drug use.

Statistical Analysis

Bivariate and multivariable logistic regression analyses were performed using IBM SPSS software (Version 21.0; SPSS Inc, Chicago, IL) to identify factors associated with HIV self-testing. Predictor variables with a p-value < 0.10 at the bivariate level were considered eligible for entry into the multivariable analysis. Separate multivariable logistic regression analyses were conducted to evaluate paying less than 8 USD for an HIV self-test and methods by which HIV self-tests were obtained.

Ethical Review

The Institutional Review Boards of the Guangdong Provincial Center for STI Prevention and Control and the UNC Division of Infectious Diseases approved this study.

Results

Of 1935 eligible MSM, 1342 (69.4%) completed the survey (Table 1). 805 (60.5%) MSM reported testing for HIV at least once in their lifetime, and 49 (6.1%) reported being HIV positive. 259 (20.3%) MSM reported having self-tested for HIV at least once in their

lifetime. Baseline sample characteristics of participants are presented in Table 1. Most men were between the ages of 21 to 30 (55.2%), had at least a college degree (53.4%), and were not married (84.5%). A large portion of MSM self-identified as gay (73.1%), reported having had anal sex with between one to five male partners in the past three months (76.0%), and having never engaged in sex with women (65.9%).

Correlates of HIV self-testing

In bivariate analysis, HIV self-testing was correlated with older age, being married, being more educated, having a higher income, having greater number of male anal sex partners in the past three months, having HIV tested within 12 months, and having tested for STIs other than HIV (Table 2). In multivariate analysis, the following factors were independently correlated with HIV self-testing: being married (aOR 1.60, 95%CI 1.08 2.36), having six or greater male anal sex partners in the past three months (aOR 4.25, 95%CI 2.05 8.79), time since last HIV testing less than or equal to 12 months (aOR 2.16, 95% CI 1.31 3.55), annual income greater than 16,000 USD (aOR 1.76, 95%CI 1.02 3.04) and history of STI testing (aOR 3.07, 95%CI 2.26 4.18).

HIV self-test costs

MSM in our sample reported paying a wide range of costs for HIV self-test kits. 125 (48.3%) MSM reported paying less than 8 USD for their most recent HIV self-test, 62 (23.9%) paid between 8 and 16 USD, 38 (14.7%) paid between 16 and 32 USD, 18 (6.9%) paid between 32 and 50 USD, and 16 (6.2%) paid greater than 50 USD. In both bivariate and multivariable regression analyses, an annual income less than 6000 USD was the only statistically significant correlate of paying less than 8 USD for an HIV self-test.

Obtaining HIV self-tests from the internet

MSM reported obtaining HIV self-tests through a variety of methods. The most common place to obtain HIV self-tests was the internet (34.7%), followed by community-based organizations (28.2%), pharmacies (17.8%), friends (10.4%), sexual partners (6.9%), and other methods (6.2%). Several factors were independently correlated with purchasing self-tests from the Internet in multivariable analysis (Supplementary Table 1).

Discussion

Over half of people living with HIV worldwide do not know their serological status.¹⁶ To reach the UNAIDS goal of universal access to ART by 2015, an estimated ten million HIV-infected individuals must be identified and treated.¹⁷ In China, systematic review data suggest that HIV testing among MSM has increased from approximately 10.8% in 2002 to 51.2% in 2009.¹⁸ HIV self-testing may expand overall HIV testing uptake among key populations,¹⁹ promote increased frequency of testing among high risk individuals,⁵ and facilitate partner services.²⁰ Establishing appropriate HIV testing interventions in the Chinese context may have far-reaching consequences because there are substantial portion of Chinese MSM who have never received HIV testing. Our study extends previous self-testing research^{21–23} by examining MSM self-testing practices in a middle income country

setting. Furthermore, extensive formative work resulted in a high completion rate that improves on previous online studies.²⁴

Our study suggests that many MSM in China have self-tested for HIV. 60.1% of all MSM in our sample had tested for HIV at least once in their lives, a figure comparable to other studies of MSM in China.²⁵ 259 (20.3%) MSM had self-tested for HIV, comprising 32.2% of all HIV testers. This is nearly tenfold the frequency of self-testing observed among online French MSM.²³ This finding demonstrates that a relatively large number of Chinese MSM are already using HIV self-tests, but there is also room for improvement in order to expand coverage of testing services among online MSM.²⁶ HIV self-testing is not illegal in China.²⁷ The relatively permissive legal and regulatory environment¹⁰ and a large undiagnosed population living with HIV in China²⁸ may encourage companies to sell self-test kits in China.

HIV self-testing can effectively reach high-risk MSM and facilitate higher frequency testing. In our study, HIV self-testing was significantly correlated with a greater number of male anal sex partners in the past three months. This finding is consistent with a French study which found that recent unprotected anal intercourse with a casual partner was associated with self-testing.²³ In addition, our study found that HIV self-testers were twice as likely to have received an HIV test in the past 12 months, suggesting that self-testing may increase the frequency of HIV testing. This is consistent with Australian behavioral research demonstrating that MSM perceived self-testing would increase HIV testing frequency.²⁹

One-third of MSM who had used HIV self-tests in China purchased them online. The Internet is increasingly used as a prompt and cost-effective method of delivering HIV prevention services.³⁰ An examination of China's online marketplace found many vendors selling HIV and STD self-test kits online.³¹ The two largest e-commerce websites in China included 21 HIV self-test vendors, with most vendors selling oral HIV tests.³¹ These findings demonstrate a rapidly expanding online marketplace already providing MSM and others in China with self-testing options.

Our study has several limitations. First, the survey captured only an online convenience sample of MSM population in China. Online MSM in China tend to be younger, more educated, and may have fewer sexual partners compared to non-online MSM in China.³² However, MSM in China are known to have high Internet access and to seek sexual partners online.²⁴ Second, our research centered on MSM and did not collect data from other key populations such as FSW and transgender individuals. Third, this study did not assess the accuracy of self-test kits or linkage to care. At the same time, a global systematic review¹⁹ and one study of MSM in China³³ suggest that community-based HIV testing, in general, improved linkage to care when compared to facility-based HIV testing.

Although HIV self-testing may be effective in expanding MSM sexual health services, several substantial challenges remain. Current HIV self-testing relies on HIV antibody testing, although nucleic acid amplification testing would improve sensitivity in high-risk populations who have an increased risk of early HIV infections.³⁴ Many individuals prefer supervised HIV self-testing strategies rather than un-supervised testing, highlighting the

need for comprehensive training, counseling, and ancillary testing services.⁶ Legal and regulatory challenges to expanding HIV self-testing also exist in many countries¹² where self-tests have not yet been approved. Adequate linkage to care and test quality assurance remain essential.³⁵

Innovative approaches are needed to improve HIV testing uptake among key populations. Technological advances and the decentralization of HIV service delivery increase the feasibility of HIV self-testing. Our study suggests that HIV self-testing may be able to reach sub-groups of high-risk MSM and may enable more frequent HIV testing. Self-testing has the potential to increase knowledge of HIV serostatus and engage key populations in HIV prevention, treatment, and care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. WHO. Global HIV/AIDS Response - Epidemic update and health sector progress towards Universal Access - Progress Report 2011. Geneva, Switzerland: 2011.
2. Song Y, Li X, Zhang L, et al. HIV-testing behavior among young migrant men who have sex with men (MSM) in Beijing, China. *AIDS care*. Feb; 2011 23(2):179–186. [PubMed: 21259130]
3. Krause J, Subklew-Sehume F, Kenyon C, Colebunders R. Acceptability of HIV self-testing: a systematic literature review. *BMC public health*. 2013; 13:735. [PubMed: 23924387]
4. Tucker JD, Bien CH, Peeling RW. Point-of-care testing for sexually transmitted infections: recent advances and implications for disease control. *Current opinion in infectious diseases*. Feb; 2013 26(1):73–79. [PubMed: 23242343]
5. Myers JE, El-Sadr WM, Zerbe A, Branson BM. Rapid HIV self-testing: long in coming but opportunities beckon. *AIDS*. Jul 17; 2013 27(11):1687–1695. [PubMed: 23807269]
6. Pant Pai N, Sharma J, Shivkumar S, et al. Supervised and Unsupervised Self-Testing for HIV in High- and Low-Risk Populations: A Systematic Review. *PLoS Med*. Apr.2013 10(4):e1001414. [PubMed: 23565066]
7. Napierala Mavedzenge S, Baggaley R, Corbett EL. A Review of Self-Testing for HIV: Research and Policy Priorities in a New Era of HIV Prevention. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. Apr 16.2013
8. Shao Y, Williamson C. The HIV-1 epidemic: low- to middle-income countries. *Cold Spring Harbor perspectives in medicine*. Mar.2012 2(3):a007187. [PubMed: 22393534]
9. Tucker JDWF, Nehl EJ, Zhang F. HIV testing and care systems focused on sexually transmitted HIV in China. *Sex Transm Infect*. 2013; 88(2):116–119. [PubMed: 22345024]

10. Wei C, Yan H, Yang C, et al. Accessing HIV testing and treatment among men who have sex with men in China: A qualitative study. *AIDS care*. Aug 2.2013 In Press.
11. WHO. HIV self-testing among health workers: A review of the literature and discussion of issues and options for increasing access to HIV testing in sub-Saharan Africa. 2011
12. UNAIDS. Global Report: UNAIDS report on the global AIDS epidemic 2013. Geneva, Switzerland: UNAIDS; 2013.
13. Chow EP, Wilson DP, Zhang J, Jing J, Zhang L. Human immunodeficiency virus prevalence is increasing among men who have sex with men in China: findings from a review and meta-analysis. *Sexually transmitted diseases*. Sep; 2011 38(9):845–857. [PubMed: 21844741]
14. Mimiaga MJ, Goldhammer H, Belanoff C, Tetu AM, Mayer KH. Men who have sex with men: perceptions about sexual risk, HIV and sexually transmitted disease testing, and provider communication. *Sexually transmitted diseases*. Feb; 2007 34(2):113–119. [PubMed: 16810121]
15. Beckwith CG, Flanigan TP, del Rio C, et al. It is time to implement routine, not risk-based, HIV testing. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. Apr 1; 2005 40(7):1037–1040. [PubMed: 15824997]
16. UNAIDS. UNAIDS World AIDS Day Report 2012. 2012. http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/JC2434_WorldAIDSday_results_en.pdf
17. WHO/UNAIDS. The Treatment 2.0 Framework for Action: Catalysing the Next Phase of Treatment, Care and Support. Geneva: World Health Organization; 2011.
18. Chow EP, Wilson DP, Zhang L. The rate of HIV testing is increasing among men who have sex with men in China. *HIV medicine*. May; 2012 13(5):255–263. [PubMed: 22252151]
19. Suthar ABFN, Bachanas PJ, Wong VJ, Rajan JS, et al. Towards Universal Voluntary HIV Testing and Counselling: A Systematic Review and Meta-Analysis of Community-Based Approaches. *PLoS medicine*. 2013; 10(8)
20. Centers for Disease Control and Prevention (CDC). . HIV testing among men who have sex with men--21 cities, United States, 2008. *MMWR Morbidity and mortality weekly report*. Jun 3; 2011 60(21):694–699. [PubMed: 21637183]
21. Carballo-Diequez A, Balan IC, Dolezal C, et al. HIV testing practices among men who have sex with men in Buenos Aires, Argentina. *AIDS care*. May 10.2013 In Press.
22. Carballo-Diequez A, Frasca T, Dolezal C, Balan I. Will gay and bisexually active men at high risk of infection use over-the-counter rapid HIV tests to screen sexual partners? *J Sex Res*. 2012; 49(4): 379–387. [PubMed: 22293029]
23. Greacen T, Friboulet D, Fugon L, Hefez S, Lorente N, Spire B. Access to and use of unauthorised online HIV self-tests by internet-using French-speaking men who have sex with men. *Sex Transm Infect*. Aug; 2012 88(5):368–374. [PubMed: 22436195]
24. Wei C, Guadamuz TE, Lim SH, Koe S. Sexual transmission behaviors and serodiscordant partnerships among HIV-positive men who have sex with men in Asia. *Sexually transmitted diseases*. Apr; 2012 39(4):312–315. [PubMed: 22421700]
25. Chow EPWD, Zhang L. The rate of HIV testing is increasing among men who have sex with men in China. *HIV Med* 2012. May; 2012 13(5):255–263.
26. Xu Y, Zhang Z, Li D, et al. Willingness to Use the Oral Fluid HIV Rapid Test among Men Who Have Sex with Men in Beijing, China. *PLoS One*. 8(5):e64652. [PubMed: 23717645]
27. Jiabao, W. Regulations on AIDS Prevention and Treatment. Beijing: Decree of the State Council of the People's Republic of China No. 457; 2006.
28. Li X, Lu H, Raymond HF, et al. Untested and undiagnosed: barriers to HIV testing among men who have sex with men, Beijing, China. *Sex Transm Infect*. Apr; 2012 88(3):187–193. [PubMed: 22158932]
29. Bavinton BR, Brown G, Hurley M, et al. Which gay men would increase their frequency of HIV testing with home self-testing? *AIDS Behav*. Jul; 2013 17(6):2084–2092. [PubMed: 23525790]
30. Young SD, Cumberland WG, Lee S-J, Jaganath D, Szekeres G, Coates T. Social Networking Technologies as an Emerging Tool for HIV PreventionA Cluster Randomized Trial. *Annals of Internal Medicine*. 2013; 159(5):318–324. [PubMed: 24026317]
31. Tucker, JD. Social Entrepreneurship for Sexual Health: Data to Inform Social Media Platforms for HIV Testing in China. Paper presented at: World Health Summit; 2013; Berlin, Germany.

32. Zhang D, Bi P, Lv F, Zhang J, Hiller JE. Differences between Internet and community samples of MSM: implications for behavioral surveillance among MSM in China. *AIDS Care*. Oct; 2008 20(9):1128–1137. [PubMed: 18825519]
33. Zhang DP, Han L, Li CM, et al. The impact of community-based organizations in HIV testing mobilization among men who have sex with men. *Zhonghua yu fang yi xue za zhi*. May; 2013 47(5):431–434. [PubMed: 23958126]
34. Stekler JD, Swenson PD, Coombs RW, et al. HIV testing in a high-incidence population: is antibody testing alone good enough? *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. Aug 1; 2009 49(3):444–453. [PubMed: 19538088]
35. Ng OT, Chow AL, Lee VJ, et al. Accuracy and user-acceptability of HIV self-testing using an oral fluid-based HIV rapid test. *PLoS One*. 2012; 7(9):e45168. [PubMed: 23028822]

Table 1

Sociodemographic and Behavioral Characteristics of Online MSM in China (n=1342)

Characteristic	Frequency	Proportion (%)
Age (years)		
16–20	37	2.8
21–30	733	55.2
31–40	440	33.2
41	117	8.8
Highest education completed		
High school or less	202	15.2
Vocational/Technical school	418	31.4
College or higher	711	53.4
Cohabitation status		
Alone	466	35.1
With others	860	64.9
Residential status		
Guangdong	1,111	82.9
Other	229	17.1
Current employment		
Student	128	9.7
Part time or unemployed	133	10
Full time	1063	80.3
Annual income (USD)		
3000	131	9.8
3001–6000	243	18.1
6001–10000	384	28.6
10001–16000	300	22.4
16001	279	20.8
Marital status		
Single*	1,120	84.5
Married	206	15.5
Number of male anal sex partners in last 3 months		
None	262	19.7
1 to 5	1,011	76.0
6	58	4.4
Sexual orientation		
Homosexual	974	73.1
Bisexual	352	26.4

Characteristic	Frequency	Proportion (%)
Heterosexual	7	0.5
Sex with women		
Yes	448	33.6
No	885	65.9
UAI in past 3 months		
Yes	298	28.3
No	755	71.7
History of STI testing (other than HIV)		
Yes	524	39.7
No	796	60.3
History of being diagnosed with STIs (other than HIV)		
Yes	157	12.5
No	1,094	87.5
Recreational drug use in past 3 months		
Yes	56	4.2
No	1275	95.8
Out to anyone**		
Yes	673	50.3
No	665	49.7
Time elapsed since last HIV test		
1 month	95	11.9
1–6 months	236	29.6
6–12 months	221	27.7
> 12 months	245	30.7
Self-reported HIV serostatus		
Positive	49	6.1
Negative	736	91.4
Unclear	20	2.5
History of HIV testing at CDC/clinic		
Yes	361	45.4
No	434	54.6

* Includes men who are not married, engaged, widowed, and divorced.

** Asked as, "Have you told anyone about your sexual orientation or that you have sex with other men?"

*** Includes Chongqing, other Chinese provinces, Hong Kong, Macao, and overseas.

Table 2

Correlates of having HIV self-tested among online MSM in China (n = 1342)

Characteristic	Self-tested (%)	uOR [95 % CI]	P value	aOR [95% CI]	P value
Age					
30 yr	118 (17.7%)	1		1	
> 30 yr	116 (22.7%)	1.36 [1.02, 1.81]	0.036	1.18 [0.82, 1.70]	0.38
Highest education completed					
High school or lower	38 (21.6%)	1.23 [0.82, 1.83]	0.32	1.26 [0.81, 1.98]	0.30
College*	159 (18.3%)	1		1	
Graduate school	38 (27.7%)	1.71 [1.13, 2.58]	0.011	1.20 [0.86, 1.66]	0.28
Cohabitation status					
Alone	70 (16.7%)	1		1	
With others	161 (21.3%)	1.35 [0.99, 1.84]	0.058	1.25 [0.87, 1.78]	0.23
Residential status					
Guangdong	166 (19.2%)	1			
Other**	69 (22.0%)	1.19 [0.87, 1.63]	0.28		
Annual income (USD)					
<6000	46 (15.5%)	1		1	
6000–16000	118 (18.9%)	1.27 [0.87, 1.84]	0.22	1.26 [0.80, 1.97]	0.31
>16000	71 (26.8%)	1.99 [1.31, 3.01]	0.001	1.76 [1.02, 3.04]	0.041
Marital status					
Single***	184 (18.5%)	1		1	
Married	46 (25.3%)	1.49 [1.03, 2.16]	0.035	1.60 [1.08, 2.36]	0.019
Number of male anal sex partners in last 3 months					
None	30 (12.9%)	1		1	
1 to 5	185 (20.6%)	1.75 [1.16, 2.65]	0.008	1.61 [1.05, 2.47]	0.03
6	21 (43.8%)	5.26 [2.65, 10.5]	<0.001	4.25 [2.05, 8.79]	<0.001

Characteristic	Self-tested (%)	uOR [95 % CI]	P value	aOR [95% CI]	P value
Sexual orientation					
Homosexual	177 (19.1%)	1			
Bisexual	75 (23.1%)	1.28 [0.95, 1.71]	0.11		
Sex with women					
Yes	87 (21.8%)	1.19 [0.80, 1.52]	0.25		
No	149 (19.0%)	1			
UAI in past 3 months					
Yes	75 (20.5%)	1			
No	131 (22.2%)	1.11 [0.80, 1.52]	0.54		
History of STI testing (other than HIV)					
Yes	148 (31.3%)	3.26 [2.42, 4.39]	<0.001	3.07 [2.26, 4.18]	<0.001
No	86 (12.3%)	1		1	
History of being diagnosed with STIs (other than HIV)					
Yes	30 (22.2%)	1.14 [0.74, 1.76]	0.55		
No	196 (20.0%)	1			
Recreational drug use in past 3 months					
Yes	14 (30.4%)	1.82 [0.96, 3.48]	0.068	1.54 [0.78, 3.04]	0.22
No	220 (19.3%)	1		1	
Out to anyone ****					
Yes	109 (19.0%)	1			
No	126 (20.6%)	1.11 [0.83, 1.48]	0.47		
Time elapsed since last HIV test					
12 months	201 (36.7%)	1.91 [1.36, 2.69]	<0.001	2.16 [1.31, 3.55]	0.002
> 12 months	57 (23.3%)	1		1	
Self-reported HIV serostatus					
Positive	8 (17.8%)	1		1	
Negative	243 (33.2%)	2.30 [1.05, 5.01]	0.036	2.60 [0.97, 6.98]	0.059

Characteristic	Self-tested (%)	uOR [95 % CI]	P value	aOR [95% CI]	P value
History of HIV testing at CDC/clinic					
Yes	116 (44.8%)	1			
No (55.2%)	143	1.04 [0.77, 1.40]	0.87		

* Includes vocational and technical schools.

** Includes Chongqing, other Chinese provinces, Hong Kong, Macao, and overseas.

*** Includes men who are not married, engaged, widowed, and divorced.

**** Asked as, "Have you told anyone about your sexual orientation or that you have sex with other men?"