



Published in final edited form as:

Sex Transm Dis. 2025 May 01; 52(5): 310–316. doi:10.1097/OLQ.0000000000002123.

Never tested for HIV among men who have sex with men, Hanoi, Vietnam: correlates and missed opportunities

Hoang Thi Hai Van, PhD^{1,2}, Dang Thi Huong, MS², Nguyen Thi Thu Hong, MS³, Willi McFarland, PhD⁴, Vu Bich Diep, PhD³, Lung Bich Ngoc, MS², Le Minh Giang, PhD^{2,5}

¹Department of Global Health, School of Preventive Medicine and Public Health, Hanoi Medical University

²Center for Training and Research on Substance Abuse - HIV, Hanoi Medical University

³Division of Global HIV and Tuberculosis, Global Health Center, U.S. Centers for Disease Control and Prevention, Vietnam

⁴Department of Epidemiology and Biostatistics, University of California San Francisco, CA USA

⁵Department of Epidemiology, School of Preventive Medicine and Public Health, Hanoi Medical University

Abstract

Introduction: Understanding levels of HIV testing among populations at risk for acquisition is essential to meeting the goal of the United Nations that 95% of individuals living with HIV know their status. This study assessed HIV testing prevalence among men who had sex with men (MSM), characteristics of MSM who have never tested for HIV, and missed testing opportunities in Hanoi, Vietnam.

Methods: We measured the prevalence of never testing for HIV and missed opportunities for testing in the baseline data of a cohort study of MSM recruited in 2017–2019 in Hanoi. Logistic regression analysis characterized MSM who had never tested prior to cohort participation.

Results: Of 1,893 MSM enrolled in the cohort, 39.4% had never previously tested for HIV. MSM with children (aOR 1.75, 95% CI 1.09–2.82) and those who did not know or remember having a male partner living with HIV (aOR 1.41, 95% CI 1.07–1.84) were more likely to have never tested. Older age, university education, higher income, and having a male partner living with HIV were associated with a lower likelihood of never having been tested. The most common missed testing opportunities to test MSM who had never been tested were when receiving free condoms from health educators (35.3%), testing for other sexually transmitted infections (STIs) (23.3%), reporting their MSM status to healthcare workers (16.4%), and receiving an STI diagnosis (13.0%). The most common barriers identified by MSM who had never tested were fear

Correspondence to: Le Minh Giang (leminhgiang@hmu.edu.vn).

Authorship disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official positions of funding agencies.

Declaration of conflicting interests

The authors declare no potential conflicts of interest concerning the research, authorship, or publication of this manuscript.

of seeking health care due to their sexual orientation (82.7%) and having been refused healthcare due to their sexual orientation (76.2%).

Conclusions: Facilitating provider-initiated HIV testing in STI clinics and other healthcare services, community-based testing, and HIV self-test kits should enhance HIV testing options for young MSM, especially those with lower education and income.

Keywords

Human immunodeficiency virus; HIV testing; men who have sex with men; Vietnam

Background

Men who have sex with men (MSM) bear a disproportionate burden of HIV worldwide, representing an estimated 7.7% of the global epidemic.¹ In Vietnam, the government has prioritized HIV prevention among MSM as part of its efforts to end the HIV/AIDS epidemic by 2030.² Recent data show an alarming rise in HIV prevalence and incidence among MSM in various provinces.^{3,4,5} HIV prevalence among MSM rose from 1.7% in 2005 to 2.4% in 2013, then to 13.4% in 2020.⁶ Hanoi follows this tendency. According to a 2016 study, 6.7%⁷ of MSM participants had HIV infection, rising to 10.9% by 2020.⁸ The rapid increase in HIV transmission necessitates a comprehensive strategy to deliver effective HIV prevention and care services to MSM in Vietnam.

HIV testing is the gateway to treatment for individuals who test positive and effective prevention such as PrEP for those who test negative. MSM and other populations at risk of HIV acquisition should test often. For example, the US Centers for Disease Control and Prevention (CDC) recommends that MSM should be tested for HIV at least annually.⁹ Similarly, the Vietnamese government promotes high HIV testing coverage and high frequency by focusing on key populations including MSM, their sexual partners and social networks, and offering self-testing.^{10,11} Frequent testing is crucial for early diagnosis of HIV infection to maximize the benefit of antiretroviral therapy (ART) in reducing morbidity, mortality, and onward transmission. HIV testing also provides an opportunity to identify MSM who are currently uninfected who can benefit from effective prevention interventions, such as PrEP, to maintain their HIV-negative status.

Despite some observed improvements, there is a persistent gap in the level of HIV status awareness among MSM in Vietnam. A recent report from the Joint United Nations Program on HIV/AIDS (UNAIDS) indicated that 83.4% of MSM in Vietnam in 2022 reported having tested negative for HIV in the past 12 months or knew that they had been living with HIV,¹² which is an increase from 65% in 2019 in a previous UNAIDS report.¹³ The National Sentinel Surveillance System of Vietnam has also observed a downward trend in the proportion of MSM who have never tested for HIV, from 39.9% in 2015 to 22.1% in 2020.¹⁴ Persistently high rates of never testing among MSM creates a significant barrier to reaching the first of the three 95:95:95 targets set in Vietnam's national strategy to end the AIDS epidemic by 2030. That is, to obtain better than 95% HIV status awareness, we must identify which MSM groups are most likely to have never been tested. Thereby, programs can prioritize interventions and maximize early detection of HIV among MSM to reduce

morbidity, mortality and onward transmission while also seizing the opportunity to help MSM who are not living with HIV but at risk to initiate PrEP and other enhanced preventive services.

To provide data to help guide HIV-testing campaigns and raise care and prevention awareness, we analyzed baseline data from a large community-recruited cohort study of MSM in Hanoi, Vietnam. Our analysis has three goals. First, we wanted to know how many MSM had never been tested for HIV prior to enrollment and were therefore unaware of their status. Second, we sought to characterize groups of MSM most likely to have never been tested for HIV to better understand the causes of low testing prevalence and tailor programs to their needs. Finally, we identified interactions with healthcare that could have led to HIV testing to quantify missed opportunities for HIV testing among MSM.

Methods

Data source, participants, recruitment

The present study was a secondary analysis of baseline data collected to establish a cohort to measure the incidence of HIV and the dynamics of behavioral change among MSM in Hanoi, Vietnam. The details of the methods employed in the parent study have been previously described and are summarized here.¹⁵

To be eligible for the parent study, participants were required to have resided in Hanoi for the previous three consecutive months with no plan to move out in the next two years, to hold Vietnamese nationality, to be aged 16 years or older, to have been assigned male sex at birth, and have engaged in oral or anal sex with another man during the last 12 months.

Recruitment occurred throughout the calendar years 2017 to 2019. To recruit a diverse, community-based sample of MSM in Hanoi, a hybrid of three sampling methods was used: a venue-based approach, peer-referral approach, and internet-based approach.^{16–18} First, the venue-based approach utilized a time-location sampling (TLS)-like method to recruit MSM at physical venues where they congregated in Hanoi. During the formative phase, a team comprising MSM community members and research staff mapped the hotspots and venues frequented by MSM as well as their relative attendance. These attendance estimates were used to develop a sampling frame, which was used to select venues for recruitment events using probability proportionate to size (PPS). On randomly selected dates, these venues were visited by the study teams which included peer outreach workers and community guides. The team intercepted MSM, assessed their eligibility, and if interested, obtained written informed consent to enroll in the cohort study. Second, the peer-referral recruitment approach employed a respondent-driven sampling (RDS)-like method to reach MSM through long chains of peer referrals. Local community-based organization (CBO) staff initially introduced nine eligible MSM (“seeds”) to the study. Upon their consent, the local community-based organization (CBO) staff enrolled nine eligible MSM (“seeds”) in the study and provided them with three coupons to refer other eligible MSM to the study. Referred MSM with a valid coupon were screened for eligibility and interest. If eligible and providing consent, they were enrolled and given three coupons to recruit other MSM. The process continued until the sample size was met. Third, an internet-based sampling (IBS)

approach was used to reach MSM who might only meet other MSM online. Information about the study was posted on LGBT community websites (e.g., xomcauvong [“Rainbow Village”]), social media interest groups for MSM (e.g., Facebook and Zalo), and MSM dating websites (e.g., Jack’d, Blued, grown, and loveboyhanoi). Users interested in the study could click on a link to answer the screening questions and provide contact information. Research assistants contacted respondents who, if eligible and consenting, provided mobile numbers to arrange an enrollment visit. The incentive for enrollment, baseline HIV testing, and completion of the interview was approximately USD \$10; an additional incentive of approximately USD \$2.5 was given for up to three enrolled referrals.

Measures

Structured audio computer-assisted self-administered interviewing (ACASI) was used to collect sociodemographic characteristics, HIV testing history, sexual behavior, substance use, and homosexuality-related stigma. Homosexuality-related stigma was assessed using three scales developed from previous work in Vietnam.¹⁹ These scales measured experienced (enacted), perceived, and internalized stigma. The items within each scale were summed to calculate the overall score, with lower scores indicating higher stigma levels. MSM who had been tested for HIV at least once in their lifetime were further asked about the location, timing, and results of their most recent HIV test.

For the present analysis, we conceived of two contexts for identifying missed opportunities and barriers for HIV testing among MSM who reported never having been tested for HIV. First, we examined reported interactions with HIV prevention programs and healthcare providers that presented an opportunity to offer or refer to HIV testing. These included receiving a condom from a peer educator, testing for an STI, or disclosing to a healthcare provider that they were MSM. Second, we considered MSM-reported barriers and high-risk events that could prompt HIV test seeking. Examples of barriers included the fear of seeking treatment for symptoms of sexually transmitted infections (STIs) and reluctance to seek care due to perceived stigma or past experiences of stigma. High-risk events included ever having sex with someone they met online, having a male sexual partner living with HIV, or sharing a needle or syringe when injecting drugs.

Statistical analysis

The overall analysis focused on characterizing MSM who had never been tested for HIV. Sample characteristics are presented proportions or means. Bivariate comparisons were made between MSM who had ever tested for HIV and those who had never tested, using the chi-square test or t-test, considering demographic characteristics, HIV risk-related behaviors, and stigma scales. For multivariate logistic regression models, variables that were associated with never testing at $p < 0.2$ in bivariate analysis and factors that had been used in previous studies were examined. Recognizing “never testing” as the inverse of “ever testing,” we chose to present factors associated with never testing (i.e., odds ratios > 1.0 , denoted a higher likelihood of never testing, and odds ratios < 1.0 , denoting a greater likelihood of ever testing). Finally, we quantified missed opportunities and barriers to testing by conducting a sub-analysis of MSM who had never been tested, as described above. This analysis provided the frequency and percentage of MSM who encountered barriers and experienced high-risk

events among those who had never tested. Statistical analyses were performed using STATA 16.0.

Ethical considerations

The study was reviewed and approved by the institutional review boards of the US Centers for Disease Control and Prevention (CDC) and Hanoi Medical University (#200/HMU-IRB). Written informed consent was obtained from all participants. In Vietnam, people aged 15 years and above are legally able to provide consent for research participation without requiring parental consent. Participants who tested positive for HIV were linked to the care and treatment services.

Results

A total of 1,893 MSM were recruited, including 796 (42.0%) through TLS, 295 (15.6%) through RDS, and 802 (42.4%) through IBS (Table 1). Participants were young, with 15.4% aged 16–19 years and 47.5% aged 20–24 years. More than half (58.5%) resided in Hanoi for five or more years. Nearly one-fourth (22.5%) had high school education or lower. Most (92.0%) had never been married to a woman, and few (7.3%) had children. Nearly four-fifths (79.5%) earned less than the gross regional domestic product (GRDP) per capita of Hanoi.

The proportion of MSM who reported having never been tested for HIV in their lifetime was 39.4%. Among MSM who reported ever testing for HIV ($n=1,148$), 77.7% had been tested in the past 12 months, with 74.1% of tests conducted in healthcare settings, 19.0% performed with assistance from a peer educator, and 6.0% performed using a self-test kit at home. The self-reported results of the last HIV test indicated that 6.5% were positive, 88.5% were negative, 3.8% were unknown, and 1.2% were indeterminate. Few MSM (1.4%) reported ever injecting non-prescribed drugs; 5.4% reported ever having a partner who was living with HIV. Nearly one-fifth (19.8%) reported having sex with someone they had met online.

Table 2 presents demographic characteristics and risk behaviors of the 1,893 MSM participants by ever ($n=1,148$) versus never ($n=745$) testing for HIV in their lifetime. In bivariate analysis, MSM recruited by TLS had a higher proportion of individuals who had never tested (44.1%) compared to those recruited through RDS (36.3%) or IBS (35.8%) ($p=0.002$). Regarding demographic characteristics, the percentage of MSM who had never tested for HIV was higher among MSM who were younger (60.6% for those aged 16–19 years, $p<0.001$), had lived in Hanoi for less than 5 years (45.8%, $p<0.001$), had a high school education or lower (47.4%, $p<0.001$), had children (47.5%, $p=0.042$), and had lower income (42.5% for those earning under GRDP per capita, $p<0.001$). MSM who had ever had a male sex partner known to be living with HIV were less likely to have never tested (13.6%) compared to those who did not (39.4%) or did not know or provide an answer (42.7%, $p<0.001$). The internalized stigma score was lower among MSM who had never been tested for HIV compared to those who had been tested (19.3 vs. 19.9, $p=0.012$).

Table 3 presents the results of the multivariable logistic regression models characterizing the associations with never testing for HIV in the lifetime. The likelihood of never testing was higher (adjusted odds ratio [aOR] >1.0) among MSM who did not remember or know if they had ever had a male partner living with HIV (aOR 1.41, 95% CI 1.07–1.84). Factors associated with a lower likelihood of never testing (i.e., aOR <1.0 or equivalently greater likelihood of ever testing) were older age groups (e.g., aOR for 30 years and older versus 16 to 19 years 0.58, 95% CI 0.36–0.95), university education (versus high school education or lower; aOR 0.69, 95% CI 0.51–0.94), higher monthly income (aOR for each one million VND increase 0.97, 95% CI 0.95–0.99), having a male partner living with HIV (aOR 0.33, 95% CI 0.18–0.62), higher internalized stigma score (aOR for each one-point increase 0.98, 95% CI 0.95 – 1.00), and being recruited by the IBS method (aOR 0.71, 95% CI 0.55 – 0.91).

Missed opportunities for HIV testing among the 745 MSM who reported never being tested for HIV in their lifetime are shown in Figure 1. Regarding healthcare providers, the most common potential missed opportunities were when MSM who had never tested received a free condom from a health educator or peer educator (35.3%), tested for an STI (23.3%), or disclosed MSM status to healthcare workers (16.4%). Additionally, 13.0% of MSM who had never been tested for HIV reported ever having been diagnosed with an STI, 9.9% received a free condom from a health clinic or hospital staff, and 3.5% received a condom from an HIV testing center worker. With respect to experiences of MSM that constitute potential missed opportunities for seeking HIV testing, the most common factors were fear of seeking health care because of their homosexuality (82.7%) and having been refused health care because of their homosexuality (76.2%). Nearly one in five MSM who had never tested reported not seeking care for their STI symptoms at a public health facility (18.8%), having sex with someone they met online (18.3%), and not seeking STI care at a private clinic (7.8%). Few MSM who had never been tested reported ever having a partner living with HIV (2.1%) or ever sharing injecting equipment (0.4%).

Discussion

Our study, conducted among a diverse sample of MSM in Hanoi, found that nearly two in five (39.4%) had never tested for HIV. Notably, our estimate of never testing is higher than found among MSM in the National Sentinel Surveillance System of Vietnam, at 22.1% in 2020.¹⁴ There are several possible reasons for this difference, including the sampling methods, study locations, and year. Because our cohort study asks for more details on HIV testing, including barriers and experiences of stigma related to healthcare, our less optimistic estimate may unfortunately be more accurate. That is, the short rapid surveys of the National Sentinel Surveillance System may be more subject to social desirability response bias favoring reporting prior testing. Globally, our estimate of never testing for HIV among MSM falls at an intermediate level. For example, compared to countries in Latin America, which has also been witnessing a resurgence in HIV infection among young MSM,²⁰ our estimated proportion of never testing is lower than that in Brazil and Peru, where nearly half of MSM have never tested for HIV.²¹ However, our level of never testing among MSM is higher than that in developed countries such as the US (13%)²² and Japan (16.5%).²³

In Vietnam, the government can continue its efforts to address the proportion of MSM who have never been tested for HIV, hopefully continuing the downward trend in noted in the National Sentinel Surveillance System.¹⁴ This is crucial to ensure the success of the national strategy to end the HIV/AIDS epidemic by 2030 through its “Three Zero’s” campaign: zero new infections, zero deaths from HIV, and zero stigma on HIV.²⁴ A central part of the strategy to reach zero new infections is to achieve UNAIDS’ 95–95–95 goals. That is, to halt viral transmission, 95% of people living with HIV are diagnosed, of whom 95% are on antiretroviral treatment, and of whom 95% are virally suppressed. The first 95 target is threatened by the high level of never testing among MSM as seen in our data. Further, the second and third 95 targets will not have their full impact if the first is not reached, which in turn means that epidemic control is not achieved. Our estimate for never testing MSM in Hanoi is particularly dismaying in the face of policies, strategies, and action plans that have been implemented in Vietnam over the last several years after recognizing MSM as the population expected to account for the largest proportion of new HIV infections in the coming years.²⁵

We also identified demographic characteristics associated with an increased likelihood of never testing for HIV among MSM, including younger age, lower education level, lower income, recruitment via the IBS method, and a higher level of internalized stigma. These findings are consistent with those of previous studies from other countries in Europe, North America, and Asia.^{21,22,26–30,31s,32s} The high level of never testing among younger MSM (60.6% of those aged 16 to 19 years) merits particular attention. The finding may be partly explained by older men having a longer time to test within their lifetimes and by the shorter period of risk for young MSM. However, case surveillance data confirmed a pattern of rising new infections among youth in Vietnam. Among the 9,025 new HIV infections reported in the first ten months of 2022, the majority (81.6%) were transmitted through sex, and nearly half (48.6%) occurred among individuals aged 16 and 29 years.^{33s} These findings highlight the importance of providing comprehensive sexual and reproductive health information to teenagers that recognizes diverse sexual orientations and gender identities. Communication and education campaigns, whether conducted in schools or through social media, can enhance teenagers’ understanding of gender, risk behaviors, and self-health care. Additionally, these campaigns could play an important role in combating homosexuality-related stigma among MSM. Consequently, MSM may reduce high-risk sexual behaviors and actively seek HIV prevention and care services. In Vietnam, communication campaigns tailored to meet the needs of MSM and other LGBT communities have been implemented in collaboration with non-governmental organizations and have achieved significant success.^{34s} However, expanding these campaigns to reach multisite or national levels would have a greater impact.

Our study identified multiple missed opportunities for HIV testing that could originate from healthcare and prevention service providers, as well as experiences of MSM that identified barriers to testing and events that could prompt test seeking. Several types of missed opportunities were particularly poignant in the context of sexual health, such as when distributing condoms, screening for STIs, and treatment of STIs. Further, a substantial proportion of MSM who had never been tested for HIV disclosed to their provider that they were MSM. These missed opportunities might be most easily addressed through policies to

routinely conduct provider-initiated HIV testing in diverse settings. Routine or universal HIV testing may also reduce stigma as a barrier to testing for MSM, as it does not require disclosure of MSM status. It was particularly disappointing that the vast majority of MSM who had never tested reported experiencing stigma and even refusal of health services because of their homosexuality. In recognition of the impact of stigma on HIV prevention, the government of Vietnam has taken proactive measures to address enacted stigma towards MSM by healthcare providers. Sensitization training programs have been implemented to familiarize healthcare staff with the concepts of sexual orientation, gender identity, and gender expression (SOGIE), and how to incorporate these principles into care services for key populations (KP), including MSM. In addition, national guidelines for the implementation of KP-friendly services have been issued to ensure comprehensive and inclusive healthcare for all individuals.

The stigma-related barrier to testing was further underscored by MSM who reported having symptoms of STI but did not seek treatment. Thus, health education to reduce stigma needs to reach healthcare providers in addition to encouraging MSM experiencing STI symptoms to seek care. HIV self-testing may provide another avenue to reach MSM who have never been tested when stigma from providers is a substantial barrier. Our finding that only 6% of previously tested MSM had used an at-home self-test indicates an untapped potential to distribute self-tests at venues, through peers, or through online-initiated delivery. Opportunities to increase HIV testing that we found have been common to other studies^{35–38s} and have led to the proposal of closer integration of STI and HIV testing, encouraging self-testing, improving education on HIV testing, and expanding community-based HIV testing. The last strategy was introduced in Vietnam in 2018 to increase the reach of HIV testing for key populations.³⁹

We recognize our study has limitations. First, our study sample may not be representative of MSM in Vietnam or Hanoi. Nonetheless, the strength of our sample is that it was not dependent on the recruitment of MSM seen at facilities, such as STI clinics. Moreover, the diverse sampling methods (i.e., through peer referral and at physical and online venues) meant that we were not dependent on the biases of one type of recruitment. For example, MSM who do not attend physical venues to find partners can be reached through online recruitment, whereas peer referral may reach MSM who are not connected to either online or physical venues. Second, the required commitment of enrolling in a longitudinal cohort may result in participation bias. Third, there may be social desirability response biases, such as previously testing or denying engaging in stigmatizing risk behaviors. To mitigate bias, we used ACASI, which can improve the accuracy of self-responses to sensitive questions.^{40s} Lastly, we recognize the age of our data, collected from 2017 to 2019. Conditions related to HIV testing may have changed over time, including those due to external factors, such as COVID-19. More recent data on HIV testing rates would indeed be valuable to better reflect the current situation. Nonetheless, our data collected greater detailed information about the barriers to HIV testing than is possible in the National Sentinel Surveillance System and are the most recent available of its kind. We also point to the need for a baseline trajectory, including one preceding COVID-19, against which to assess future progress.

Despite these limitations, our data draw attention to the large gap in HIV testing for Vietnam's priority MSM population. Simultaneously, we identified practical opportunities to close this testing gap. These include maximizing provider-initiated testing within all interactions with MSM and providing education to reduce stigma. HIV testing may also be expanded at venues where MSM can be reached, particularly if peer-delivered and performed with community consultation.^{39s,41s,42s,43s} Finally, it is important to maximize HIV testing opportunities for young MSM for whom HIV testing coverage is low and the potential for future HIV transmission and acquisition is high in Vietnam.

Attribution of support

This research was supported by the President's Emergency Plan for AIDS Relief (PEPFAR) through the Centers for Disease Control and Prevention (CDC) under HMU Grant number: GH002150. We also wish to acknowledge support for writing from the University of California, San Francisco's International Traineeships in AIDS Prevention Studies (ITAPS), U.S. NIMH, R25MH123256.

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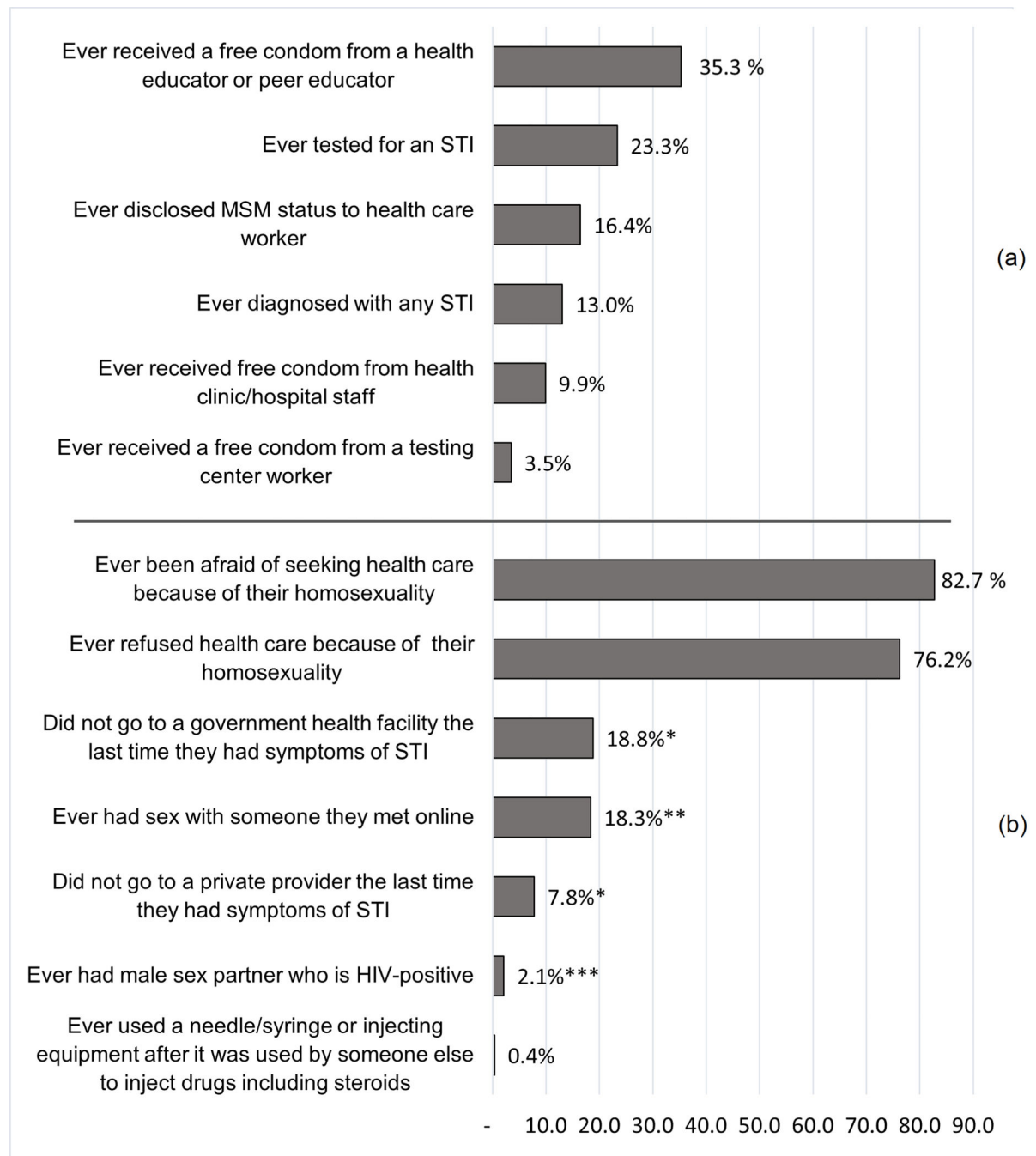


Figure 1. Missed opportunities and barriers for HIV testing among men who have sex with men who have never tested: (a) originating from healthcare providers, (b) and reported participant experiences, Hanoi, Vietnam, 2017–2019 (n=745)

Table 1.

Demographic characteristics, HIV testing history, and risk-related variables, men who have sex with men, Hanoi, Vietnam, 2017-2019 (N=1,893)

Variables	N	%
Sampling/recruitment method		
Time location sampling (TLS)	796	42.0
Respondent-driven sampling (RDS)	295	15.6
Internet-based sampling (IBS)	802	42.4
Age group (years)		
16–19	292	15.4
20–24	900	47.5
25–29	440	23.2
30+	261	13.8
Born in Hanoi		
Yes	781	41.3
No	1,110	58.7
Time living in Hanoi (years)		
<5	786	41.5
5 - <10	324	17.1
≥10	783	41.4
Education level		
High school or lower	426	22.5
Vocational training	698	36.9
Finished college or vocational training	176	9.3
Finished university	593	31.3
Married to a woman		
Yes	152	8.0
No	1,741	92.0
Has children		
Yes	139	7.3
No	1,754	92.7
Mainly lived alone in the last month		
Yes	461	24.4
No	1,432	75.6
Currently unemployed		
Yes	126	6.7
No	1,767	93.3

Variables	N	%
Income level in last month		
< gross regional domestic product (GRDP) per capita of Hanoi	1,505	79.5
≥ GRDP per capita of Hanoi	388	20.5
Sexual attraction		
Attracted to men	969	51.2
Attracted to women	22	1.2
Attracted to both men and women	902	47.6
Lifetime history of HIV testing		
Ever	1,148	60.6
Never	745	39.4
Tested for HIV in the past 12 months (n=1,148)		
Yes	891	77.7
No	256	22.3
Do not remember/know	1	0.1
Place where last tested for HIV (n=1,148)		
Healthcare settings	851	74.1
A peer-educator (lay test)	218	19.0
At home (self-test)	69	6.0
Others	10	0.9
Testing results in the last test (n=1,148)		
Positive	75	6.5
Negative	1,016	88.5
Indeterminate	14	1.2
Don't know	43	3.8
Ever injected drugs (non-prescribed)		
Yes	26	1.4
No	1,867	98.6
Ever had a male sex partner who is living with HIV-positive		
Yes	103	5.4
No	1,010	53.4
Do not remember/know/refused	780	41.2
Ever had group sex with non-regular partners that included women *		
Never	1,695	90.4
Ever	126	6.7
Don't know/refused	55	2.9
Ever had sex with someone they met online *		
Never	1,469	78.1

Variables	N	%
Ever	373	19.8
Don't know/refused	38	2.0
Homosexual stigma scales, mean score $\pm$ SD		
Experienced stigma	26.1	$\pm$ 5.2
Perceived stigma	26.2	$\pm$ 6.6
Internalized stigma	19.6	$\pm$ 5.2

* Categories do not sum to the total due to missing data (<2%)

Table 2.

Bivariate analysis: factors associated with never having tested for HIV, men who have sex with men, Hanoi, Vietnam, 2017-2019

Characteristics	Ever tested n=1,148 (%)	Never tested n=745 (%)	p-value
Sampling/recruitment method			
TLS	445 (55.9)	351 (44.1)	0.002
RDS	188 (63.7)	107 (36.3)	
IBS	515 (64.2)	287 (35.8)	
Age group (years)			
16-19	115 (39.4)	177 (60.6)	<0.001
20-24	539 (59.9)	361 (40.1)	
25-29	334 (75.9)	106 (24.1)	
30+	160 (61.3)	101 (38.7)	
Born in Hanoi *			
Yes	479 (61.3)	302 (38.7)	0.586
No	667 (60.1)	443 (39.9)	
Time living in Hanoi (years)			
<5	426 (54.2)	360 (45.8)	<0.001
5 - <10	229 (70.7)	95 (29.3)	
≥10	493 (63.0)	290 (37.0)	
Education level			
High school or lower	224 (52.6)	202 (47.4)	<0.001
In vocational training	371 (53.2)	327 (46.8)	
Finished college/vocational training	125 (71.0)	51 (29.0)	
Finished university	428 (72.2)	165 (27.8)	
Married to a woman			
Yes	83 (54.6)	69 (45.4)	0.112
No	1,065 (61.2)	676 (38.8)	
Has children			
Yes	73 (52.5)	66 (47.5)	0.042
No	1,075 (61.3)	679 (38.7)	
Mainly lived alone in the last month			
Yes	277 (60.1)	184 (39.9)	0.778
No	871 (60.8)	561 (39.2)	
Currently unemployed			
Yes	83 (65.9)	43 (34.1)	0.214
No	1,065 (60.3)	702 (39.7)	

Characteristics	Ever tested n=1,148 (%)	Never tested n=745 (%)	p-value
Income level in the last month			
< GRDP per capita of Hanoi	866 (57.5)	639 (42.5)	<0.001
≥ GRDP per capita of Hanoi	282 (72.7)	106 (27.3)	
Sexual attraction			
Attracted to men	610 (63.0)	359 (37.0)	0.079
Attracted to women	11 (50.0)	11 (50.0)	
Attracted to both	527 (58.4)	375 (41.6)	
Ever injected drugs (non-prescribed)			
Yes	14 (53.8)	12 (46.2)	0.475
No	1,134 (60.7)	733 (39.3)	
Ever had a male sex partner who is HIV-positive			
Yes	89 (86.4)	14 (13.6)	<0.001
No	612 (60.6)	398 (39.4)	
Do not remember/know/refused	447 (57.3)	333 (42.7)	
Ever had group sex with non-regular partners that included women *			
Never	911 (62.4)	550 (37.6)	0.340
Ever	64 (55.7)	51 (44.3)	
Refusal/do not know	29 (52.7)	26 (47.3)	
Ever had sex with someone they met online *			
Never	760 (61.1)	484 (38.9)	0.176
Ever	213 (62.6)	127 (37.4)	
Refusal/Do not know	19 (50.0)	19 (50.0)	
Homosexual stigma scales, mean ±SD			
Experienced stigma	26.3 ± 5.3	25.9 ± 5.1	0.070
Perceived stigma	26.2 ± 6.8	26.3 ± 6.5	0.776
Internalized stigma	19.9 ± 5.2	19.3 ± 5.1	0.012

* Categories do not sum to the total due to missing data (<2%)

Table 3.

Multivariable logistic regression analysis: factors associated with never having tested for HIV, men who have sex with men, Hanoi, Vietnam, 2017–2019 (N=1,893)

Variable	Adjusted OR [*]	95% CI
Age group (ref: 16-19 years)		
20-24 years	0.55	0.41 – 0.75
25-29 years	0.34	0.23 – 0.51
30+ years	0.58	0.36 – 0.95
Time living in Hanoi (ref: <5 years)		
5 - <10 years	0.73	0.53 – 1.00
≥10 years	0.80	0.63 – 1.01
Education level (ref: High school or lower)		
In vocational training	0.87	0.66 – 1.15
Finished college/vocational training	0.73	0.48 – 1.10
Finished university	0.69	0.51 – 0.94
Married to a woman (Ref: not married to a woman)		
	0.77	0.29 – 2.00
Has children (ref: Has no children)		
	1.29	0.48 – 3.46
Income level in last month (per 1 million VND)		
	0.97	0.95 – 0.99
Sexual attraction (ref: attracted to men)		
Attracted to women	1.20	0.46 – 3.17
Attracted to both men and women	1.04	0.84 – 1.29
Sampling/recruitment method (ref: TLS)		
RDS	0.79	0.57 – 1.09
IBS	0.71	0.55 – 0.91
Ever had male sex partner who was HIV-positive (ref: No)		
Yes	0.33	0.18 – 0.62
Do not remember/know	1.47	1.17 – 1.85
Ever had group sex with non-regular partners that included women[*] (ref: No)		
Yes	0.93	0.61 – 1.43
Refusal/Do not know	0.87	0.43 – 1.75
Ever had sex with someone they met online[*] (ref: No)		
Yes	0.77	0.59 – 1.01
Refusal/Do not know	1.25	0.56 – 2.77
Experienced homosexual stigma score (per scale point)		
	1.00	0.99 – 1.03
Internalized homosexual stigma score (per scale point)		
	0.98	0.95 – 1.00

* Adjusted for other variables in the table.

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