HHS Public Access

Author manuscript

AIDS Behav. Author manuscript; available in PMC 2019 July 01.

Published in final edited form as:

AIDS Behav. 2018 July ; 22(Suppl 1): 26–34. doi:10.1007/s10461-017-2018-9.

The relationship between risk perception and frequency of HIV testing among men who have sex with men and transgender women, Lima, Peru

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Abstract

HIV infections in Peru are concentrated among men who have sex with men (MSM) and transgender women (TW). HIV testing rates among them remain low, delaying entrance into care. We assessed the prevalence of frequent HIV testing (at least every 6 months) and associated factors among 310 MSM and TW who attend sexual health clinics in Lima, Peru, and who reported that they were HIV seronegative or unaware of their status. Only 39% of participants tested frequently, and 22% had never tested; 29% reported that they were at low or no risk for acquiring HIV. Reporting low or no risk for acquiring HIV was associated with frequent testing (adjusted prevalence ratio [aPR]=1.53, 95% CI, 1.13–2.08); those reporting unprotected anal sex were less likely to test frequently (aPR=0.66, 95% CI, 0.50–0.87). HIV prevalence was 12% and did not vary by risk perception categories. This at-risk population tests infrequently and may not understand the risk of having unprotected sex.

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Disclosure of potential conflict of interests: Vargas S K declares that he has no conflict of interest; Konda K A declares that she has no conflict of interest; Leon S R declares that he has no conflict of interest; Brown B declares that he has no conflict of interest; Klausner J D declares that he has no conflict of interest; Lindan C declares that she has no conflict of interest; Caceres C F declares that he has no conflict of interest

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Resumen

Las infecciones por el VIH en el Perú se concentran entre hombres-que-tienen-sexo-con-hombres (HSH) y mujeres transgénero (MT). El tamizaje de VIH entre ellos se mantiene bajo, retrasando la atención y el cuidado. Se evaluó la prevalencia de “tamizaje frecuente” para VIH (hacerse la prueba al menos cada 6 meses) y factores asociados en 310 HSH/MT que se atendieron en clínicas de salud sexual en Lima, Perú, y reportaron ser VIH-negativo o desconocer su status. Sólo 39% de los participantes reportaron tamizaje frecuente y 22% nunca se realizó una prueba de VIH. 29% reportó sentirse en bajo riesgo o no sentirse en riesgo de adquirir VIH. Reportar bajo o ningún riesgo de contraer VIH estuvo asociado al tamizaje frecuente (razón de prevalencia ajustada [RPa]: 1,53; IC del 95%: 1.13 a 2.8); Reportar sexo anal sin protección disminuye el tamizaje frecuente (RPa: 0,66; IC del 95%: 0,50–0,87). La prevalencia total de VIH fue 12% y no varió según las categorías de percepción de riesgo. Esta población en riesgo no se realiza tamizaje frecuentemente y quizá no comprenden el riesgo de tener sexo sin protección.

Keywords

HIV; MSM; HIV testing; risk perception; Peru

Introduction

By the first quarter of 2017, the number of HIV and AIDS cases in Peru reached 68,201 and 35,847, respectively, according to official reports of the National Center for Epidemiology, Prevention and Control of Diseases,[1] with more than 50% of cases occurring among men who have sex with men (MSM) and transgender women (TW).[2] Approximately 20% of MSM [3,4] and 30% of TW are HIV infected, with little change in prevalence over the past decade.[5] The incidence of new infection remains about 3 per 100/person-years despite the introduction of antiretroviral therapy (ART).[6,7]

The Peruvian national HIV prevention plan focuses on promotion of HIV testing under the assumption that persons identified as seropositive will be rapidly referred for care and treatment, which are free and government sponsored.[8] However, studies from Peru and the Andean region have shown a low uptake of HIV testing among MSM [9–11]; consequently, many are unaware of their HIV status.[6,12,13] Factors such as poor knowledge of HIV and feelings of being stigmatized and discriminated against have been associated with delayed or infrequent testing.[11,14]

The relationship of risk perception to HIV testing among MSM and TW has been evaluated in multiple settings, and the results have been mixed. Studies from the United States and China have shown that MSM who perceived themselves at higher risk of HIV were less likely to test,[15,16] whereas a study among MSM in Seattle found that those with higher perceived risk were more likely to test.[17] To better understand factors associated with HIV testing in Peru, particularly the perception of risk for HIV acquisition, we evaluated MSM and TW who were attending sexually transmitted infection (STI) clinics in Lima, the capital city.

Methods

Study population

We analyzed data collected from the baseline assessment of participants enrolled in PICASSO, a longitudinal cohort study designed to evaluate the prevalence and acquisition of syphilis among MSM and TW in Lima; study methods have been described in detail elsewhere.[18] In brief, from June 2013 through May 2014, MSM and TW attending two STI clinics in the city were invited to participate. Participants had to be aged ≥18 years and at high risk for syphilis acquisition, defined as having at least 3 of the following risk factors: (1) 5 years of sexual activity, (2) more than 5 sex partners during the preceding 3 months, (3) more than 5 episodes of condomless anal intercourse during the preceding 6 months, (4) a self-reported genital ulcer at recruitment, (5) self-report of a syphilis diagnosis in the preceding 2 years, (6) self-report of an STI diagnosis in the preceding 6 months, and (7) self-report of being HIV seropositive. Subjects willing to participate signed informed-consent forms and received 15 *soles* ($5) as reimbursement for the cost of transportation.

The PICASSO study recruited a total of 401 MSM and TW. Of these, 310 (77.3%) were included in the current analyses because they reported being HIV seronegative (N=243) or were unaware of their HIV status (N=67*)*. Participants in the PICASSO study who reported that they were HIV seropositive (N=91) were excluded from the current analysis. The ethical review board at Universidad Peruana Cayetano Heredia, Lima, approved the protocol.

Data collection

Participants completed a computer-assisted personal interviewing (CAPI) survey lasting 30 minutes that assessed sociodemographic characteristics, gender or identity, sexual orientation, sexual risk behavior in the preceding 3 months, self-reported current HIV status, and history of syphilis. We also grouped participants who indicated that their sexual identity was “heterosexual” (N=8) with those who were “bisexual” because the number of heterosexuals was small. Participants were asked how often they had undergone HIV testing and their perceived risk of acquiring HIV. Participants who indicated that they had tested at least every 6 months were considered “frequent HIV testers,” regardless of how many times they had tested. Participants reported their perceived risk of acquiring HIV as high, moderate, low, or no risk; we grouped participants who indicated that they had “no risk for HIV” (N=15) with those who reported “low risk” (N=75).

Venous blood samples were obtained for HIV and syphilis testing. At clinic sites, samples were tested for HIV with a third-generation rapid test (Determine HIV 1/2 Alere Determine™, Israel). Syphilis infection was evaluated by using a third-generation treponemal-specific antibody rapid test (Determine syphilis Alere Determine™, Israel) in parallel with a rapid plasma reagin (RPR) test (BD Macro-Vue™ RPR Card Test Kit, Beckton Dickinson, United States). Clients were told that results from rapid testing were preliminary and would be confirmed by further testing of samples at the reference laboratory. Participants also self-collected anal swab samples for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (GC) testing.

All samples were sent to the Laboratory of Sexual Health, located at Universidad Peruana Cayetano Heredia, Lima, for confirmatory testing. Serum samples were rescreened for HIV using a fourth-generation enzyme immunoassay (EIA) test (Genscreen™ ULTRA HIV Ag-Ab, Bio-Rad, France); samples that were positive in an EIA or rapid test were confirmed using a western blot test (NEW LAV BLOT I, Bio-Rad, France). All samples were evaluated for the presence of syphilis by testing with the Treponema pallidum particle agglutination (TPPA) assay (Fujirebio Diagnostics, Tokyo, Japan). A participant was considered to have a recent syphilis infection if the RPR titer was ≥1:16 and the TPPA test was positive. We used a transcription mediated amplification (TMA) assay (Aptima Combo2 Assay, Gen-probe, United States) on anal swab samples to diagnose CT and GC. The confirmatory results of syphilis, HIV, CT, and GC testing were delivered to participants 2 weeks after sample collection. STIs were treated according to national guidelines [19]; those who were identified as being HIV seropositive were referred for further evaluation and care.

Data analysis

We evaluated the distribution of sociodemographic characteristics, sexual risk behavior in the preceding 3 months, and STIs and HIV infection, as well as the proportion of participants in each category who tested “frequently.” Differences in proportions among the categories were evaluated using the chi-square test. We evaluated the univariate and multivariable association of covariates with frequent HIV testing using prevalence ratios (PRs), as the frequency of the outcome was greater than 10% [20] and all data were cross-sectional. In multivariable models, we included age, monthly income, and presence of a stable sex partner *a priori*, as well as variables associated with frequent testing and a *P* value of <0.2 in univariate analysis. We used generalized linear models with a log link and Poisson robust error variance to calculate PRs.[20,21] Our modeling strategy was to group variables into sexual behavior (first subgroup) and sociodemographics (second subgroup). The effect of each significant variable within the sexual behavior subgroup was entered, then the significant variables of the sociodemographics subgroup. Finally, *a priori* variables were added. The multivariable model was evaluated after the addition of each variable. The selection criteria for inclusion of variables in the final model were based on choosing the regression model with lower values of the Akaike information criterion and the Bayesian information criterion that included *a priori* variables of importance. We also evaluated the association between sociodemographic and other variables and levels of risk perception using chi-square and Fisher exact tests, as appropriate. The association between self-reported history of syphilis and laboratory-confirmed syphilis infection was determined using chi-square tests.

Results

Approximately two thirds (68.1%) of recruited participants were aged 35 years or younger (Table 1). More than half (53.8%) self-identified as gay or homosexual, 24.2% as bisexual, and 22.0% as TW. Nearly two thirds (63.4%) earned more than the Peruvian monthly minimum wage of about 250 USD; 51.0% reported having had at least some postsecondary education. Eighty percent reported having more than 1 sex partner during the preceding three months, and almost the same proportion reported unprotected anal intercourse. About

one third (31.9%) reported having had syphilis in the past; 28.4% had a laboratory-confirmed diagnosis of an STI, including anal chlamydia (14%), anal gonorrhea (9%), and recent syphilis infection (12%). Twenty-three percent of the entire sample considered themselves at high risk for HIV, 47.7% at moderate risk, and 29.0% at low or no risk. A total of 37 participants (12%) were found to be HIV infected. In subanalyses for which data are not shown, 11% (26 of 243) of those who reported themselves as HIV negative at enrollment were found to be HIV seropositive, and 16% (11 of 67) of those who did not know their HIV status were identified as being infected (*P* value <0.1). The proportion of MSM and TW who reported testing frequently was 39.3%. Participants reporting low or no HIV risk had a higher prevalence of frequent testing (55.6%) when compared with those who perceived themselves at moderate (29.7%) or high (38.9%) HIV risk. Variables related to testing frequently included being a TW, reporting 2 or more recent sex partners, being engaged primarily in receptive anal intercourse, having engaged in sex work, or reporting a previous syphilis infection.

Factors independently associated with frequent HIV testing included having postsecondary education (aPR=1.38, 95% CI, 1.03–1.84); believing oneself to have little or no risk for HIV (aPR=1.53, 95% CI, 1.13–2.08), compared with feeling at moderate risk; reporting a history of syphilis (aPR=1.59, 95% CI, 1.23–2.06); and having 2 to 4 recent sex partners (aPR=1.73, 95% CI, 1.09–2.72) (Table 2). Having condomless anal intercourse was associated with being less likely to test frequently (aPR=0.66, 95% CI, 0.50–0.87).

We analyzed the association of sociodemographic characteristics and sexual behavior with HIV risk perception (Table 3). Among those with less education, 27.0% reported being at high risk for HIV, compared with 19.6% of those who had postsecondary education. Among those reporting more than 4 recent sex partners, 30.7% felt at high risk for HIV, compared with 18.3% of those who had 2 to 4 sex partners and 17.7% of those with 1 or no recent sex partners. The proportion of MSM and TW who perceived themselves at high risk for HIV was higher among those who engaged in sex work compared with those who did not (32.3% vs 11.2%). There was no association between recently identified HIV infection and risk perception. A subanalysis among those who reported having had a syphilis infection showed that 65% had a positive TPPA test (data not shown).

Discussion

Even though MSM and TW are the key populations in the HIV epidemic in Peru, we found that only 39% of our sample reported testing for HIV every 6 months, as recommended by both international and national guidelines [19,22]; 20% of our sample had never had an HIV test. Several other studies had evaluated HIV testing behavior among MSM in Peru, and even though these studies were conducted 6 to 7 years before ours, the proportion of participants who had never had an HIV test was similar. In 2007, 15% of MSM who were enrolled from a STI clinic in Lima and 19% who were recruited from neighborhoods surrounding the city reported that they had never undergone HIV testing.[23] In 2008, only 6% of MSM who were recruited from low-income neighborhoods of Lima reported testing every 6 months, and 20% of the sample had never tested.[10] Among MSM responding to an internet-based survey in 2008, one half indicated that they had never tested.[24] Men who

are sampled via an internet survey, however, may be less likely to test than those recruited from STI or other clinics, because HIV testing in Peru is provided almost exclusively at health care facilities. Overall, services and prevention messages targeting key populations in Peru remain limited in scope, which could help explain why rates of HIV testing do not appear to have changed much over time.

These results are concerning because a large proportion of our participants reported engaging in high-risk sexual behavior. In the past 3 months, about three quarters of our sample had more than 1 sex partner, and slightly more reported having unprotected anal intercourse. Some studies have shown that MSM who report more high-risk behavior are themselves more likely to test.[25,26] However, we found an inconsistent relationship between reported high-risk behavior and testing, which could be due to several factors, including an inaccurate perception of risk. For example, a high proportion of MSM and TW who had unprotected anal sex (primarily receptive sex) or a history of syphilis did not believe they were at high risk for HIV acquisition. It is possible that a lack of understanding of risk was due to low levels of knowledge, which could be the result of limited messaging about HIV prevention. In addition, factors that we did not measure may have contributed to how participants assessed their risk, such as knowledge of a partner's HIV status.[13,27]

Overall, perceived risk has not been found to be a consistent predictor of testing behavior among MSM.[15–17, 28, 29]. In our study, there was an inverse relationship between perceived risk and frequent testing. It is likely that contextual factors also play a role in determining who seeks testing. For example, in our sample, MSM and TW with a history of syphilis may have been more likely to test for HIV because such testing is provided primarily at health facilities. In addition, MSM in Peru who already feel stigmatized for being gay may wish to avoid the additional discrimination that comes with being identified as HIV infected. This is consistent with a study of MSM and TW in New York City, in which those who said they would be stigmatized if identified as HIV infected were less likely to test.[29,30] In Peru, even though ART is widely available, it has been shown that HIV stigma may affect the adherence to treatment, affecting benefits of suppressed viral load.[31]

Our study had several limitations. First, our primary outcome measure—frequency of HIV testing—was based on its definition in the Peruvian HIV guidelines.[8] This definition is imprecise, however. We did not specify a time frame or the number of times someone needed to have tested to be considered a frequent tester. Second, we used only a single-item measure of HIV risk perception; more complex measures have been used to evaluate a broader range of dimensions of perceived risk.[32] Third, we did not ask questions about stigma or discrimination, which might have otherwise revealed whether fear of an HIV-positive test result and the potential stigma associated with it were related to avoidance of testing. Fourth, study participants were recruited at 2 STI clinics and screened for being at risk for syphilis infection, and therefore may not have been representative of MSM and TW who were not accessing care. Finally, our questionnaire was administered using CAPI to reduce social desirability bias, so we could not explore a more nuanced understanding of sexual and testing behavior or perceived risk.

Conclusions

Results from our study indicate that high-risk MSM and TW in Peru undergo HIV testing infrequently. Being unaware of their HIV status prevents those who are HIV infected from accessing treatment, for their own benefit as well as to reduce transmission to others.[33] Because testing in Peru is primarily facility-based, expansion to other venues and implementation of self-testing programs could increase coverage among this high-risk group.[34,35] Use of social media and more up-to-date information and communication methods could also encourage testing and treatment [36–40] as well as improve understanding of the importance of achieving an undetectable viral load.[41] Reducing stigma is complex and difficult, but engagement of HIV-infected MSM and TW in educational campaigns at the community level, and improving the sensitivity of health care providers, are still needed in Peru.[42–46] Overall, efforts to reach and to provide information and care to MSM and TW in Peru remain underresourced despite it being decades since the beginning of the HIV epidemic in this region. Even though the Peruvian Health Authorities proposed greater inclusion of gender and sexual minorities within the health services, interventions to ensure that this happens have not been implemented widely.[47]

Acknowledgments

This research was supported by US National Institute of Allergy and Infectious Diseases (R01AI099727-01). The authors express appreciation for the assistance of the Picasso project staff at the Universidad Peruana Cayetano Heredia, and the staff of the Epicentro Clinic and Barton MoH Center. We also wish to acknowledge all the participants of the Picasso Cohort. This article was partially prepared as part of the activities of the Masters in Epidemiologic Research offered jointly by the Universidad Peruana Cayetano Heredia (UPCH) and NAMRU-6, Peru. This program is part of the grant 2D43 TW007393 “Peru Infectious Diseases Epidemiology Research Training Consortium”, sponsored by the Fogarty International Center of the US National Institutes of Health (NIH/FIC). We wish to acknowledge the support from the University of California, San Francisco’s International Traineeships in AIDS Prevention Studies (US National Institute of Mental Health, R25 MH064712) and from the Starr Foundation Scholarship Fund. The authors are thankful for the support and guidance received from the faculty and fellow students of the program.

Funding: This study was funded by NIH/NIAID R-01 study #1R01AI099727-01.

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Table 1.

Characteristics of MSM and TW attending STI clinics and the proportion who reported testing frequently[a] for HIV, Lima, Peru, 2014.

Variable	All N(%)	Tested frequently n(%)	Test statistic	*P* value
All	310(100)	122(39.3)		
Sexual orientation/gender identity[b]			X^2=14.1, *df*=2	.001
Gay/homosexual	164(53.8)	66(40.2)		
Bisexual/heterosexual	74(24.2)	18(24.3)		
Transgender woman	67(22.0)	37(55.2)		
Age (years)			X^2=1.1, *df*=2	.565
18–25	102(32.9)	36(35.3)		
26–35	109(35.2)	44(40.4)		
≥36	99(31.9)	42(42.4)		
Monthly income (USD)[b]			X^2=6.9, *df*=2	.031
≤250	109(36.6)	54(49.5)		
251–500	147(49.3)	49(33.3)		
≥501	42(14.1)	18(42.9)		
Education			X^2=2.5, *df*=1	.113
≤ High school	152(49.0)	53(34.9)		
> High school	158(51.0)	69(43.7)		
Perceived risk for HIV			X^2=15.8, *df*=3	<.001
High	72(23.3)	28(38.9)		
Moderate	148(47.7)	44(29.7)		
Low/none	90(29.0)	50(55.6)		
Number of sex partners, last 3 months			X^2=7.2, *df*=2	.028
0–1	62(20.0)	16(25.8)		
2–4	82(26.5)	39(47.6)		
≥5	166(53.5)	67(40.4)		
Condomless anal intercourse, last 3 months[b]			X^2=13.1, *df*=1	<.001
Yes	239(79.7)	84(35.1)		
No	61(20.3)	37(60.7)		
Sex role during intercourse, last 3 months			X^2=6.8, *df*=2	.034
Insertive	77(24.8)	22(28.6)		
Receptive	98(31.6)	47(48.0)		
Insertive and receptive	135(43.6)	53(39.3)		
Had male/TW stable sex partner, last 3 months			X^2=2.6, *df*=1	.152

Variable	All N(%)	Tested frequently n(%)	Test statistic	*P* value
Yes	147(47.4)	64(43.5)		
No	163(52.6)	58(35.6)		
Had male/TW casual sex partner, last 3 months			X^2=0.1, *df*=1	.740
Yes	159(51.3)	64(40.3)		
No	151(48.7)	58(38.4)		
Performed sex work, last 3 months			X^2=3.7, *df*=1	.055
Yes	62(20.0)	31(50.0)		
No	248(80.0)	91(36.7)		
Self-reported history of syphilis, ever			X^2=14.1, *df*=1	<.001
Yes	99(31.9)	54(54.5)		
No	211(68.1)	68(32.2)		
Laboratory diagnosis of STI[c]			X^2=0.5, *df*=1	.497
Yes	88(28.4)	32(36.4)		
No	222(71.6)	90(40.5)		
Laboratory diagnosis of HIV			X^2= 0.3, *df*=1	.432
Positive	37(11.9)	13(35.1)		
Negative	273(88.1)	109(39.9)		

[a] Testing frequently was defined as having tested at least every 6 months.

[b] Small discrepancies in subtotals and totals are due to rounding and/or missing values.

[c] Syphilis, rectal chlamydia, and/or rectal gonorrhea.

Table 2.

Factors associated with frequent HIV testing[a] among MSM and TW, Lima, Peru, 2014.

Variables	PR[b]	95% CI	*z* score	*P* value	aPR[b]	95% CI	*z* score	*P* value
Sexual orientation/gender identity								
Gay/homosexual	Ref.	-	-		Ref.	-	-	
Bisexual/heterosexual	0.60	0.39–0.94	–2.22	.026	0.77	0.48–1.24	–1.06	.291
Transgender woman	1.37	1.03–1.83	2.17	.030	1.28	0.91–1.79	1.43	.152
Age (years)								
18–25	Ref.	-	-		Ref.	-	-	
26–35	1.14	0.81–1.62	0.76	.450	1.04	0.73–1.46	0.20	.839
≥36	1.20	0.85–1.70	1.03	.302	0.96	0.69–1.33	–0.24	.809
Monthly income (USD)								
≤250	Ref.	-	-		Ref.	-	-	
251–500	0.67	0.50–0.91	–2.61	.009	0.76	0.57–1.01	–1.92	.055
≥501	0.87	0.58–1.29	–0.71	.475	0.81	0.53–1.23	–0.98	.325
Education								
≤ High school	Ref.	-	-		Ref.	-	-	
> High school	1.25	0.95–1.66	1.57	.116	1.38	1.03–1.84	2.20	.028
Perceived risk for HIV								
High	1.31	0.89–1.92	1.38	.168	1.02	0.71–1.46	0.11	.913
Moderate	Ref.	-	-		Ref.	-	-	
Low/none	1.87	1.37–2.55	3.96	<.001	1.53	1.13–2.08	2.77	.006
Number of sex partners, last 3 months								
0–1	Ref.	-	-		Ref.	-	-	
2–4	1.84	1.14–2.98	2.50	.013	1.73	1.09–2.72	2.36	.018
≥5	1.56	0.99–2.48	1.90	.058	1.49	0.94–2.36	1.71	.086
Condomless anal intercourse, last 3 months								
Yes	0.58	0.44–0.76	–4.02	<.001	0.66	0.49–0.87	–3.01	.003

Variables	PR[b]	95% CI	*z* score	*P* value	aPR[b]	95% CI	*z* score	*P* value
No	Ref.	-	-		Ref.	-	-	
Sex role during anal intercourse, last 3 months								
Insertive	Ref.	-	-		Ref.	-	-	
Receptive	1.68	1.11–2.53	2.48	.013	1.04	0.66–1.62	0.17	.865
Insertive and receptive	1.37	0.91–2.07	1.51	.130	0.97	0.63–1.51	–0.11	.915
Had male/TW stable sex partner, last 3 months								
Yes	1.22	0.93–1.61	1.43	.154	1.2	0.93–1.56	1.43	.152
No	Ref.	-	-		Ref.	-	-	
Performed sex work, last 3 months								
Yes	1.36	1.01–1.83	2.03	.042	1.21	0.89–1.65	1.20	.229
No	Ref.	-	-		Ref.	-	-	
Self-reported history of syphilis, ever								
Yes	1.69	1.29–2.21	3.87	<.001	1.59	1.23–2.06	3.60	<.001
No	Ref.	-	-		Ref.	-	-	
Laboratory diagnosis of STI[c]								
Yes	0.89	0.65–1.23	–0.67	.505	-	-	-	
No	Ref.	-	-		-	-	-	
Laboratory diagnosis of HIV								
Positive	0.88	0.55–1.39	–0.54	.588	-	-	-	
Negative	Ref.	-	-		-	-	-	

[a] Testing frequently was defined as having tested at least every 6 months.

[b] PR = prevalence ratio, (a)PR = adjusted prevalence ratio.

[c] Syphilis, rectal chlamydia, and/or rectal gonorrhea.

Table 3.

Factors associated with perceived risk for HIV among MSM and TW attending STI clinics, Lima, Peru, 2014.

Variable	N (%)	Perceived risk			Test statistic	*P* value
		High	Moderate	Low/None		
All	310 (100)	72 (23.3)	148 (47.7)	90 (29.0)		-
Sexual orientation/gender identity[a]					X^2=8.5, *df*=4	.075
Gay/homosexual	164 (53.8)	33 (20.1)	75 (45.7)	56 (34.2)		
Bisexual/heterosexual	74 (24.2)	16 (21.6)	43 (58.1)	15 (20.3)		
Transgender woman	67 (22.0)	21 (31.3)	29 (43.2)	17 (25.4)		
Age (years)					X^2=2.4, *df*=4	.658
18–25	102 (32.9)	22 (21.6)	50 (49.0)	30 (29.4)		
26–35	109 (35.2)	26 (23.9)	56 (51.4)	27 (24.7)		
≥36	99 (31.9)	24 (24.2)	42 (42.4)	33 (33.4)		
Monthly income (USD)[a]					X^2=4.5, *df*=4	.346
≤250	109 (36.6)	27 (24.8)	45 (41.3)	37 (33.9)		
251–500	147 (49.3)	36 (24.5)	73 (49.7)	38 (25.8)		
≥501	42 (14.1)	6 (14.3)	22 (52.4)	14 (33.3)		
Education					X^2=6.9, *df*=2	.032
≤ High school	152 (49.0)	41 (27.0)	77 (50.7)	34 (22.3)		
> High school	158 (51.0)	31 (19.6)	71 (44.9)	56 (35.4)		
Number of sex partners, last 3 months					X^2=17.6, *df*=4	.002
0–1	62 (20.0)	11 (17.7)	28 (45.2)	23 (37.1)		
2–4	82 (26.5)	15 (18.3)	32 (39.0)	35 (42.7)		
≥5	166 (53.5)	46 (27.7)	88 (53.0)	32 (19.3)		
Condomless anal intercourse[a]**, last 3 months**					X^2=2.4, *df*=2	.299
Yes	239 (79.7)	57 (23.9)	119 (49.8)	63 (26.4)		
No	61 (20.3)	14 (23.0)	25 (41.0)	22 (36.1)		
Sex role during anal intercourse, last 3 months					X^2=6.2, *df*=4	.182

Variable	N (%)	Perceived risk			Test statistic	*P* value
		High	Moderate	Low/None		
Insertive	77 (24.8)	22 (28.6)	38 (49.4)	17 (22.0)		
Receptive	98 (31.6)	22 (22.5)	40 (40.8)	36 (36.7)		
Insertive and receptive	135 (43.6)	28 (20.7)	70 (51.9)	37 (27.4)		
Had male/TW stable sex partner, last 3 months					X^2=5.4, *df*=2	.067
Yes	147 (47.4)	38 (25.8)	60 (40.8)	49 (33.3)		
No	163 (52.6)	34 (20.9)	88 (54.0)	41 (25.1)		
Performed sex work, last 3 months					X^2=5.2, *df*=2	.073
Yes	62 (20.0)	20 (32.3)	30 (48.4)	12 (19.3)		
No	248 (80.0)	52 (21.0)	118 (47.6)	78 (31.4)		
Self-reported history of syphilis					X^2=1.2, *df*=2	.542
Yes	99 (31.9)	26 (26.3)	43 (43.4)	30 (30.3)		
No	211 (68.1)	46 (21.8)	105 (49.8)	60 (28.4)		
Laboratory diagnosis of STI[b]					X^2=0.3, *df*=2	.981
Yes	88 (28.4)	21 (23.8)	42 (47.7)	25 (28.5)		
No	222 (71.6)	51 (23.0)	106 (47.8)	65 (29.2)		
Laboratory diagnosis of HIV					X^2=0.7, *df*=2	.698
Positive	37 (11.9)	8 (21.6)	20 (54.1)	9 (24.3)		
Negative	273 (88.1)	64 (23.4)	128 (46.9)	81 (29.7)		

[a] Small discrepancies in subtotals and totals are due to rounding and/or missing values.

[b] Syphilis, rectal chlamydia, and/or rectal gonorrhea.