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Recent HIV Testing Among Young Men Who Have Sex with Men in Bangkok and Chiang Mai: HIV Testing and Prevention Strategies Must Be Enhanced in Thailand

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Abstract HIV infection among men who have sex with men, particularly in Thai urban settings and among younger cohorts, is escalating. HIV testing and counseling (HTC) are important for prevention and obtaining treatment and care. We examine data from a 2013 survey of males, 15–24 years, reporting past-year sex with a male and living in Bangkok or Chiang Mai. Almost three quarters of young MSM (YMSM) in Bangkok and only 27 % in Chiang Mai had an HIV test in the previous year. Associations for HIV testing varied between cities, although having employment increased the odds of HIV testing for both cities. In Bangkok, family knowledge of same sex attraction and talking to parents/guardians about HIV/AIDS had higher odds of HIV testing. Expanded HTC coverage is needed for YMSM in Chiang Mai. All health centers providing HTC, including those targeting MSM, need to address the specific needs of younger cohorts.

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Over the past three decades, Thailand has successfully reduced new HIV infections in the overall population. Systematic interventions in the late-1980s and early-1990s, including the 100 % condom campaign, are credited for reducing HIV incidence [1, 2]. However, since 2000, budget constraints and policy shifts from HIV prevention to treatment have resulted in fewer and less effective prevention campaigns and consequent increases in HIV and other sexually transmitted infections, especially among key populations at higher risk of HIV exposure [2]. Over the past decade, men who have sex with men (MSM), especially in large cities such as Bangkok and Chiang Mai, have experienced high rates of HIV incidence [3–5]. Between 2006 and 2013, MSM in Bangkok were found to have an HIV incidence of 5.5 per 100 person-years, 180 times higher than the estimated incidence of adults in Thailand in 2011 [4]. And young MSM (YMSM) were found to have significantly higher HIV incidence (12.2 per 100 person years among 15–21 year-olds) compared to older MSM. Despite findings of lower condom use and higher rates of exchanging sex for money or goods among MSM in Chiang Mai [5–7], most studies measuring sexual risk behaviors focus on MSM in Bangkok [3, 4, 6, 8–10].

HIV testing and counseling (HTC) is an important component of HIV prevention interventions and the essential first step to obtaining treatment and related care [11–13]. HTC is important for providing a timely uptake of needed treatment and suppression of viral load [14–16] and encouraging modifications in sexual risk behaviors, particularly among those who test positive [17–20]. Assessing

associations with HIV testing among key populations, including MSM, is essential for designing effective HIV prevention and intervention programs [21]. However, reliable epidemiological data on young key populations remains limited despite their increased risk for HIV transmission, sexual health-related complications, stigma, discrimination, violence and more limited access to healthcare when compared to older cohorts [11, 22, 23]. Recent data indicate that Thai YMSM (15–22 years) have lower percentages of ever being tested for HIV compared to older (23–28 years) MSM (37 vs. 57 %, respectively) [24].

In 2013 a behavioral risk survey was conducted in Bangkok and Chiang Mai to evaluate the associations of HIV testing and sexual risk among YMSM. Bangkok, the capital and most populous city in Thailand, and Chiang Mai, the largest city in the north, have concentrated HIV epidemics among MSM [25]. These findings will inform the implementation of Thailand's Operational Plan for Ending AIDS (2015–2019) which defines tailored service packages for MSM and introduces a new approach, *Reach-Recruit-Test-Treat-Retain*, to increase awareness of HIV status and access to care [26].

Methods

Surveys were conducted in Bangkok and Chiang Mai among males, 15–24 years old, having sex with a male in the past 12 months and living in the survey area for at least 1 year. Given that YMSM in Thailand are often considered hidden but socially networked, this study used Respondent-driven Sampling (RDS) [27–29]. Recruitment for each survey area began with a small number of "seeds" (e.g., purposefully selected eligible members of the target population) selected based on having diverse characteristics and large social networks through organizations working with YMSM. Eligible participants completed informed consent and an interviewer-administered questionnaire with trained staff in Thai language using a mobile tablet device. Before leaving the interview site, each participant received phone credit as an incentive for participation and up to three coupons to use in recruiting eligible YMSM peers. This process continued until the calculated sample size was attained. The survey protocol was reviewed and approved by the Thammasat University Institutional Review Board in Bangkok. No personal identifying information was collected from participants.

Measures

Variables of sexual behaviors were selected based on a review of the literature about HTC among MSM. In addition, a 14 item Condom Self-efficacy Scale was used to measure three self-efficacy factors related to condom use based on (1) communication/negotiation skills, (2) consistency, and (3) correct use, which together provided an overall condom use efficacy score [30, 31]. Each scale item is scored from 1, "Very Unsure" to 5, "Very Sure" with resulting total scores ranging from 14 to 70. The communication, consistency, and correct condom use sub-scales are composed of six, three, and five items, respectively, with scores ranging from 6 to 30, 3 to 15, and 5 to 25. Higher scores indicate higher levels of condom use self-efficacy. Variables to measure social support (i.e., awareness of same sex attraction by family members, talking to others about HIV/AIDS) were also included.

Statistical Methods

Data were assessed for homophily, bottlenecks, and convergence, each of which can indicate bias in the sample [32]. Population estimates and 95 % confidence intervals among those reporting ever having sex were derived using the successive sampling estimator [33] in RDS Analyst (www.hpmrg.org). Data were adjusted based on participants' self-reported social network sizes which were measured based on each participant's reported reciprocal relationships with those fulfilling eligibility and whom the participant had seen in the previous week. Significant differences between the cities were assessed with $p < 0.05$. Bivariate and multivariable logistic regression analyses using successive sampling estimator weights were performed on each city separately to determine associations of having been tested for HIV in the past 12 months. Variables from the bivariate analysis with $p < 0.1$ or known correlates of the outcome of interest were candidates for entry in the final multivariable model using a stepwise backward regression with $p < 0.1$.

Results

Data collection started with six seeds, and continued through ten waves in Bangkok ($N = 273$) and started with eight seeds and continued through nine waves in Chiang Mai ($N = 272$). Statistical diagnostics of all variables found low homophily, no bottlenecks and convergence in advance of attaining the sample size.

Analysis was conducted on 267 YMSM in Bangkok and 243 in Chiang Mai who reported ever having sex. The median age of YMSM was slightly higher in Bangkok than in Chiang Mai (Table 1). Most YMSM in both cities lived with friends, a partner or in a dormitory, however a higher percentage in Bangkok, compared to Chiang Mai, lived alone ($p < 0.01$). A higher percentage of YMSM in

Table 1 Population estimates and 95 % confidence intervals of select variables among sexually active MSM in Bangkok and Chiang Mai, Thailand, 2013

Variable	MSM, Bangkok N = 267		MSM, Chiang Mai N = 243	
	n	% (95 % CI)	n	% (95 % CI)
Sociodemographics				
Age (years)				
Mean, median (std. dev)	22.1, 23 (1.8)		20.1, 20 (1.9)	
Living situation				
Alone*	116	43.7 (36.6, 50.7)	37	15.6 (10.5, 20.7)
With friends, partner, or in dormitory	121	48.0 (41.0, 55.0)	136	54.1 (46.7, 61.1)
With family/other*	21	8.3 (4.2, 12.5)	68	30.3 (23.3, 37.5)
Employment				
Unemployed*	4	1.4 (0–2.9)	32	16.1 (11.4, 22.5)
Unemployed full time student*	26	9.2 (5.3, 13.1)	149	62.5 (54.0, 69.3)
Employed part time*	62	23.6 (17.0, 30.3)	26	10.0 (5.8, 14.1)
Employed full time*	169	66.8 (58.8, 72.6)	22	11.4 (5.9, 16.8)
Currently enrolled/attending school full time				
Yes	174	64.4 (56.4, 72.2)	176	72.6 (65.8, 79.1)
Sexual orientation				
Bisexual	22	8.5 (4.8, 12.2)	12	7.4 (3.1, 12.1)
Heterosexual*	2	0.4 (0.1, 0.9)	11	5.8 (2.2, 9.5)
Homosexual	239	91.1 (87.2, 94.8)	205	86.7 (81.2, 91.3)
Family members aware of sexual attraction to males				
None	53	19.7 (14.7, 24.7)	61	31.9 (23.9, 39.7)
Some	64	23.5 (17.7, 29.4)	48	22.2 (14.8, 29.3)
Nearly all/all	139	56.8 (50.0, 63.5)	87	45.9 (38.2, 53.9)
Sexual and condom use behaviors				
Ever had sexual intercourse				
Yes	267	98.1 (96.9. 99.4)	243	87.3 (82.6, 92.7)
Age at first sex				
≤15 years*	138	56.8 (49.6, 63.9)	81	40.4 (32.3, 48.7)
16–17 years	83	30.5 (24.5, 36.6)	72	31.8 (24.8, 38.5)
18+ years*	29	12.7 (8.3, 17.1)	60	28.9 (20.3, 35.2)
Coerced first sex with a man				
Yes	54	22.8 (16.0, 29.7)	22	13.1 (7.4, 18.9)
Number of anal sex partners, past 12 months[a]	15.1, 8 (42.7) range: 0–416		4.3, 1 (13.2) range: 0–200	
Condom use during anal sex, past 12 months				
Never	20	6.3 (3.1, 9.5)	22	10.2 (5.1, 15.0)
Sometimes	50	23.4 (16.7, 30.2)	57	31.8 (22.9, 41.0)
Most of the time/always	172	70.2 (63.0, 77.4)	114	58.0 (48.1, 67.4)
Used condom at last anal sex				
Yes*	225	95.9 (93.4, 98.6)	156	70.3 (61.1, 76.1)
Condom use communication[a]		24.7, 25 (3.7)		23.9, 24 (4.4)
Consistent condom use scale[a]		12.5, 12 (2.1)		11.5, 12 (2.6)
Correct condom efficacy scale[a]		29.9, 21 (3.2)		18.9, 20 (4.4)
Overall condom efficacy score[a]		57.9, 57 (8.4)		55.0, 55 (10.2)
Can obtain condom every time needed				
Yes	233	97.0 (92.1, 99.9)	151	82.3 (74.8, 89.8)
Ever partner violence after condom request				
Yes	60	27.2 (21.3, 33.1)	26	15.9 (8.9, 22.9)

Table 1 continued

Variable	MSM, Bangkok N = 267		MSM, Chiang Mai N = 243	
	n	% (95 % CI)	n	% (95 % CI)
Male partner ever refused condom				
Yes	121	58.7 (48.4, 69.0)	70	42.4 (33.8, 51.3)
Never wanted to use one	11	4.4 (1.8, 7.0)	19	11.1 (4,8, 17.3)
Able to refuse men who want to have sex when you do not want to have sex				
Yes*	162	67.6 (60.1, 75.3)	80	41.4 (33.4, 49.1)
Alcohol/drug use before sex, past 6 months				
Yes	172	65.7 (58.4, 73.0)	108	59.6 (51.3, 68.1)
HIV testing, knowledge and support				
Know where youth can get HIV test				
Yes*	224	89.9 (83.2, 96.5)	157	69.6 (61.9, 77.2)
Tested for HIV, past 12 months				
Yes*	166	74.1 (68.2, 80.1)	50	27.1 (19.8, 34.5)
Correct HIV transmission knowledge				
Yes*	183	64.7 (55.6, 73.9)	97	37.9 (31.2, 44.5)
Perceived level of HIV risk				
No risk*	69	29.7 (22.2, 36.1)	143	65.4 (57.8, 73.1)
Some risk*	120	57.5 (50.5, 64.8)	72	32.1 (24.4, 39.6)
High risk*	32	13.0 (7.1, 18.9)	4	3.2 (0.0, 5.2)
Received any information/knowledge/services for HIV/AIDS, past 12 months				
Yes	241	94.7 (89.0, 100)	176	84.1 (77.0, 91.0)
Talked to the following about HIV/AIDS, past 12 months (multiple responses allowed)				
No one	22	7.8 (3.4, 12.2)	–	–
Friends	190	76.2 (69.8, 82.5)	127	78.3 (70.8, 86.1)
Parent/guardian*	79	27.2 (20.0, 34.4)	15	10.1 (4.1, 16.2)
Other adult*	81	27.5 (18.9, 36.8)	10	7.0 (1.9, 12.2)
Health care provider	88	30.8 (22.7, 38.6)	42	23.4 (15.9, 30.3)

* Significant difference at p value <0.05

[a] Presented as mean, median (std. dev)

Bangkok were employed full time compared to Chiang Mai ($p < 0.01$); most in both cities were attending school full time and reported their sexual orientation as homosexual and around half reported that nearly all or all family members were aware of their sexual attraction to males.

Almost all YMSM in Bangkok and 87 % in Chiang Mai ever had sexual intercourse. Among those, a higher percentage in Bangkok, compared to Chiang Mai, had their first sex at ≤15 years ($p < 0.05$) and 23 % in Bangkok and 13 % in Chiang Mai were coerced the first time they had sex with a man. YMSM in Bangkok had a higher mean number of anal sex partners, a higher percentage of always or most of the time using condoms during anal, and using a condom at last anal sex ($p < 0.01$) sex in the last 12 months compared to Chiang Mai. With the exception of consistent condom use, which had an equal mean score for both cities, YMSM in Bangkok had higher mean scores on

the condom use efficacy scales for communication, correct use and for the overall score. Most YMSM in both cities were able to obtain a condom every time they needed it; low percentages experienced violence after requesting the use of a condom, 59 % in Bangkok and 42 % in Chiang Mai had a male partner ever refuse to use a condom and 68 % in Bangkok and 41 % in Chiang Mai were able to refuse unwanted sex with male partners ($p < 0.01$). Just over half of YMSM used alcohol and drugs before sex in the past 6 months.

A higher percentage of YMSM in Bangkok, compared to Chiang Mai, knew where youth could go to have an HIV test ($p < 0.05$), had been tested for HIV in the past 12 months ($p < 0.01$) and had correct knowledge about HIV transmission ($p < 0.05$). Few YMSM in both cities perceived themselves to be at high risk for HIV ($p < 0.05$). High percentages in both cities received

Table 2 Bivariate regression, odds ratios (OR) and 95 % confidence intervals (95 % CI) of HIV testing in the past 12 months among sexually active YMSM in Bangkok and Chiang Mai, Thailand, 2013

Variable	HIV test in past 12 months	
	Bangkok, $N = 267$ OR (95 % CI)	Chiang Mai, $N = 243$ OR (95 % CI)
Age (years)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)
Living situation (ref. alone)		
With friends, partner, or in dormitory	1.0 (0.5, 2.1)	1.0 (0.3, 3.2)
With family/other	0.3 (0.1, 0.9)*	1.6 (0.6, 5.2)
Currently employed (ref. no)	11.7 (3.4, 39.6)***	2.4 (0.9, 5.9)
Currently enrolled/attending school full time (ref. no)	0.4 (0.2, 1.0)	0.7 (0.3, 1.9)
Family members aware of sexual attraction to males (ref. none)		
Some	2.4 (0.9, 7.1)	2.2 (0.6, 8.1)
Nearly all/all	1.4 (0.6, 3.3)	5.0 (1.7, 14.6)**
Age at first sex (ref. ≤15 years)		
16–17 years	1.3 (0.6, 2.8)	0.7 (0.3, 1.7)
18+ years	0.3 (0.1, 0.9)*	0.5 (0.2, 1.5)
Number of anal sex partners, past 12 months	0.98 (0.97, 0.99)**	1.1 (0.9, 1.2)
Condom use communication scale	1.2 (1.1, 1.3)**	0.9 (0.8, 1.0)
Consistent condom use scale	1.3 (1.1, 1.5)**	1.1 (0.9, 1.2)
Correct condom use scale	1.2 (1.1, 1.3)**	1.0 (0.9, 1.1)
Overall condom self-efficacy scale	1.2 (1.0, 1.1)**	1.0 (0.9, 1.1)
Can obtain condom every time needed (ref. no)	2.2 (0.5, 9.1)	2.9 (0.7, 11.9)
Able to refuse men who want to have sex with you if you do not want to have sex (ref. no)	1.4 (0.6, 2.9)	0.7 (0.3, 1.7)
Alcohol/drug use before sex, past 6 months (ref. no)	0.9 (0.4, 1.8)	5.5 (1.8, 17.0)**
Correct HIV transmission knowledge (ref. no)	3.7 (1.7, 7.9)***	0.6 (0.3, 1.3)
Perceived level of HIV risk (ref. no risk)		
Some risk	1.1 (0.4, 3.2)	0.4 (0.0, 5.4)
High risk	1.8 (0.6, 4.8)	0.7 (0.0, 8.7)
Talked to the following about HIV/AIDS, past 12 months (multiple responses allowed) (ref. no)		
No one	0.1 (0.02, 0.4)***	*No values*
Friends	1.6 (0.7, 3.6)	0.8 (0.3, 2.7)
Parent/guardian	4.0 (1.8, 8.9)***	0.9 (0.2, 4.5)
Other adult	2.9 (1.3, 6.3)**	2.0 (0.3, 13.5)
Health care provider	2.4 (1.1, 5.1)*	1.4 (0.5, 3.8)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

information, knowledge and services for and talked with friends about HIV/AIDS in the past 12 months. Higher percentages of YMSM in Bangkok, compared to Chiang Mai, talked to parents or guardians ($p < 0.05$), other adults ($p < 0.05$) or health care providers about HIV/AIDS.

YMSM in Chiang Mai who reported that nearly all or all family members were aware of their sexual attraction to males (vs. no family members being aware) and who used alcohol or drugs before sex in the past 6 months (vs. not doing so) had higher odds of having been tested for HIV in the past 12 months (Table 2). YMSM in Bangkok who were currently employed (vs. unemployed), had correct HIV transmission knowledge (vs. incorrect knowledge),

and had talked about HIV/AIDS in the past 12 months to a parent or guardian, an older adult or a health care provider (vs. not talking to these types of persons) had higher odds of having been tested for HIV. In addition, one unit increases in YMSM's ability to communicate about condoms, use condoms consistently and correctly and having overall self-efficacy in condom use resulted in 20 % to 30 % increased odds of having been tested for HIV. YMSM in Bangkok, who lived with their family (vs. living alone), were 18 years or older when they first had sex (vs. ≤15 years) and who talked to no one about HIV/AIDS in the past 12 months (vs. talking with someone) had lower odds of having been tested for HIV. Finally, a one unit increase in the number of anal sex partners in the past

Table 3 Multivariable regression, odds ratios (OR) and 95 % confidence intervals (95 % CI) of HIV testing in the past 12 months among sexually active MSM in Bangkok and Chiang Mai, Thailand, 2013

Variable	HIV test in past 12 months	
	Bangkok, N = 267 OR (95 % CI)	Chiang Mai, N = 243 OR (95 % CI)
Age (years)		
Living situation (ref. alone)		
With friends, partner, or in dormitory		
With family/other	0.2 (0.03, 0.7)*	
Currently employed (ref. no)	20.0 (4.3, 97.2)***	9.6 (1.3, 73.0)*
Currently enrolled/attending school full time (ref. no)		
Family members aware of sexual attraction to males (ref. none)		
Some	12.1 (1.5, 100.7)*	
Nearly all/all	5.1 (1.7, 15.4)**	
Age at first sex (ref. ≤15 years)		
16–17 years	0.2 (0.02, 0.8)*	
18+ years		
Number of anal sex partners, past 12 months		
Condom use communication scale (ref. no)		
Consistent condom use scale (ref. no)		
Correct condom use scale (ref. no)		0.8 (0.6, 0.9)*
Overall condom self-efficacy scale (ref. no)		
Can obtain condom every time needed (ref. no)		
Able to refuse men who want to have sex with you if you do not want to have sex (ref. No)		
Alcohol/drug use before sex, past 6 months (ref. no)		15.1 (1.6, 140.4)*
Correct HIV transmission knowledge (ref. no)	*Dropped due to collinearity*	
Perceived level of HIV risk (ref. no risk)		
Some risk		
High risk		
Talked to the following about HIV/AIDS, past 12 months (multiple responses allowed) (ref. no)		
No one	0.1 (0.04, 0.9)*	
Friends		
Parent/guardian	3.5 (1.2, 9.9)*	
Other adult		
Health care provider		

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

12 months resulted in a 2 % decrease in having been tested for HIV.

In the final multivariable model, YMSM living in Chiang Mai who were currently employed (vs. unemployed) and who used alcohol or drugs before sex in the past 6 months (vs. not doing so) had higher odds of having been tested for HIV in the past 12 months (Table 3). One unit increases in YMSM's ability to use condoms correctly had a 20 % decreased odds of having been tested for HIV. In the final multivariable model, YMSM living in Bangkok, who were currently employed (vs. unemployed) and had some or nearly all/all family members aware of their sexual attraction to males and who talked to a parent or guardian about HIV/AIDS (vs. not talking to them) had higher odds of having been tested for HIV. YMSM in Bangkok who

lived with their family (vs. living alone), were ≥18 years when they first had sex (vs. ≤15 years) and who talked to no one about HIV/AIDS in the past 12 months (vs. talking with someone) retained lower odds of having been tested for HIV.

Discussion

Levels of HIV testing among YMSM in Bangkok were higher than those reported in previous studies of MSM of all ages in Thailand [3, 4, 34], and roughly 2.75 times higher than among YMSM in Chiang Mai. Difference in HIV testing between YMSM in Bangkok and Chiang Mai is likely due to the greater availability of services in

Bangkok, estimated to include 91 public and private hospitals, and research clinics including the Thai Red Cross Anonymous Clinic (TRCAC), Silom Community Clinic, and Bangkok Metropolitan Authority (BMA) clinics [35, 36]. Within the BMA *Bangkok: Getting to Zero* initiative, MSM are encouraged to access free HTC at public and research clinics twice a year. Culturally-competent care and integrated screening and services on sexual health needs are reported in many Bangkok sites [34], with website and social media networks, such as Adam's Love linked to TRCAC, providing online counselling and advice [37]. In Chiang Mai, there is only one clinic specifically focused on the needs of MSM, the PIMAN (Prevention of Infection in Man) Center and while community-led and mobile HTC clinics have expanded in recent years, the services are limited. Thailand's recent implementation of same-day results at public health facilities and national guidelines for using rapid HIV testing may also improve HTC access.

Despite availability of some HTC services in both cities, some sexually active YMSM reported that they did not know where to get an HIV test. This suggests the need for raising greater awareness of existing services through social media, the Internet, peer-educator outreach, and other strategies. More research is required to understand how YMSM access information about testing, and which channels are most likely to facilitate positive attitudes about testing, as this has been an important predictor of intention to test in other studies among MSM and one of three predictors influencing behavioral intention in the Theory of planned behavior [38–40].

The relative lack of MSM-friendly HIV clinics and outreach programs in Chiang Mai may lower HIV knowledge, and consequently lower accuracy in assessing HIV risk. Only 3 % of YMSM in Chiang Mai, compared to 13 % in Bangkok, reported having "high risk" of HIV infection, despite YMSM in Chiang Mai having lower condom efficacy scores and percentages of condom use at last anal sex. Lower levels of HIV knowledge and higher levels of inconsistent condom use have been found to be associated with less accuracy in self assessments of risk among MSM [41]. Interventions to improve YMSM's capacity to make realistic risk assessments, and apply this information to lower risk sexual behaviors are needed, and may also positively influence HIV testing [42, 43].

One-quarter of YMSM in Bangkok and three-quarters of YMSM in Chiang Mai reported not being tested for HIV in the past 12 months, with younger YMSM less likely to be tested. Recent updates to the Thailand HIV clinical and operations guidelines included lowering the parental consent requirement for HIV testing from 18 to 15 years of age [44] with the intention to increase young people's access to the full health benefits of HTC without having the

additional complications of disclosing their same sex attractions or sexual behaviors to parents or guardians [45, 46]. Other considerations may be required, however, to make clinics more youth-friendly and to address the social barriers facing MSM in health facilities [24]. The accessibility of HIV self-test kits could also be endorsed given that they have been found to increase confidentiality and privacy for young people in other settings [47].

Being employed was the only correlate that was positively significantly associated in the multivariable model for HIV testing in both cities. HIV pre-employment screening may contribute to the increased odds of being tested among YMSM who reported being employed in this study, similar to findings from another study among adult MSM in Thailand [24]. Being employed reduces economic insecurity and increases choices and is seen as a positive enabler for attaining HIV-related health services [21, 23].

Roughly 60 % of YMSM in both cities reported using alcohol or drugs before sex. Drug use to enhance sex among MSM has been reported in a Bangkok study, with participants ≤21 years significantly more likely to use drugs than all other age groups [10]. While our study did not inquire about types of drugs, methamphetamine use among MSM has been found to increase risk of HIV transmission [48]. It is well known that alcohol and drug use may inhibit safe sex decision-making, however, this may be more pronounced in younger key populations [23, 49]. Reasons for why drug or alcohol use before sex in the past 6 months increased the odds of HIV testing are unclear and further research on the quantity and type of alcohol or drug use before sex would be useful for understanding YMSM's actual and perceived risk related to alcohol or drug use before sex.

Correctly using a condom during sex is a common and well-known protection against HIV infection. However, relatively high percentages of YMSM in Bangkok and Chiang Mai reported experiencing violence after requesting the use of a condom, having a male partner refuse to use a condom and having to refuse unwanted sex with male partners. Thailand's National AIDS Program has produced a National Condom Strategy for 2015–2019, and condom use negotiation should be an essential component of any service tailored for YMSM. Although condom use at last anal sex was almost 100 % among YMSM in Bangkok (and YMSM in Bangkok had higher odds of testing for all of the condom scales in the bivariate analysis) and 70 % in Chiang Mai, condom use over the past 12 months was inconsistent. Effective condom programming is particularly important for MSM, especially for YMSM who may not have as much experience in sexual relations. In Chiang Mai, correct condom use was found to decrease odds of HIV testing in the multivariable analysis. It may be that YMSM who correctly use condoms believe themselves to

be at less risk for HIV infection and therefore less likely to need HTC.

In the final multivariable model for YMSM in Bangkok, being open about same sex attraction with some, nearly all or all family members, and talking to a parent or guardian about HIV/AIDS in the past 12 month all increased the odds of HIV testing. YMSM in Bangkok who had not talked to anyone about HIV/AIDS in the past 12 months had statistically significantly lower odds of HIV testing, and those who reported living with family had a reduced odds of HIV testing. Social acceptance and information exchange within the family are may indirectly affect HIV testing behaviors among YMSM who receive positive normative pressure (i.e., subjective norms to be aware of one's HIV status from people important to them), while those living with family anticipate more negative personal consequences [40]. Perhaps those living outside of the family have greater social and financial independence, and are more likely to access testing. More data are needed to understand the role of information exchange on sexuality and HIV/AIDS within families, on intentions to test among YMSM, and whether parents should be engaged in building positive attitudes towards, and self-efficacy for, HIV testing.

In the final multivariable model, sexual debut at the age of 16 or 17 decreased the odds of HIV testing among YMSM in Bangkok compared to those who became sexually active at ≤15 years. Those having later sexual debut may consider themselves to be less exposed to HIV and are therefore not seeking testing. In Bangkok, the majority of YMSM reported their debut at ≤15, whereas only 13 % reported their sexual debut at ≥18 years. Delaying sexual debut is an important strategy in reducing HIV infection and is an essential component in HIV prevention among young populations including young MSM [10].

There are several limitations in our study. This was a cross-sectional survey unable to establish causal inference. Our findings may not be generalizable to YMSM in other cities in Thailand or elsewhere and the relatively small sample sizes in these surveys may have resulted in wide variance, thereby masking some inferences. This survey used RDS to sample a hidden population of YMSM and relies on statistical adjustments based on participants' network sizes in order to make inferences about the network of the sampled population. In so far as the network of YMSM resemble the population, these findings can be interpreted as representative of YMSM in Bangkok and Chiang Mai. Despite these limitations, this study is the first to investigate factors related to HIV testing among YMSM in these cities and provides a foundation upon which to guide the National AIDS Program's *Reach-Recruit-Test-Treat-Retain* strategy in Thailand.

In conclusion, YMSM are at significant risk for HIV transmission. In order to increase the uptake of HTC, especially in Chiang Mai, all health centers, including those that target MSM, must be equipped to address the specific needs of younger cohorts. Testing services should be designed and delivered to address the varied and overlapping vulnerabilities confronting YMSM taking into account their age, unique behaviors, and level of community and personal social support. This includes inquiring about alcohol and drug use and prior experience of sexual violence including coerced sex, and providing testing alternatives, pre-exposure prophylaxis, health counselling information, and appropriate referrals, when required.

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