

# Sexual Behavior and Risk Factors for HIV Infection Among Homosexual and Bisexual Men in Thailand

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**Abstract** HIV prevalence and associated risk behaviors were examined among Thai bisexually active men (MSMW,  $n = 450$ ) and men who have sex with men only (MSM-only,  $n = 1,125$ ). Cross sectional venue-day-time sampling was used to collect data. Chi-square and logistic regression were used to identify HIV risk factors. HIV prevalence was 8.2% among MSMW and 21.2% among MSM-only. Consistent condom use with male partners was higher among MSMW (77.6%) than MSM-only (62.9%), and lower with female partners (44.4%). Lack of family confidant, migration, concern about acquiring HIV infection, and self-reported STD were associated with HIV prevalence among MSMW. Older age, lower educational level, residing in Bangkok or Chiang Mai, living away from family, recruitment from a sauna, increased frequency of visiting the surveyed venue, practicing receptive or both receptive and insertive anal intercourse, inconsistent

condom use with male paying partners, and a history of drug use were associated with HIV prevalence in MSM-only.

**Keywords** Homosexuality · Bisexuality · Thailand · Human immunodeficiency virus · Sexual behavior

## Introduction

In Thailand, the first reported case of acquired immunodeficiency syndrome (AIDS) was in a homosexual male (Wangroongsarb et al. 1985). Although virtually all early AIDS cases in Thailand were in homosexual or bisexual men, the focus of surveillance and prevention since the late 1980s has been on heterosexual populations, as the epidemic grew among female sex workers (FSW) and their male clients (Nelson et al. 2002). Men who have sex with men (MSM) were not included in the national HIV surveillance system since they were not an identified group attending the Ministry of Public Health (MOPH) clinical infrastructure (Thailand Ministry of Public Health 2003). The Thai government is credited with reversing the upward trend in HIV prevalence among heterosexuals by implementing 100% condom use in sex work venues (Hananberg et al. 1994) and reducing the number of new HIV infections from an estimated 143,000 cases in 1991 to 19,000 cases in 2003 (Thai Working Group on HIV/AIDS Projection 2001). Despite these successes, growing epidemics of HIV infection have been described in injecting drug users (IDU) and MSM (Beyrer et al. 1995; Nelson et al. 2002; van Griensven et al. 2005).

Surveys have reported the proportion of Thai men with same-sex experience to be between 3.3% and 16% (Beyrer et al. 1995; Sittitrai et al. 1992; van Griensven et al. 2004). Since the adult male population in Thailand is about

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22.5 million (CIA 2007), the population of MSM may be large. In 2003, the first community-based assessment of HIV infection and associated behaviors among MSM in Bangkok reported an HIV prevalence of 17.3% (van Griensven et al. 2005). This survey also highlighted the proportion (22%) of men who recently had sex with both men and women (MSMW) as contrasted to men who have sex with men only (MSM-only). Bisexually active Thai men potentially constitute an epidemiological bridge for HIV transmission to the heterosexual population. In the 2005 follow-up assessment using identical methods, the HIV prevalence among MSM in Bangkok had increased to 28.3% (CDC 2006). In addition to concern for the rising prevalence of HIV within the Thai MSM population for its own sake, MSMW with rising HIV prevalence may foreshadow an increase in HIV infections in their female sexual partners.

The association between bisexual behavior and HIV transmission has been widely examined in non-Asian contexts (Adimora and Fullilove 2006; Boulton et al. 1992; Hightow et al. 2006; Izazola-Licea et al. 2003). In the United States, relatively high levels of bisexual activity among HIV-infected African American and Hispanic men have raised concerns about increasing HIV transmission risk to female sex partners who may not be aware of their partners' bisexual behavior (Montgomery et al. 2003). Elevated rates of bisexual behavior have also been found in MSM sampled in Ho Chi Minh City, Vietnam (Colby 2003) and Phnom Penh, Cambodia (Girault et al. 2004). In these cities, marriage or sex with women was reported by 22.0% and 61.2% of MSM, respectively. The extent to which MSMW serve as an epidemiological bridge with heterosexual populations in Thailand is unknown; risk factors for HIV infection in this population (as compared to MSM-only) are also unknown. In the 2005 survey of MSM conducted in Chiang Mai, Phuket, and Bangkok, Thailand, we previously reported that men with bisexual behavior had a significantly reduced risk of HIV infection when compared to those reporting strictly homosexual behavior (CDC 2006). The objective of the current analysis is to identify behaviors that may explain the difference in this prevalence and to examine potential risk to female partners by comparing demographic characteristics and HIV risk behaviors between MSMW and MSM-only.

## Methods

### Community-Based Recruitment

A cross-sectional assessment was conducted in Bangkok, Chiang Mai, and Phuket, Thailand in 2005. Using venue-day-time sampling (VDTS), men were enrolled from entertainment establishments (bars and discos), parks,

saunas, street locations, and male sex work venues. VDTS is a systematic method of identification and mapping of venues, followed by enumeration of male venue attendees, determination of attendees' eligibility and willingness to participate in research, and selection of venues to be included in the research assessment. VDTS methodology in the Asian setting has been described in detail elsewhere (Mansergh et al. 2006). To be eligible for the survey, participants had to be Thai, >15 years old, male, resident of the study area, and reporting anal or oral sex with a man in the past 6 months. Participation was anonymous and voluntary.

### Data Collection and HIV Testing

After providing verbal informed consent, participants completed self-administered questionnaires on hand-held computers, providing demographic, behavioral, and psychosocial information. Participants requiring assistance in interpreting survey questions or layout could consult trained outreach workers. Number of sexual partners and condom use with partners was reported according to partner type: a steady partner was defined as "somebody you have been with for 3 months or longer, have sex with regularly and to whom you feel an emotional bond," a casual partner was defined as "somebody you have sex with only, without payment," a paying partner was defined as "a partner from whom you received money, gifts or valuables in exchange for sex," and a paid partner was defined as "a partner to whom you gave money, gifts or valuables in exchange for sex." Perceived risk of acquiring HIV and STD were measured by questions (e.g., "How much are you concerned about getting HIV/AIDS [STD] in the future?") using an integral scale from 1 (not at all) to 5 (a great deal). Answers were stratified into low (1 = not at all and 2 = a little), moderate (3 = some), and high (4 = very and 5 = a great deal) levels of concern for analysis. Participants were also asked to answer questions assessing social support (having a family or friend confidant) and suicidal ideation. An oral fluid sample was collected (OraSure<sup>®</sup> Salivary Collection Device; OraSure Technologies, Inc, Bethlehem, PA, USA) for HIV-antibody testing. Samples were tested at a dilution ratio of 1:2 in single wells by an enzyme immunoassay (EIA) (Oral Fluid Vironostika<sup>®</sup> HIV Microelisa System; Organon Teknika Corp., Durham, NC, USA). Samples positive for HIV antibodies were re-tested in duplicate and a result of >1 positive well was reported as oral fluid anti-HIV positive (Mansergh et al. 2006). Participants had the option of anonymously obtaining their test results: those who were positive were counseled as to the possible meaning of the screening test result and were referred for confirmatory EIA serum testing and medical and counseling services according to Thai national guidelines (Thailand Ministry of

Public Health 2004). The protocol of our assessment was determined to be a surveillance activity by the U.S. Centers for Disease Control and Prevention which, consequently, did not require an IRB review. It was reviewed and approved by the Research in Human Subjects Committee of the Thailand Ministry of Public Health.

#### Characterization of MSM-only Versus MSMW

A total of 2,049 Thai men were enrolled from 106 venues (97.3% of men who were approached); 949 from Bangkok, 572 from Chiang Mai, and 528 from Phuket. Of the total sample, 474 men were classified as transgender (based on their outward characteristics and on the characteristics of the enrollment venue (cabaret, revue, and show settings, etc.)). These men had low rates of recent bisexual behavior (0.6%) and were not included in this analysis. Of the remaining 1,575 men, 821 (52.1%) were enrolled from locations where men congregate to socialize with other men and seek male sexual partners (e.g., bars and discos); and 754 who enrolled were personnel (performers, sex workers, waiters etc.) from male sex-work venues (e.g., “go-go” bars [bars where sex workers can be solicited] and massage parlors). The total 1,575 were dichotomized into MSM-only (no sex with women in the past 3 months) and MSMW (sex with women in the past 3 months).

#### Statistical Analysis

The association between demographic and behavioral characteristics and HIV status was evaluated using Pearson’s chi square for categorical variables or Fisher’s exact test when expected values for these variables were less than 5. To identify independent risk factors for HIV infection, variables that were theoretically relevant, were not collinear and that had *P*-values of 0.10 or lower in bivariate analysis were entered into generalized estimating equation (GEE) backward stepwise selection logistic regression. A variable identifying each venue and calendar date cluster was created which was used to adjust the standard errors and *P*-values in the GEE regression analysis. There were a total of 152 clusters with the number of enrolled subjects ranging from 1 to 52 with a median of 11. STATA 9.0 (Version 9.1, 2005; Stata Corp., College Station, Texas, USA) was used for all data analysis.

## Results

#### Demographics and HIV Prevalence

Of the 1,575 men included in the analysis, 450 (28.6%) reported sex with men and women in the past 3 months

(MSMW) and 1,125 (71.4%) reported sex with men only (MSM-only). The HIV prevalence in the total sample was 17.5% (276/1,575); it was 8.2% (37/450) in MSMW and 21.2% (239/1,125) in MSM-only ( $\chi^2 = 37.7$ ,  $P < 0.001$ ). MSMW were significantly younger than MSM-only, less educated (27.1% of MSMW had never attained higher than high school education vs. 11.9% of MSM-only,  $\chi^2 = 54.6$ ,  $P < 0.001$ , Table 1), and more likely to be married (14.9% vs. 2.0%,  $\chi^2 = 100.8$ ,  $P < 0.001$ ). Twenty-nine percent of MSMW lived with a steady partner compared with 15.9% of MSM-only ( $\chi^2 = 33.2$ ,  $P < 0.001$ ). A lower percentage of MSMW had migrated to the surveyed region than MSM-only (36.4% vs. 42.8%, respectively,  $\chi^2 = 5.4$ ,  $P = 0.020$ ).

#### Sexual and Drug Use History

A majority of MSMW identified as heterosexual (58.0%), while most MSM-only identified as homosexual (69.4%,  $\chi^2 = 471.5$ ,  $P < 0.001$ ). A higher percentage of MSMW (17.3%, [78/450], Table 1, see “Usual anal sex position”) reported to have never had anal sex with a man than did MSM-only (5.9%, [66/1,125],  $\chi^2 = 50.9$ ,  $P < 0.001$ ); these participants reported having oral sex only. Of MSMW who had ever had anal sex, 81.5% (303/372) reported usually having the insertive role, 2.7% the receptive role, and 15.9% said to have both insertive and receptive roles. Among MSM-only these percentages were 34.8%, 35.5%, and 29.7% of men, respectively ( $\chi^2 = 257.3$ ,  $P < 0.001$ ). MSMW reported higher numbers of sexual partners in the past 3 months than did MSM-only (66.7% of MSMW had 6 or more partners compared with 27.4% of MSM-only,  $\chi^2 = 49.5$ ,  $P < 0.001$ ). MSMW were more likely than MSM-only to have received money, gifts or valuables in return for sex from a male partner in the past 3 months ([275/450] 61.1% vs. [384/1,125] 34.1%;  $\chi^2 = 96.1$ ,  $P < 0.001$ , Table 1, see “Condom use with male paying partners”). Sixty-two percent of MSMW reported having steady female partners in the last 3 months.

A higher proportion of MSMW (77.6%) consistently used condoms with male partners than did MSM-only (62.9%,  $\chi^2 = 22.9$ ,  $P < 0.001$ ). Among MSMW, consistent condom use in the past 3 months with female partners (44.4%) was lower than condom use with male partners (77.6%). A higher percentage of MSMW reported having experienced symptoms of an STD (in the last 6 months) than MSM-only (61.8% vs. 56.5%,  $\chi^2 = 3.6$ ,  $P = 0.057$ ), although this did not reach statistical significance. MSMW were more likely than MSM-only to have ever used drugs (70.4% vs. 53.2%, respectively;  $\chi^2 = 39.1$ ,  $P < 0.001$ ).

#### Perceived Risks and Psychosocial History

The level of concern about acquiring HIV infection did not differ significantly between MSMW and MSM-only

**Table 1** Demographic and behavior characteristics and risk factors for HIV infection among men who have sex with men and women (MSMW) and men who have sex with men only (MSM-only), Thailand, 2005

Characteristic	MSMW			MSM-only		
	Total N (%)	HIV+ n (m/N%)	Multivariate OR (95% CI)	Total N (%)	HIV+ n (m/N%)	Multivariate OR (95% CI)
Overall	450 (100)	37 (8.2)	–	1,125 (100)	239 (21.2)	–
Study location						
Phuket	134 (29.8)	5 (3.7)	Ref	268 (23.8)	35 (13.1)	Ref
Bangkok	189 (42.0)	28 (14.8)	4.49 (1.41–14.30)	560 (49.8)	151 (27)	2.46 (1.63–3.71)
Chiang Mai	127 (28.2)	4 (3.1)	0.84 (0.19–3.75)	297 (26.4)	53 (17.8)	1.45 (0.92–2.29)
Age group (years)						
≤21	177 (39.3)	9 (5.1)	Ref	322 (28.6)	42 (13)	Ref
22–26	173 (38.4)	12 (6.9)	1.39 (0.64–3.04)	391 (34.8)	99 (25.3)	2.26 (1.52–3.36)
27+	100 (22.2)	16 (16.0)	3.56 (1.62–7.80)	412 (36.6)	98 (23.8)	2.08 (1.39–3.13)
Education level						
University	29 (6.4)	5 (17.2)	Ref	313 (27.8)	56 (17.9)	Ref
Vocational	299 (66.4)	22 (7.4)	0.38 (0.14–1.07)	678 (60.3)	154 (22.7)	1.35 (1.02–1.79)
High school or less	122 (27.1)	10 (8.2)	0.43 (0.12–1.57)	134 (11.9)	29 (21.6)	1.27 (0.81–1.97)
Marital status						
Single	356 (79.1)	28 (7.9)	Ref	1,081 (96.1)	231 (21.4)	Ref
Currently married	67 (14.9)	7 (10.4)	1.37 (0.64–2.93)	22 (2.0)	2 (9.1)	0.37 (0.08–1.63)
Separated/divorced/widowed	27 (6.0)	2 (7.4)	0.94 (0.23–3.90)	22 (2.0)	6 (27.3)	1.38 (0.54–3.56)
Living situation						
Family/relatives	146 (32.4)	9 (6.2)	Ref	388 (34.5)	63 (16.2)	Ref
Steady partner	129 (28.7)	14 (10.9)	1.85 (0.63–5.46)	179 (15.9)	33 (18.4)	1.17 (0.77–1.76)
Roommate or alone	175 (38.9)	14 (8.0)	1.32 (0.52–3.35)	558 (49.6)	143 (25.6)	1.78 (1.30–2.44)
Inter-regional migration						
Born within survey region	286 (63.6)	13 (4.5)	Ref	643 (57.2)	116 (18)	Ref
Born outside of the region	164 (36.4)	24 (14.6)	3.60 (1.62–8.01)	482 (42.8)	123 (25.5)	1.56 (1.15–2.11)
Recruitment venue <sup>a</sup>						
Entertainment	246 (54.7)	16 (6.5)	Ref	588 (52.3)	111 (18.9)	Ref
Sauna	14 (3.1)	2 (14.3)	2.40 (0.60–9.61)	144 (12.8)	45 (31.3)	1.95 (1.34–2.85)
Park/street	190 (42.2)	19 (10.0)	1.60 (0.72–3.56)	393 (34.9)	83 (21.1)	1.15 (0.77–1.73)
Frequency of visiting venue						
Less than once per month	105 (23.3)	6 (5.7)	Ref	347 (30.8)	52 (15)	Ref
1–4 times per month	168 (37.3)	15 (8.9)	1.62 (0.73–3.56)	430 (38.2)	107 (24.9)	1.88 (1.24–2.85)
Daily	177 (39.3)	16 (9.0)	1.64 (0.59–4.52)	348 (30.9)	80 (23)	1.69 (1.17–2.46)

Table 1 continued

Characteristic	MSMW				MSM-only			
	Total N (%)	HIV+ n (n/N%)	Univariate OR (95% CI)	Multivariate OR (95% CI)	Total N (%)	HIV+ n (n/N%)	Univariate OR (95% CI)	Multivariate OR (95% CI)
Sexual orientation								
Heterosexual	261 (58.0)	16 (6.1)	Ref		192 (17.1)	25 (13)	Ref	
Homosexual	42 (9.3)	6 (14.3)	2.55 (0.95–6.84)		781 (69.4)	181 (23.2)	2.02 (1.29–3.16)	
Bisexual	147 (32.7)	15 (10.2)	1.74 (0.85–3.54)		152 (13.5)	33 (21.7)	1.85 (1.00–3.43)	
Usual anal sex position <sup>b</sup>								
Insertive	303 (81.5)	27 (8.91)	Ref		369 (34.8)	55 (14.9)	Ref	Ref
Receptive	10 (2.7)	0 (0)	–		376 (35.5)	78 (20.7)	1.49 (1.04–2.15)	2.02 (1.36–3.02)
Both	59 (15.9)	4 (6.78)	0.74 (0.25–2.20)		314 (29.7)	97 (30.9)	2.55 (1.83–3.56)	2.49 (1.71–3.63)
No anal sex	78 (–)	6 (7.69)	0.85 (0.38–1.93)		66 (–)	9 (13.6)	0.90 (0.45–1.80)	1.15 (0.53–2.47)
<i>Recent sexual behavior (last 3 months)</i>								
Total number of sexual partners								
0–1	29 (6.4)	3 (10.3)	Ref		506 (45.0)	95 (18.8)	Ref	
2–5	121 (26.9)	8 (6.6)	0.61 (0.20–1.85)		311 (27.6)	66 (21.2)	1.17 (0.84–1.61)	
6+	300 (66.7)	26 (8.7)	0.82 (0.31–2.21)		308 (27.4)	78 (25.3)	1.47 (1.04–2.06)	
Any steady female partners								
Yes	279 (62.0)	23 (8.2)	Ref					
No	171 (38.0)	14 (8.2)	0.99 (0.52–1.89)					
Condom use with male partners								
Always	260 (77.6)	23 (8.8)	Ref		484 (62.9)	105 (21.7)	Ref	
Not always	75 (22.4)	7 (9.3)	1.06 (0.48–2.36)		285 (37.1)	69 (24.2)	1.15 (0.83–1.60)	
No anal sex	115 (–)	7 (6.1)	–		356 (–)	65 (18.3)	–	
Condom use with female partners								
Always	200 (44.4)	16 (8.0)	Ref					
Not always	250 (55.6)	21 (8.4)	1.05 (0.50–2.21)					
Condom use with male paying partners <sup>c</sup>								
Always	230 (83.6)	19 (8.3)	Ref		295 (76.8)	63 (21.4)	Ref	Ref
Not always	45 (16.4)	4 (8.9)	1.08 (0.37–3.17)		89 (23.2)	29 (32.6)	1.78 (1.11–2.85)	1.87 (1.11–3.15)
No paying partners	175 (–)	14 (8.0)	–		741 (–)	147 (19.8)	–	1.01 (0.74–1.39)
STD symptoms past 6 months (urethral pain or discharge)								
No	278 (61.8)	14 (5.0)	Ref	Ref	636 (56.5)	121 (19)	Ref	
Yes	172 (38.2)	23 (13.4)	2.91 (1.64–5.16)	2.88 (1.63–5.10)	489 (43.5)	118 (24.1)	1.35 (1.02–1.80)	

Table 1 continued

Characteristic	MSMW				MSM-only			
	Total N (%)	HIV+ n (n/N%)	Univariate OR (95% CI)	Multivariate OR (95% CI)	Total N (%)	HIV+ n (n/N%)	Univariate OR (95% CI)	Multivariate OR (95% CI)
<i>Drug use</i>								
Drug use during lifetime <sup>d</sup>								
Never	133 (29.6)	11 (8.3)	Ref	Ref	526 (46.8)	91 (17.3)	Ref	Ref
Ever	317 (70.4)	26 (8.2)	0.99 (0.46–2.13)		599 (53.2)	148 (24.7)	1.57 (1.14–2.16)	1.60 (1.13–2.26)
<i>Perceived risk and psychosocial history</i>								
Concern about HIV								
Low	171 (38.0)	7 (4.1)	Ref	Ref	412 (36.6)	70 (17.0)	Ref	Ref
Moderate	166 (36.9)	15 (9.0)	2.33 (0.89–6.08)	1.79 (0.68–4.74)	457 (40.6)	105 (23.0)	1.46 (1.07–1.98)	
High	113 (25.1)	15 (13.3)	3.59 (1.45–8.87)	2.99 (1.23–7.97)	256 (22.8)	64 (25.0)	1.63 (1.12–2.38)	
Has a family confidant								
Yes	291 (64.7)	18 (6.2)	Ref	Ref	703 (62.5)	150 (21.3)	Ref	Ref
No	159 (35.3)	19 (11.9)	2.06 (1.16–3.67)	2.00 (1.10–3.67)	422 (37.5)	89 (21.1)	0.99 (0.75–1.29)	
Has a friend confidant								
Yes	338 (75.1)	24 (7.1)	Ref	Ref	958 (85.2)	198 (20.7)	Ref	Ref
No	112 (24.9)	13 (11.6)	1.72 (0.86–3.42)		167 (14.8)	41 (24.6)	1.25 (0.85–1.84)	
Ever considered suicide								
No	360 (80.0)	29 (8.1)	Ref	Ref	893 (79.4)	178 (19.9)	Ref	Ref
Yes	90 (20.0)	8 (8.9)	1.11 (0.46–2.67)		232 (20.6)	61 (26.3)	1.43 (1.01–2.03)	

<sup>a</sup> Participants were enrolled from entertainment venues (bars, discos, go-go bars, restaurants etc.), saunas (saunas or massage parlors), or the park and street

<sup>b</sup> Percentages anal sex position were calculated among those who reported anal sex

<sup>c</sup> Paying partners are defined by the participants' report of receiving money, gifts, or valuables in exchange for sex

<sup>d</sup> Includes noninjecting drugs, "ecstasy" (methylenedioxymethamphetamine), methamphetamine, amphetamine, cocaine, inhaled nitrates, benzodiazepines

(Table 1). Measures of psychosocial history, including suicidal ideation and having a family confidant, did not differ significantly, however MSMW were less likely to have a friend as a confidant when compared to MSM-only (75.1% vs. 85.2%,  $\chi^2 = 22.3$ ,  $P < 0.001$ ).

#### Risk Factors for HIV Infection

Among MSMW, residing in Bangkok (vs. living in Phuket, OR = 4.49, 95% CI 1.41–14.30), age greater than 26 (vs.  $\leq 21$  years, OR = 3.56, 95% CI 1.62–7.80), having migrated to the surveyed province (OR = 3.60, 95% CI 1.62–8.01), a self-reported history of STD in the past 6 months (OR = 2.91, 95% CI 1.64–5.16), having high levels of concern about contracting HIV (vs. low concern, OR = 3.59, 95% CI 1.45–8.87), and not having a family confidant (OR = 2.06, 95% CI 1.16–3.67) were significantly associated with HIV prevalence in univariate analysis (Table 1). Among MSM-only, residing in Bangkok (OR = 2.46, 95% CI 1.63–3.71), older age (22–26 years vs.  $\leq 21$  years, OR = 2.26, 95% CI 1.52–3.36; and  $\geq 27$  years vs.  $\leq 21$  years, OR = 2.08, 95% CI 1.39–3.13), vocational education (vs. university, OR = 1.35, 95% CI 1.02–1.79), living alone or with a roommate (vs. with family, OR = 1.78, 95% CI 1.30–2.44), having migrated to the surveyed province (OR = 1.56, 95% CI 1.15–2.11), recruitment from a sauna (vs. entertainment venues, OR = 1.95, 95% CI 1.34–2.85), frequenting the enrollment venue at least once a month (1–4 times per month, OR = 1.88, 95% CI 1.24–2.85; daily, OR = 1.69, 95% CI 1.17–2.46), homosexual (OR = 2.02, 95% CI 1.29–3.16) or bisexual orientation (OR = 1.85, 95% CI 1.00–3.43), practicing receptive (OR = 1.49, 95% CI 1.04–2.15) or both receptive and insertive anal sex roles (vs. insertive sex role only, OR = 2.55, 95% CI 1.83–3.56), having more than 5 male partners (vs.  $\leq 1$  partner) in the past 3 months (OR = 1.47, 95% CI 1.04–2.06), not always using condoms with male paying partners (OR = 1.78, 95% CI 1.11–2.85), a self-reported history of STD in the past 6 months (OR = 1.35, 95% CI 1.02–1.80), lifetime drug use (OR = 1.57, 95% CI 1.14–2.16), moderate (OR = 1.46, 95% CI 1.07–1.98) to high concern (OR = 1.63, 95% CI 1.12–2.38) about acquiring HIV (vs. low concern), and a history of suicidal ideation (ever, OR = 1.43, 95% CI 1.01–2.03) were associated with HIV infection (Table 1).

In multivariate analyses, having migrated to the surveyed region (OR = 3.59, 95% CI 1.54–8.35) a self-reported history of STD symptoms in the past 6 months (OR = 2.88, 95% CI 1.63–5.10), having high levels of concern about contracting HIV in the future (OR = 2.99, 95% CI 1.23–7.97), and not having a family confidant (OR = 2.00, 95% CI 1.10–3.67) were independently and

significantly associated with HIV prevalence in MSMW. Among MSM-only, residing in Bangkok (OR = 2.48, 95% CI 1.66–3.69) or Chiang Mai (OR = 2.16, 95% CI 1.40–3.32) (vs. Phuket), older age (22–26 years, OR = 2.08, 95% CI 1.37–3.16;  $\geq 27$  years, OR = 2.02, 95% CI 1.33–3.08), lower educational status (vocational education, OR = 1.88, 95% CI 1.35–2.63) or lower vs. university education (OR = 2.45, 95% CI 1.51–3.98), living alone or with a roommate (vs. with family, OR = 1.46, 95% CI 1.05–2.02), recruitment from a sauna (OR = 2.32, 95% CI 1.48–3.65), frequenting the surveyed venue at least once per month (1–4 times/month, OR = 1.72, 95% CI 1.14–2.59; daily, OR = 1.63, 95% CI 1.07–2.50), having receptive (OR = 2.02, 95% CI 1.36–3.02) or both receptive and insertive anal sex roles (OR = 2.49, 95% CI 1.71–3.63), having unprotected intercourse with a male paying partner (previous 3 months, OR = 1.87, 95% CI 1.11–3.15), and ever using drugs (OR = 1.60, 95% CI 1.13–2.26) were independently and significantly associated with HIV prevalence.

#### Discussion

This study demonstrates substantial differences in HIV prevalence, risk behavior, and predictors of HIV infection between behaviorally bisexual men and strictly homosexual men in Thailand. Our data contribute to understanding the potential role of Thai MSMW in epidemiologic bridging. Although MSMW reported higher rates of behaviors commonly associated with HIV transmission risk including drug use and frequent partner change (Anonymous 1988; Mansergh et al. 2001), HIV prevalence among bisexually active men was nearly three times lower than that among MSM-only. This disparity potentially could be attributed to two factors: higher levels of consistent condom use with male partners and lower levels of receptive anal intercourse among behaviorally bisexual men; both differences are expected to reduce HIV acquisition risk (Caceres and van Griensven 1994). Although MSMW engaged in lower risk sexual behaviors with male partners, consistent condom use with female partners was low. Higher levels of protected sex with male partners limit the potential of MSMW to acquire HIV infection from same-sex behavior, and a majority of MSMW had three or fewer recent female sex partners (data not shown); these factors may decelerate epidemiologic bridging by MSMW. However low rates of condom use with women indicate individual female partners remain at risk of HIV infection.

Results of our cross-sectional assessment of MSMW and MSM-only are similar to HIV prevalence and condom use studies in bisexual men in the Western context. In a review of 17 studies of HIV prevalence among behaviorally

bisexual and homosexual men, HIV prevalence was found to be consistently lower among bisexual men than homosexual men (Stokes et al. 1996). Proposed explanations for this disparity include higher rates of condom use, which our results support. Yet, as mentioned, low rates of condom use with female partners leave a low risk population vulnerable to HIV infection (only 1.0% of women attending antenatal clinics were HIV-positive) (Thailand Ministry of Public Health 2006). Studies among bisexual men in the United States and Great Britain (Boulton et al. 1992; Wold et al. 1998) similarly have described increased rates of unprotected sex with women relative to men. Differential rates of condom use based on partner gender indicate that Thai MSMW may perceive sex with males to be higher risk. In addition, consistent condom use may be related to decreased familiarity with male partners (most sexual encounters were with non-steady partners), whereas condom use would be expected to be lower (Nagachinta et al. 1997) (here it was 33.0%, data not shown) among the 62.0% of MSMW with steady female partners, including wives (14.9%). These results support studies that demonstrate decreased rates of condom use with increased length of partnership (Bankole et al. 1999) among heterosexuals. The implications of these findings are serious: women who are in long-term steady relationships may be unable to reintroduce condom use with MSMW partners or may be unaware of their partner's bisexual behavior. The lack of female-controlled methods of protection from HIV infection makes promotion of condom use among bisexual men increasingly important.

A study of bisexual men in San Francisco concluded that bisexual men were not an efficient epidemiologic bridge due to increases in consistent condom use with female partners after men were diagnosed with HIV (Ekstrand et al. 1994). In our study, over half of MSMW and MSM-only had been tested for HIV previously, although few reported receiving a positive test result (data not shown). Although no studies have explored behavior change before and after HIV diagnosis in Thai MSM, heterosexual and homosexual clients accessing voluntary counseling and testing services in Bangkok expressed intentions to reduce HIV risk behaviors if they were to test positive for HIV (Phanuphak et al. 1994a). This information, together with evidence of reductions in high-risk behavior after diagnosis with HIV in the United States (Weinhardt et al. 1999) suggests increased HIV testing among men who have sex with men is needed. Our results demonstrate that MSMW with high concern for becoming HIV infected were more likely to actually be HIV positive than those with low levels of concern, therefore these men may recognize their own behaviors as high-risk; testing services should be made more accessible to these individuals in order to promote behavior change. With knowledge of their positive

HIV status, men may take precautions to protect their sex partners and thwart a potentially expanding epidemic.

Our finding of 28.6% recent bisexual behavior among the MSM sample was higher than that observed in a 2003 MSM assessment in Bangkok (22.0%) (van Griensven et al. 2005) due to the recruitment of male sex workers in addition to community-based MSM in this study. Over half of MSMW self-identified as heterosexual, and an even larger proportion were recruited from sex work venues. Studies among sex workers in Thailand have described the tendency for heterosexual males to subvert their sexual orientation in order for economic gain in sex work (Kunawarak et al. 1995; Phanuphak et al. 1994b). Thus, same-sex intercourse may be limited to the short period of time (Phanuphak et al. 1994b) in which these men sell sex, thereby limiting the exposure of men to sexual networks with elevated HIV prevalence. Yet, for some MSMW, self-reported heterosexual orientation may be a reflection of Thai cultural ascriptions of sex roles. Most MSMW assumed the insertive role in anal sex; in Thai culture this allows them to maintain a "masculine" identity that is nearly equivalent to heterosexual (Jackson 1997). This discordance between behavior and sexual orientation suggests MSMW may be less likely to fully disclose their same-sex behavior to others, including female partners. Conversely, men who assume the receptive sex role lose their masculine identity and are labeled as "gay," thus the relationship to sex position could explain the association between homosexual orientation and HIV infection among MSM-only in univariate analysis.

Absence of a family confidant and migration from another region were risk factors for HIV infection in MSMW. Absence of a confidant may reflect the perception of men that it would be inappropriate to confide in family members due to the discrepancy between their normative outward heterosexual identity and their same-sex behavior (21.0% had ever married). Although male homosexuality is relatively accepted in Thai culture, open expression of sexual intimacy is socially prohibited (Jackson 1997). The absence of family support with its attendant moral value system and reinforcement on normative behavior may facilitate increased risk taking by behaviorally bisexual men. While migrants in Thailand have been identified as at higher HIV risk (Beesey 2000; Podhisita et al. 1996), research has focused largely on heterosexual behavior, specifically the association between female sex work and the epidemic in Northern Thailand (Maticka-Tyndale et al. 1997). Although from this cross sectional study we cannot determine whether HIV was acquired before or after migration, it is likely that migrants who move away from their families will have less restriction on their behavior and may engage in higher risk behavior. The availability of drugs and alcohol in urban centers facilitate high-risk



behavior for internal migrants who are in a new environment away from inhibiting social norms “at home”. Substantial numbers of both MSMW and MSM-only reported lifetime non-injecting drug use. Recreational use of drugs that enhance sexual pleasure, including methamphetamines and amyl nitrate, among bisexual and homosexual men in the United States has been associated with unprotected anal sex (Colfax et al. 2001). In Northern Thailand, high rates of chlamydial infection have been described among methamphetamine users (Beyrer et al. 2004), and our analysis indicates lifetime drug use was a risk factor for HIV infection in the MSM-only group. For MSMW, sexual networks with other men increase substantially the risk for female partners, more so among migrant men who may not disclose their homosexual behavior to wives or girlfriends. In addition, migrants may be harder to reach and have less access to healthcare, presenting further prevention challenges (Skeldon 2000). These findings suggest MSM outreach activities should address psychosocial issues associated with risky behavior.

Our study served as a rare glimpse into the diverse worlds of bisexual versus exclusively homosexual men, but it was subject to limitations. First, although the venue-day-time-sampling method allowed for more generalizability of our sample of MSM than clinic-based data or convenience samples, there may be different risk factors among men who seek sex outside of our selected venues to which we cannot generalize, as with other social networks derived from Internet contacts, private gatherings, or escort services, etc. In addition, this was a cross-sectional study, thus we were not able to determine the time-order of HIV infection and behavior, and therefore we cannot draw any causal conclusions based on our data. Moreover, some bisexually active men may have been miss-classified as MSM-only; 2.0% of this group reported being married. However, the aim of this study was to assess recent bisexual behavior, therefore a 3-month cut-off was used to investigate condom use and number of sexual partners. Finally, self-reports may impose limitations as participants may not have disclosed sensitive behavioral information due to embarrassment or fear of legal or social sanctions. However, we collected data using palmtop-assisted self-interviewing, which was associated with more reliable reports of sensitive behaviors compared to face-to-face interviewing (van Griensven et al. 2006).

Future research and HIV preventive interventions targeting MSM should not only focus on male-to-male transmission but also on the risk of heterosexual transmission. In order to further elucidate the potential role of MSMW as an epidemiologic bridge, research should focus on mapping sexual networks and assessing whether sex with a bisexual male is a major risk factor for HIV infection among women. Prevention programs that address

bisexual behaviors among MSM and increase awareness among women are necessary. Furthermore, it is essential to increase HIV testing and to educate and inform HIV-positive individuals so that they can protect their partners, both male and female, from HIV transmission.

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