

## HIV, STIs, AND SEXUAL BEHAVIORS AMONG MEN WHO HAVE SEX WITH MEN IN PHNOM PENH, CAMBODIA

Philippe Girault, Tobi Saidel, Ngak Song,  
Jan W. de Lind Van Wijngaarden, Gina Dallabetta,  
Francesca Stuer, Stephen Mills, Vathanak Or, Pierre Grosjean,  
Philippe Glaziou, and Elizabeth Pisani

A probability sample of 206 men who have sex with men from 16 sites in Phnom Penh were surveyed about sexual behaviors and tested for HIV and sexually transmitted infections (STIs). HIV and syphilis prevalence was 14.4% and 5.5%, respectively. Out of the total sample, 81% reported anal sex with any male partners in the past 6 months, and 61.2% reported having had vaginal sex. In the past 6 months, 82.8% of the sample reported having had male partners who paid them to have sex. Self-reported sexual orientation did not match well with self-reported sexual behavior. Significant risk factors for HIV infection were anal sex with multiple partners, unprotected vaginal sex with commercial female partners in the past month, and any STI. Complex sexual networks indicate that men who have sex with men act as a bridge between higher and lower HIV prevalence populations. Better prevention efforts structured around behaviors rather than sexual identities are needed.

Cambodia began the 20th century with the highest recorded HIV prevalence in Asia. Estimates based on national surveillance data put HIV infection among adults nationwide at 2.8% in 2000 (Cambodia Working Group on HIV/AIDS Projection, 2002). In the late 1990s, much attention was paid to tracking behaviors and infection among female sex workers and the clients they served, and extensive prevention campaigns focused on increasing condom use in extramarital sex. These campaigns were largely successful; when behavioral surveillance began in 1997, 29% of the Cambodian military reported unprotected sex with sex workers in the last month. By 2001, this had dropped precipitously to under 3%. Recent HIV surveillance data indicate that this

---

Philippe Girault, Ngak Song, Jan W. de Lind Van Wijngaarden, Francesca Stuer, and Vathanak Or are at Family Health International, IMPACT, Phnom Penh Cambodia. Tobi Saidel, Stephen Mills, and Elizabeth Pisani are at Family Health International, Asia Pacific Division, Bangkok, Thailand. Gina Dallabetta is at Family Health International, Arlington, VA. Pierre Grosjean and Philippe Glaziou are at Pasteur Institute, Phnom Penh, Cambodia.

This work was supported by the United States Agency for International Development as part of Family Health International's Implementing AIDS Prevention and Care, Project (HRN-A-00-97-0017-00). It does not necessarily reflect the views or policies of Family Health International or the United States Agency for International Development.

Address correspondence to Philippe Girault, c/o FHI/APD, Arwan Bldg., 1339 Pracharat 1 Rd., Bangsue, Bangkok 10800, Thailand; e-mail: [pgirault@fhibkk.org](mailto:pgirault@fhibkk.org)

fall in risky commercial sex between men and women has contributed to a drop in HIV prevalence (National Center for HIV/AIDS Dermatology and STDs, 2002).

Risk behavior and HIV prevalence among the heterosexual population are thus well characterized in Cambodia, but virtually nothing is known about other types of behavior that carry high risk for HIV infection. Sex between males is not included in the surveillance system. Isolated behavioral surveys and anecdotal evidence have however described the existence of male-male sex in Cambodia. A study of university students in the capital, Phnom Penh, reported that 8% of sexually active male students ( $N = 278$ ) had ever had penetrative sex with another man (Glaziou et al., 1999), whereas male-male sex was described in an ethnographic study of gender and sexuality among Cambodian youth (Tarr, 1996). Like neighboring Thailand, Cambodia also has an identifiable population of biological males who live their lives as women (hereafter referred to as transgender); in Cambodia, many of these individuals traditionally sell sex. No studies of this community exist to our knowledge. By the end of the 1990s, no systematic study of HIV-related risk or infection levels among any of the types of men who have sex with men (MSM) in Cambodia had been undertaken, and no prevention services were available to this community. In an attempt to fill this gap, a systematic mapping of MSM social networking was undertaken in Phnom Penh in 1999. The mapping was not intended to estimate the total size of the MSM population, but rather to identify the areas where MSM meet partners, the peak days and peak hours for each of the identified locations, the mobility of MSM populations from a location to another, and the different sexual networks operating in these locations. The mapping identified 27 locations where MSM meet partners or gather socially, including parks, karaoke bars, male massage parlors and brothels, discotheques, cinemas, and street cruising areas. Mapping teams observed high-risk behaviors among MSM such as transactions for commercial sex and multiple sexual partners. They reported that HIV prevention services were clearly likely to be needed by MSM in Cambodia. Therefore, an anonymous cross-sectional survey of MSM in Phnom Penh was undertaken, the results of which are reported in this article.

The objectives of this study were (a) to describe sociodemographic characteristics and self-reported behaviors of MSM in Phnom Penh, (b) to measure HIV and sexually transmitted infection (STI) prevalence linked to these characteristics, and (c) to plan appropriate behavior change interventions.

## METHODS

### SAMPLING AND RECRUITMENT

Prior to the implementation of this cross-sectional study in 2000, the 1999 mapping was updated to gain further accurate information to develop the sampling approach. Locations identified in the previous mapping were visited over a 1-week period, and activities and movement of the MSM population in each of these locations were explored. The updated mapping found fewer gathering places (16 were identified in all); some of the male massage parlors and brothels that operate out of rented locations had disappeared and did not seem to have been replaced.

Because populations differ by time of day and day of the week, a "time-location" sampling approach was chosen (Semaan, Lauby, & Liebman, 2002; Watters & Biernacki, 1989). Based on the findings of the mapping, clusters for each location were constructed with fixed time intervals of 2 hours, starting late in the afternoon until midnight, and for each day of the week. If locations were active only on specific days of the week, the clusters were only defined only for these active days. Some 87

clusters were identified in this way. The target sample size was 200. A two-stage sampling strategy was adopted: Forty-one clusters were randomly selected with equal probability as a first stage, and an average of five individuals were approached at random from each selected cluster. Potential respondents were identified by key informants who had a close working relationship with study staff. If the selected individual refused or was not eligible, another individual was approached. This selection procedure resulted in a non-self-weighted sample (Family Health International, 2000).

### STUDY PROCEDURES

Two drop-in centers were established for the study. They were staffed by medical assistants and interviewers. Outreach workers recruited potential participants in the field, while other survey staff systematically developed a sampling frame on the spot and counted MSM present at each selected cluster to allow for weighted analysis. All of the survey staff were Cambodian and were MSM (either self-identified or not identified but “practicing” for various reasons).

Questionnaires were adapted for local use from internationally standardized instruments (Family Health International, 2000), and were translated into Khmer and then field-tested. The questionnaire was divided into seven sections: (a) background characteristics; (b) marriage and partnership; (c) sexual history, types and number of partners; (d) Male condom and lubricant; (e) STIs; (f) knowledge, opinions and attitudes; (g) miscellaneous. Questions related to sexual behaviors were translated into the local language using explicit wordings to describe sexual practices such as anal sex and vaginal sex; ambiguous terms such as “sexual intercourse” were avoided throughout the questionnaire. Condom use during anal (or, when the question related to female partners, vaginal) sex was asked in two ways: condom use at the last vaginal or anal sex and the frequency of condom use during vaginal or anal sex in the past month (every time, most of the time, sometimes, and never). Respondents were asked general questions about partner types over the 6 months preceding the survey. However, to minimize recall bias in this highly sexually active population, specific questions about number of partners and consistent condom use were asked using a 1-month reference period. Prior to the collection of data, field teams were trained in interviewing skills, including the open discussion of sexuality, sampling methodology, and questionnaire administration. Medical assistants practiced appropriate specimen collection for 2 weeks at an STI clinic.

Inclusion criteria for recruitment into the study were any kind of self-reported male-to-male sex behavior during the previous 12 months and being age 18 or older. No effort was made at the recruitment stage to categorize MSM into subpopulations, such as male sex workers, transgenders, gays, or others, as not enough was known about the extent to which these categories were appropriate.

Potential participants were approached and told about the study. If they were interested, one of the field workers accompanied the participant to one of the drop-in centers established for the study. Witnessed oral informed consent was administered at the study site. No identifiers were recorded. All consenting participants underwent a medical and physical examination. Anal specimens were obtained from all participants regardless of symptoms and urethral specimens were taken from those presenting with urethral discharge. Specimens were inoculated onto Modified Thayer Martin Media in the clinic and placed in CO<sub>2</sub> extinction jars. All men were asked to provide a urine sample. Rectal and urethral swabs and urine specimens were collected for the detection of *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. Blood was collected for

HIV and syphilis serology. Individuals with symptoms suggestive of an STI were treated syndromically without charge. Finally, the questionnaire was administered by trained interviewers, taking an average of 30 minutes per respondent. Education and counseling were offered to each participant, and participants were also offered a shower, condoms, and a T-shirt. Participants were given a card with an ID number and invited to come back to obtain their STI results after a week. Those who had positive results and had not been treated syndromically at their first visit were treated according to national guidelines. Because there were no trained counselors in the study team, participants were referred to a local site for free HIV counseling and testing if they chose, and transportation was provided. This study received ethical approval from the Protection of Human Subjects Committee of Family Health International and the Ministry of Health of Cambodia.

### LABORATORY METHODS

Serologic testing for HIV and syphilis, *Neisseria gonorrhoeae* cultures, and specimen handling were performed at the Pasteur Institute of Cambodia. Initial HIV screening was performed with a direct particle agglutination test (Serodia-HIV1, Fujirebio Inc., Tokyo, Japan). If the test was positive, a confirmation with an Enzyme Linked Fluorescent Assay, or ELFA (Vidas HIV DUO, bioMérieux Sa. Marcy l'Etoile, France), was undertaken. If the test was negative, the confirmation was done with a third generation ELISA (Geenscreen HIV 1/2, Biorad, France). The negative results of this test confirmed the HIV negativity serostatus. However, if the ELISA was positive another confirmation as a final test with an ELFA test was undertaken.

Sera were tested for syphilis using quantitative Rapid Plasma Reagin (RPR; Becton, Dickinson, Cockeysville MD). RPR reactive sera were confirmed using particle agglutination (Treponema Pallidum Passive Particle Agglutination (Serodia-TP-PA, Fujirebio INC, Tokyo Japan).

Gonorrhea cultures for anal and urethral swab inoculated on modified Thayer-Martin medium at the clinic were transferred to incubators at 36°C in 5% CO<sub>2</sub> atmosphere and read at 48 hours and 72 hours. The *Neisseria gonorrhoeae* strains isolated were stored in Skim Milk glycerol medium at -80°C. Urine and anal specimens were frozen (-20°C), batched at the Pasteur Institute and transported to the Institute of Tropical Medicine (ITM) in Antwerp for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* detection using polymerase chain reaction (PCR) (Amplicor NG/CT co-amplification PCR, Roche Diagnostic System, Branchburg, NJ).

### STATISTICAL ANALYSES

Data were double entered using SPSS 10.0 (SPSS Inc. Chicago) and compared with Epi Info 6 (Centers for Diseases Control and Prevention, Atlanta, GA). After cleaning, data were analyzed using STATA software (STATA Corporation, College Station, TX). Data were collected to allow for cluster analysis and weighted counts. As it was a non-self-weighted sample, standardized weights were calculated and applied for each cluster, according to the total number of potential respondents observed at the cluster during the 2-hour period selected for data collection (Family Health International, 2000). Cluster and weighted univariate and bivariate analyses were conducted, adjusting for design effect, and significant differences in proportions were tested using the chi-square statistic test. Demographic, behavioral, and biological variables that were significantly associated with HIV at the 5% alpha level in bivariate analysis were entered into a multivariate model. Logistic regression was used to assess

the independent effects of each of these significantly associated variables, adjusting for survey design.

## RESULTS

### SOCIODEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

During the study period, 206 males were enrolled in the study. The refusal rate at the initial contact between the potential participant and the outreach worker was 37%. No information was recorded about people who refused to participate.

Overall, respondents were young and poorly educated, with a mean age of 24.4 years (range, 19-42) and a mean of 6.4 years (range, 0-14) schooling. Almost all the respondents were unmarried and Buddhist. About half of the respondents said they were unemployed at the time of the study, but the mean income of U.S. \$62 (range, 0-789) per month did not differ significantly between those who worked and those who did not.

Mobility in the study population was high. Half of all respondents said that they had been away from home for more than a month during the preceding 12 months, and over 40% had lived in Phnom Penh 3 years or less.

### SEXUAL IDENTITY AND BEHAVIOR

When respondents were asked to characterize their sexual identity, 30.3% described themselves simply as men, which in the Cambodian context means they consider themselves to be heterosexual; 22.9% said they were homosexual (including one respondent who used the term “gay”); and a further 27.3% said they were bisexual.

A total of 39 transgendered respondents (19.7%) identified themselves as women. However, people’s behavior did not match well with self-reported sexual identity. As Table 1 shows, many men who described themselves as homosexual also had sex with women; because of the nature of the study all men who described themselves as heterosexual (“man”) had sex with men but not all of them had sex with women.

The mean age at first sex for all respondents was 17.7 years (range, 10-29). Just under half of respondents (49.8%) reported that their first sex partner was male; those who identified as homosexual or as “women” were most likely to first sexual experience with a male: 83.8% and 75.9%, respectively.

Over half of people who identified as “men” and 45.2% of men who consider themselves bisexual only had sex with men if they were paid, and this was also true of a significant proportion of men who consider themselves homosexual. Despite the fact that “bisexual” men were less likely than other groups to have only nonpaying partners, 90.3% cited desire as well as money as a motivation for having sex with other men. Overall, 69.4% of respondents who only had sex for money gave desire as at least a partial motivation for having sex with men (data not shown).

Among men who identified as “bisexual” and “men,” the majority of them reported to have had sex with a woman in the 6 months prior to the survey. These high levels of sexual activity with women were also reflected in consumption of commercial sex. More surprisingly, however, a fifth of men who said they were homosexual and over a third of males who identified as women said they had had vaginal sex with a woman in the 6 months prior to the survey, and a quarter of the female-identified respondents reported buying sex from female sex workers. Some 8.3% of the overall sample also reported selling sex to women, and 85% of these men identified as “men”

TABLE 1. Sexual Behavior and Motivation to Have Sex with Males, According to Declared Sexual Identity

	Man <i>n</i> = 60 % (95% CI)	Homosexual <i>n</i> = 47 % (95% CI)	Bisexual <i>n</i> = 56 % (95% CI)	Woman <i>n</i> = 40 % (95% CI)	All <i>n</i> = 203 % (95% CI)
All male partners paying <sup>a</sup>	50.3 (30.5 – 70)	22.4 (9.4 – 44.7)	45.2 (28.5 – 63.0)	40.3 (15.2 – 71.8)	40.5 (30.0 – 52.0)
No male partners paying <sup>a</sup>	17.5 (8.0 – 34.2)	21.5 (9.7 – 41.1)	10.9 (1.7 – 46.3)	20.8 (7.5 – 45.8)	17.3 (11.6 – 24.8)
Both paying and nonpaying male partners <sup>a</sup>	32.3 (22.8 – 43.5)	56.1 (31.0 – 78.4)	43.9 (26.5 – 63.0)	39.0 (22.4 – 58.6)	42.2 (32.9 – 52.1)
Motivated to have sex with men by desire and money	40.2 (28.0 – 53.8)	78.5 (58.9 – 90.3)	90.3 (51.6 – 98.8)	39.8 (24.4 – 57.4)	62.7 (50.9 – 73.1)
First sex partner male	37.5 (25.8 – 50.9)	83.8 (64.2 – 93.8)	16.3 (3.8 – 40.4)	75.9 (43.1 – 92.9)	49.8 (40.6 – 59.0)
Sex with any woman <sup>a</sup>	79.9 (65.5 – 89.2)	20.6 (9.5 – 39)	93.5 (69.2 – 98.1)	34.3 (12.2 – 66.1)	61.0 (49.2 – 71.6)
Sex with female sex worker <sup>a</sup>	49.1 (36.7 – 61.5)	7.8 (3.0 – 19.2)	41.8 (26.2 – 59.3)	25.5 (7.7 – 58.3)	33.1 (24.1 – 43.5)
Any insertive anal sex <sup>b</sup>	90.9 (81.4 – 95.8)	93.3 (80.7 – 97.9)	75.5 (43.5 – 92.5)	26.7 (7.5 – 62.1)	74.0 (59.9 – 84.4)
Any receptive anal sex <sup>b</sup>	32.6 (16.6 – 54.1)	59.2 (26.7 – 85.3)	61.7 (44.7 – 76.3)	77.8 (40.8 – 94.7)	57.0 (45.0 – 68.3)
Multiple male anal partners, in last month <sup>c</sup>	87.5 (74.2 – 94.5)	90.3 (75.8 – 96.5)	74.3 (46.9 – 90.4)	96.7 (82.0 – 99.5)	86.8 (78.4 – 92.2)
Multiple female partners in last month <sup>c</sup>	68 (51.7 – 80.8)	44.5 (18.2 – 74.3)	52.2 (30.6 – 73.1)	74.0 (36.3 – 93.5)	60.1 (47.6 – 71.5)
Anal/vaginal sex with men and women in last month	45.3 (36.5 – 85.0)	17.4 (7.8 – 34.6)	70.0 (49.9 – 84.5)	17.6 (3.9 – 53.2)	40.3 (30.8 – 50.5)

Note. CI = confidence interval. <sup>a</sup>In the 6 months prior to the survey. <sup>b</sup>With most recent partners of all types, of those who have had any anal sex partners in the last 6 months. <sup>c</sup>Of respondent reporting this type of partner.

or “bisexual.” A total of 36% of men had more than one female partner in the past month.

Sex with males in the year prior to the survey was an inclusion criterion for the study, and 80.1% of respondents reported anal sex with any male partners in the 6 months prior to the interview. Close to a third of male-identified respondents and more than a fifth of bisexual identified respondents reported no anal partners in the preceding 6 months, compared with just 3.2% of homosexual identified respondents. Those who did report anal partners had sex with a mean of 6.4 males (range, 1-66) in the preceding month (95% confidence interval [CI]: 5.0-7.8), with no significant differences between orientation groups.

As Table 1 shows, three quarters of the males who reported any anal sex partners in the last 6 months reported some insertive sex, and 57.1% reported some receptive sex. Compared to the other identity groups, a smaller proportion of respondents who identified as “men” reported receptive anal sex.

Insertive and receptive practice at last anal sex with a male client did not differ between men who identified as homosexual and those who identified as bisexual. In both groups, just over half reported being the insertive partner only and 14% the receptive partner only, with the remaining third engaging in both insertive and receptive sex. Male-identified respondents were, however, more likely to play the insertive role with clients, 64.1%, (95% CI: 40.0-82.7) with only 8.7% (95% CI: 3.6 - 19.6) reporting a purely receptive role, whereas female-identified respondents were far more likely to be the receptive partner at 71% (95% CI: 34.2-92). No female-identified respondents reported playing both insertive and receptive roles with their most recent client.

Among those who had female partners, multiple female partners were less common than multiple male anal partners in all identity groups. The mean number of female partners in the last month among those with female partners was 3.2 (range, 1-17). Overall, 40% of all respondents reported anal sex with men and vaginal sex with women in month preceding the survey.

### CONDOM AND LUBRICANT USE

As Table 2 shows, reported condom use at last anal or vaginal sex was relatively high with many partner types of both sexes. A higher proportion of men reported using condoms with female casual partners than with female sex workers, but the difference was not statistically significant. Condom use was also lower with casual male partners than with casual female partners, probably reflecting the effect of large-scale prevention campaigns focused on reducing risky heterosexual encounters. Just a third of the respondents with casual male partners always used condoms with those partners in the past month.

Overall, 48.4% of respondents had some unprotected anal sex with a male partner in the month preceding the survey, and 26.3% reported unprotected sex with a female partner over the same period. Some 13.3% reported both of these behaviors, and close to 1 in 10 respondents had unprotected sex with a female sex worker (the group with the highest HIV prevalence in Cambodia) and with a member of at least one other subpopulation.

Eighty-seven of respondents knew that condoms prevent HIV, but those who knew were no more likely to have used condoms at last sex with a casual male partner or client than those who did not know. Some 46% of respondents said they could not easily obtain condoms whenever they needed them, and 80% of these said this was be-

TABLE 2. Condom Use, According to Partner Type  
(the denominator is those who reported sex with this type of partner in the last month)

	With Regular Partner % (95% CI)	With Sex Worker % (95% CI)	With Client % (95% CI)	With Casual Partner % (95% CI)
Used condom at last anal sex with a male partner:	73.7 (44.8 – 90.6)	—	60.6 (47.1 – 72.7)	52.5 (36.6 – 68.0)
Used condom at last sex with a female partner	15.8 (4.8 – 41.1)	69.7 (43.3 – 87.4)	68.0 (45.4 – 84.4)	77.8 (59.7 – 89.3)
Always used condom in anal sex with male partner last month	54.4 (35.5 – 72.1)	—	46.8 (32.9 – 61.2)	33.0 (12.9 – 62.2)
Always used condom with female partner last month	19.3 (5.9 – 85.5)	58.5 (35.4 – 78.4)	68.5 (44.9 – 85.3)	78.7 (60.2 – 90.0)

Note. CI = confidence interval. — Results suppressed because only three respondents reported buying sex from another man last month.

TABLE 3. HIV and STI Prevalence and Self-Reported STI Symptoms (N = 206)

	Serological n % (95% CI)	Urethral/genital n % (95% CI)	Anal n % (95% CI)
HIV antibody positive	29 14.4% (8.94 – 22.25)	—	—
Syphilis confirmed RPR positive	11 5.5% (2.5 – 11.8)	—	—
Neisseria gonorrhoeae	—	10 4.8% (1.5–13.7)	1 0.3% (0.03–2.2)
Chlamydia	—	15 7.2% (3.2–14.9)	3 1% (0.3–3.3)
Tested positive for any curable STI	—	39 18.8% (10.5 – 27.2)	—
Tested positive for any STI, including HIV	—	55 26.5% (17.9 – 35.1)	—
Self-reported ulcer in last 12 months	—	32 15.3% (7.7 – 28.3)	4 1.9% (8 – 4.8)
Self-reported discharge in last 12 months	—	32 15.7% (8 – 28.5)	2 0.7% (1 – 4)
Any self-reported STI symptom in last 12 months	—	43 21.1% (12.2 – 33.9)	—

Note. STI = sexually transmitted infection; CI = confidence interval; RPR = Rapid Plasma Reagin.

cause condom outlets were not conveniently located. This is surprising in a context where condoms are actively promoted and very widely available throughout the city at low prices.

Safe lubricant use was far less common than condom use. Fifty-seven percent of respondents reported using oil-based lubricants (beauty cream, cooking oil, medicinal cream, and hair oil), and a third used saliva. Only four individuals reported using water-based lubricant, and 60% of respondents had never even heard of such a product.

#### HIV-RELATED KNOWLEDGE AND TESTING HISTORY

All but four of the respondents had heard of HIV; 41.8% of all respondents said they personally knew someone living with the infection. Between 85 and 90% of respondents knew that condoms, mutual monogamy, and abstinence prevent HIV. Close to three quarters were also aware that it was not possible to tell someone was infected with HIV just by looking at them. However only 52% knew that condoms could protect against HIV and were aware that they could not “screen” infected partners by sight, which in this largely sex-working population might be considered the minimum necessary knowledge to protect effectively against HIV.

Over 7 in 10 respondents reported that it was possible to obtain a confidential HIV test, and close to 1 in 5 had ever voluntarily requested an HIV test and received the results. This compares very favorably with other countries in the region. In Indonesia and China, for example, fewer than one in 20 MSM had ever had an HIV test (Choi et al., 2003; Pisani et al., 2003).

#### STI HISTORY AND HIV AND STI PREVALENCE

HIV antibody prevalence was relatively high in this previously untested population, at 14.4%, as shown in Table 3. The prevalence of other STIs at the time of the survey was also significant, with a total of 18.8% testing positive for any of the curable STIs included in the study. Anal infections were less common than urethral infections, and the relative values of self-reported symptoms of STIs over the past year appeared to correlate relatively well with measured point prevalence.

Just over a third of men who reported symptoms of STIs in the last year did not get treatment for their infections from modern medical facilities. There was no significant association between STI infection and either penetrative sex or unprotected sex with any partner type, sexual orientation, or total number of either male or female partners in the preceding month. As Table 4 shows, however, there was a significant association between HIV infection and infection with any curable STI, as well as between HIV infection and syphilis.

In terms of sexual orientation, respondents who identified as “women” were more likely to be HIV infected than those who identified as men, but there were no significant differences between other groups. No other sociodemographic characteristics were significantly associated with HIV infection. The only behaviors significantly associated with HIV infection were anal sex with multiple partners in the last month, and unprotected sex with a female sex worker in the last month.

When all of the factors significantly associated with HIV infection were put into a multivariate model, syphilis infection and female sexual orientation became insignificant. Because of its colinearity with infection with any curable STI, syphilis was subsequently dropped from the model. As shown in Table 4, after controlling for other factors, anal sex with multiple partners, unprotected sex with a female sex

**TABLE 4. Logistic Regression of HIV Infection by Various Socio-Demographic, Behavioral, and Biological Characteristics**  
(all odds ratios are for “yes” on the variable in question, with “no” = 1, unless otherwise stated)

	Odds Ratio in Univariate Analysis N = 206 OR (95% CI)	Odds Ratio in Multivariate Analysis <sup>a</sup> N = 206 OR (95% CI)
Sufficient knowledge to protect against HIV <sup>b</sup>	0.57 (0.2 – 1.7)	3.0 (0.9 – 10.1)*
Reported sexual identity		
Man	1	
Homosexual	0.47 (0.1 – 1.8)	
Bisexual	1.51 (0.6 – 4.1)	
Woman	3.8 (1.4 – 10.2)***	
Anal sex with multiple male partners last month	3.3 (1.3 – 8.4)**	3.4 (1.2 – 10.0)**
Any unprotected anal sex with commercial male partner last month	2.4 (0.8 – 7.2)	—
Any unprotected anal sex with a non-paying male partner last month	0.7 (0.2 – 2.5)	—
Any unprotected sex with a non-commercial female partner last month	0.2 (0.02 – 1.3)	—
Any unprotected sex with a female sex worker last month	3.3 (1.2 – 9.1)**	2.9 (1.3 – 6.5)**
Any receptive anal sex with recent partners	1.1 (0.4 – 3.3)	—
Syphilis confirmed RPR positive	9 (2.0 – 40.2)***	2.0 (0.3 – 14.6)
Infection with any curable STD	5.9 (1.5 – 23.6)**	6.2 (1.7 – 22.8)***

*Note.* OR = odds ratio; CI = confidence interval; RPR = Rapid Plasma Reagin. <sup>a</sup>Variables in the multivariate model were sexual identity, anal sex with multiple partners, unprotected sex with multiple partners last month, unprotected sex with a female sex worker and infection with any curable STD. <sup>b</sup> Defined for this largely sex-working group, as knowing condoms prevent HIV and healthy-looking people can be infected with HIV. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ ; \*\*\*\*  $p < 0.001$ .

worker and infection with any curable STI remained significantly associated with HIV infection.

## DISCUSSION

This study suffers from the limitations common to cross-sectional surveys: Although it is possible to demonstrate associations between behaviors and infection, the time of infection is not known so it is not possible to establish causality. In addition, this study was constrained by high rates of refusal, which limits the ability to generalize the results. About 37% of all those approached refused to participate in the survey, and field workers observed that the majority of the MSM who refused seemed to be the clients of the male sex workers. Moreover, some locations where MSM can be found or other networks such as male sex workers working in exclusive entertainment establishments or telephone networks for commercial sex were not possible to access by the research team. Although a significant proportion of MSM under 18 years old were observed during the mapping, they were not enrolled for legal and social reasons. Finally, because of the relatively small sample size of the captured population, some univariate and bivariate analysis showed very broad confidence intervals that affect the precision of some of the results presented in the tables.

The majority of those eventually included as respondents in this survey were male sex workers (82.8%), a group of men at very high risk for HIV and other STIs. The study was not able to estimate the total number of MSM in Phnom Penh or Cambodia. Because of the limitations described above, it would be inappropriate to extrapolate these findings to the general population of MSM in Phnom Penh or to draw firm conclusions about the impact they may have on a wider epidemic in Cambodia. Nevertheless, the findings highlight the different and complex sexual networks that males who have sex with males have in the Cambodian context.

It is frequently assumed that HIV in Asian countries follows a “wave” pattern similar to that recorded in Thailand, with MSM and injection drug users the first to be affected (Dore, Brown, Tarantola, & Kaldor, 1998). HIV infection is assumed to spread from these groups into heterosexual networks, first entering the community of sex workers and their clients and then spreading to the general population. The evidence presented in this article contradicts this view. HIV prevalence among female sex workers was, at the time of the study, roughly twice as high as HIV prevalence among MSM. Men in this study who had had recent unprotected sex with female sex workers were three times as likely to be infected with HIV as men who had not, even after controlling for other risk factors. Although the cross-sectional nature of the study makes it impossible to determine the temporal relationship between behavior and infection, the data strongly suggest that MSM who have sex with female sex workers may have introduced HIV into the male-male sex community rather than vice versa. This phenomenon has not, to our knowledge been recorded in any other country. As the epidemic progresses, the patterns of spread of HIV from one at-risk sub-population to another become less relevant to prevention program planners. It is clear that HIV and other STIs already exist at high levels within the MSM community in Cambodia. The fact that 37% of HIV infections in this study were recorded in men who reported never having had sex with a woman demonstrates that HIV is spreading in this community, regardless of the intersection with heterosexual risk.

Despite relatively high awareness surrounding HIV, MSM in this study continue to report significant levels of risk behavior, reports that are confirmed by high levels of

STIs. Cambodia has well-developed HIV prevention services, but it seems that these do not meet the needs of MSM. Men report difficulty accessing condoms when they need them, suggesting that the active social marketing campaigns that have delivered condoms to almost all heterosexual commercial sex venues in Phnom Penh are not reaching areas where men meet male sex partners. Water-based lubricant is little unknown and virtually never used and a third of men reporting STI symptoms do not get proper medical attention.

Clearly, more carefully targeted prevention services and commodities are needed for males who have sex with other males in Cambodia. The targeting cannot, however, be based on sexual identity. Although all the men in this study had sex with other men, many of them did not identify as either homosexual or bi-sexual, and only one person used a social group identifier such as “gay.” Men in this study had sex with men for money as well as for pleasure, and their identities were more closely linked to the type of sex they had than to the gender of partners. For example, males who identified as “men”—who had masculine or heterosexual identities—were less likely to have insertive anal sex than other groups. The minority of respondents identifying as women were most likely to have receptive anal sex. Whatever the psychosocial basis for these identities, it is doubtful that these individuals would respond well to prevention programs targeted at a “gay” audience commonly reached by MSM programs in other countries. Meeting the HIV prevention needs of these men will not be straightforward: Prevention programs are likely to succeed better if they focus on behaviors rather than target any particular sexual identity or “community.” To help inform such programs, more qualitative research is needed to shed light on the way Cambodian MSM explain or experience their sexual behavior and their sexuality, and to what extent they see their behavior as “part of an identity” or just as a behavior.

MSM in Cambodia are at high risk for HIV and STI infection. Despite the limitations of the study, the findings show a high prevalence of HIV infection and risk behaviors among MSM that persist even as sexual behavior among heterosexuals in Cambodia is becoming safer. In addition, many of these men have unprotected sex with both high and low risk female partners; they may therefore act as an efficient conduit for the virus between populations with different levels of risk behavior.

It is not possible to judge the impact of male-male sex on a wider epidemic until more is known about the extent of this behavior in the population. However, these findings suggest that high-risk male-to-male sexual behavior should not be ignored when planning HIV prevention interventions in Cambodia. Peer outreach programs promoting knowledge and the use of easily accessible condoms and lubricant are a priority for men identifiable as sex workers. The strong association between HIV infection and infection with other STIs, even after controlling for behavior, emphasizes the need for appropriate STI screening and treatment programs in an environment which is physically and psychologically safe for MSM. In addition, because heterosexually identified men appear to be engaging in high-risk male-male sex, anal sex risks should be integrated into existing information, education and communication material aimed principally at heterosexual men. Finally, with HIV prevalence among MSM in Cambodia at 14.4%, planning is needed to provide psychosocial support and medical care for those already infected.

## REFERENCES

- Cambodia Working Group on HIV/AIDS Projection. (2002). *Projection for HIV/AIDS in Cambodia: 2000-2010*. Phnom Penh, Cambodia: National Center for HIV/AIDS Dermatology and STDs / Ministry of Health.
- Choi, K. H., Liu, H., Guo, Y., Han, L., Mandel, J. S. & Rutherford, G. W. (2003). Emerging HIV-1 epidemic in China in men who have sex with men. *Lancet* 361(9375), 2125-2126.
- Dore, G. J., Brown, T., Tarantola, D., & Kaldor, J. M. (1998). HIV and AIDS in the Asia-Pacific region: An epidemiological overview. *AIDS*, 12 ( Suppl. B), S1-S110.
- Family Health International. (2000). Behavioral surveillance surveys: Guidelines for repeated behavioral surveys in populations at risk of HIV. Arlington, VA: Author.
- Glaziou, P., Bodet, C., Loy, T., Vonthanak, S., El-Kouby, S., & Sainte Marie, F. F. (1999). Knowledge, attitudes and practices of university students regarding HIV infection, in Phnom Penh, Cambodia, 1999. *AIDS*, 13(14): 1982-1983.
- National Center for HIV/AIDS Dermatology and STDs. (2002). *HIV sentinel surveillance 2002, National dissemination*. Phnom Penh, Cambodia: Ministry of Health.
- Pisani, E., Girault, P., Gultom, M., Dadun, D., Sukartini, N., Kumalawati, J., Jazan, S., & Donegan, E. (in press). HIV, syphilis infection and sexual practices among transgenders, male sex workers and other men who have sex with men in Jakarta, Indonesia.
- Semaan, S., Lauby, J., & Liebman, J. (2002). Street and network sampling in evaluation studies of HIV risk-reduction interventions. *AIDS Review*, 4(4), 213-223.
- Tarr, C. M. (1996). *People in Cambodia don't talk about sex, they simply do it! A study on the social and contextual factors affecting risk-related sexual behavior among young Cambodians*. Phnom Penh, Cambodia: Cambodian AIDS Social Research.
- Watters, J. K., & Biernacki, P. (1989). Targeted Sampling: Options for the study of hidden populations. *Social Problems*, 36(4), 416-430.