

2005 Cambodia STI Prevalence Survey

Integrated Biological and Behavioral Survey

Sexually transmitted infections and related behaviors
among brothel-based female sex workers, police, and
men who have sex with men

Heng Sopheab, Guy Morineau, Joyce J. Neal, Chhea Chhorvann



USAID
FROM THE AMERICAN PEOPLE

Foreword

The 2005 Sexually Transmitted Infection (STI) Prevalence Survey is the third of its kind in Cambodia. The first one was conducted by the National Center for HIV/AIDS Dermatology and STD (NCHADS) in collaboration with partners in 1996, followed by a second one in 2001.

Information related to STIs is crucial for fighting against the spread of HIV/AIDS as evidence shows that several STIs, such as syphilis, have a strong association with the risk of HIV transmission and acquisition. Furthermore, STIs are believed to be responsible for large proportion of pelvic inflammatory disease, ectopic pregnancy, infertility and congenital infections. Because of its significance to HIV/AIDS prevention activities, the third STI survey round, conducted in 2005, aimed to estimate the prevalence of three STIs -gonorrhea, chlamydia, and syphilis - among brothel-based female sex workers (FSWs), police, and men who have sex with men (MSM).

The survey showed that the prevalence of STIs among brothel-based FSWs since 2001. STI prevalence among police remained low, and syphilis seropositivity declined to less than 1%. Police who were currently infected with STIs were more likely to report having unprotected sex with FSWs. STI prevalence among MSM was relatively high compared with the police group. Moreover, rectal chlamydia among MSM, especially among transgenders (12%), was high.

The sustained high prevalence of gonorrhea and chlamydia among FSWs five years after the previous survey suggests that FSWs are not always adequately treated for their STI or that reinfection may be common. Innovative approaches are needed to increase FSWs participation in STI prevention programs and to ensure appropriate and effective treatment on a regular basis, beginning as soon as they start work in a new establishment. Because of its role in preventing the spread of HIV in Cambodia, controlling the STI epidemic among female sex workers, their partners and MSM is of critical importance.

Finally, I would like to express my gratitude to all those who have contributed to this survey and particularly, the study participants who helped make this study happen.

Phnom Penh, 29 April 2008
NCHADS Director



Mean Chhivun, MD, MPH

Acknowledgments

Survey Team:

- Dr. Heng Sopheab
- Dr. Mun Phalkun
- Dr. Theng Thithara
- Mrs. Seng Sopheata
- Mrs. Kao Chantha
- Dr. Lon Say Heng
- Dr. Chan Navy
- Dr. Thei Sophalla
- Dr. Kheiv Nareth
- Mr. Chhok Sam

Technical Assistance Team

- Dr. Guy Morineau: Family Health International (FHI), Senior Surveillance Officer
- Dr. Joyce J. Neal: US CDC Global AIDS Program (GAP), Epidemiologist
- Dr. James C. McDonald: US CDC GAP, Microbiology Laboratory Advisor
- Dr. François Crabbe: Institute of Tropical Medicine Antwerp, STI advisor
- Dr. Nigel O'Farrell: Asian Development Bank (ADB), Consultant
- Dr. Saphonn Vonthanak: NCHADS Research Unit, Head

Acknowledgements

NCHADS would like to express gratitude to those who provided support for this survey, including:

- The Ministry of Health of Cambodia
- USAID, US CDC GAP, and ADB for their financial support
- FHI and US CDC GAP for their technical and logistical assistance
- The National Center for Dermatology and STDs referral laboratory for STI and HIV testing
- US CDC STD Laboratory for quality control testing
- The Provincial AIDS Offices for their participation
- The NCHADS Surveillance Unit
- The survey respondents

Table of Contents

Foreword.....	i
Acknowledgments.....	iii
List of Tables.....	vii
List of Figures.....	viii
List of Abbreviations.....	ix
I. Executive Summary.....	1
II. Background and Rationale.....	6
III. Objectives.....	9
IV. Methods.....	10
4.1. Survey design.....	10
4.2. Survey populations.....	10
4.3. Survey areas.....	10
4.4. Sample sizes.....	11
4.5. Sampling strategies.....	12
4.5.1. Brothel-based sex workers.....	12
4.5.2. Police.....	12
4.5.3. MSM.....	12
4.6. STIs and laboratory procedures.....	12
4.7. Survey procedures.....	13
4.8. Interviews.....	14
4.8.1. Clinical procedures.....	14
4.8.2. Composition of survey teams.....	14
4.8.3. Data entry, processing and analysis.....	15
4.9. Ethical issues.....	15
4.10. Ethical review.....	15
4.11. Quality control.....	15
4.11.1. FSW specimens.....	15
4.11.2. MSM specimens.....	16
4.11.3. Police specimens.....	17
4.12. Response rates and refusals.....	18

V.	Behavioral Results	19
5.1.	Female sex workers	19
5.1.1.	<i>Demographic characteristics</i>	19
5.1.2.	<i>Duration of selling sex and internal migration</i>	20
5.1.3.	<i>Age at first sex and reproductive history</i>	21
5.1.4.	<i>Sexual partners</i>	21
5.1.5.	<i>Sexual behaviors and condom use</i>	22
5.1.6.	<i>Risk perception</i>	23
5.1.7.	<i>Uptake of VCCT services</i>	23
5.1.8.	<i>STI history and service uptake</i>	24
5.1.9.	<i>Trends</i>	25
5.2.	Police	26
5.2.1.	<i>Demographic characteristics</i>	26
5.2.2.	<i>Sexual behaviors</i>	26
5.2.3.	<i>Trends</i>	28
5.3.	MSM	29
5.3.1.	<i>Demographic characteristics</i>	29
5.3.2.	<i>Internal migration</i>	30
5.3.3.	<i>Sex with female partners</i>	31
5.3.4.	<i>Sex with male partners</i>	32
5.3.5.	<i>Sexual practices</i>	33
5.3.6.	<i>Lubricant use</i>	34
5.3.7.	<i>Sexual risk with male partners</i>	34
5.3.8.	<i>HIV testing</i>	35
5.3.9.	<i>STI knowledge, occurrence, and service uptake</i>	36
5.3.10.	<i>Meeting places</i>	36
VI.	Prevalence of Sexually Transmitted Infections	37
6.1.	Chlamydia	37
6.2.	Gonorrhea	37
6.3.	Syphilis	38
6.4.	Prevalence of STIs by sentinel group	38
6.4.1.	<i>Female sex workers</i>	38
6.4.2.	<i>Police</i>	40
6.4.3.	<i>MSM</i>	42
VII.	Conclusion and Recommendations	44
VIII.	References	46

List of Tables

Table 1.	Prevalence estimates obtained from Cambodia STI Survey, 1996	6
Table 2.	Prevalence estimates obtained from Cambodia STI Survey, 2001	7
Table 3.	Prevalence estimates obtained from Banteay Meanchey Integrated HIV, STI, and Behavioral Survey, 2003.....	8
Table 4.	Provinces included in the Cambodia STI surveys, by year of survey	10
Table 5.	Coverage of the 2005 STI survey, by province and sentinel group	11
Table 6.	Proposed sample sizes by province and survey group	11
Table 7.	STIs surveyed and type of specimen collected, by sentinel population	13
Table 8.	Comparison of Cambodia and CDC Atlanta results for testing FSW vaginal swabs	16
Table 9.	Comparison of Cambodia and CDC Atlanta results for testing MSM rectal swabs.....	16
Table 10.	Comparison of Cambodia and CDC Atlanta results for testing MSM urine specimens	17
Table 11.	Comparison of Cambodia and CDC Atlanta for testing police urine specimens.....	17
Table 12.	FSW sample, by province	19
Table 13.	Demographic characteristics of FSWs surveyed	20
Table 14.	Duration of selling sex in brothels and internal migration among FSWs	20
Table 15.	Age at first sex and reproductive history among FSWs.....	21
Table 16.	Number and type of partners reported by FSWs	22
Table 17.	Condom use and sexual practices reported by FSWs	23
Table 18.	Uptake of VCCT services among FSWs	24
Table 19.	Self-reported history of STI among FSWs	24
Table 20.	Demographic characteristics of police surveyed	26
Table 21.	Recent internal migration reported by policemen surveyed.....	26
Table 22.	Uptake of VCCT services among police	27
Table 23.	Demographic characteristics of MSM, by survey location.....	30
Table 24.	Internal migration among MSM, by survey location	30
Table 25.	Number of male partners in the past month and in the past week reported by MSM, by survey location.....	32
Table 26.	Sexual practices reported by MSM, by self-reported gender.....	34
Table 27.	MSM lubricant use by survey location	34
Table 28.	STI prevalence among FSWs by province.....	38
Table 29.	Association between testing positive for any STI and demographic and behavioral characteristics among FSWs	39
Table 30.	Association between testing positive for any STI and demographic and behavioral characteristics among police, 2005	41

List of Figures

Figure 1.	Self-perceived risk of acquiring an STI	23
Figure 2.	Services used by FSWs for STI treatment	24
Figure 3.	Consistent condom use by FSWs	25
Figure 4.	Uptake of medical services by FSWs for treatment of last STI	25
Figure 5.	Proportion of policemen who reported sex with non-marital-partners	27
Figure 6.	Proportion of police who reported always using condoms	27
Figure 7.	Self-perceived risk of acquiring an STI	27
Figure 8.	Place where police sought treatment for the last episode of STI	28
Figure 9.	Proportion of police who reported sex with non-marital partners	28
Figure 10.	Trends in consistent condom use with FSWs among police	28
Figure 11.	Percent distribution of MSM gender	29
Figure 12.	Percent of non-transgender MSM who reported sex with women	31
Figure 13.	Percent of MSM who reported consistent condom use with women	31
Figure 14.	Percent of other MSM who reported sexual risk with female partners	32
Figure 15.	Percent of MSM who reported sex with men	33
Figure 16.	Percent of consistent condom use by MSM with men	33
Figure 17.	Sexual risk with male partners in the past month	35
Figure 18.	Consistent condom use during anal sex	35
Figure 19.	Uptake of HIV testing services among MSM	35
Figure 20.	MSM's self-perceived risk of acquiring an STI	36
Figure 21.	Places visited by MSM when seeking partners	36
Figure 22.	Crude prevalence of chlamydia, 2005	37
Figure 23.	Crude prevalence of gonorrhea, 2005	37
Figure 24.	Crude prevalence of syphilis, 2005	38
Figure 25.	Comparison of STI prevalence among FSW, 2001 and 2005	40
Figure 26.	Prevalence of STIs among police, 2005	40
Figure 27.	Comparison of STI prevalence among police, 2001 and 2005	42
Figure 28.	Prevalence of STIs among transgenders and other MSM, 2005	42
Figure 29.	Prevalence of STIs among MSM, by survey location	43

List of Abbreviations

AIDS	Acquired immune deficiency syndrome
ANC	Antenatal care
BSS	Behavioral surveillance survey
CDC	Centers for Disease Control and Prevention
CT	<i>Chlamydia trachomatis</i>
CUP	Condom Use Program
FSW	Female sex worker
FHI	Family Health International
GAP	Global AIDS Program
HIV	Human immunodeficiency virus
HSV	Herpes simplex virus
IBBS	Integrated biological and behavioral survey
MSM	Men who have sex with men
NCHADS	National Center for HIV/AIDS, Dermatology, and STDs
NG	<i>Neisseria gonorrhoeae</i>
NGO	Non-governmental organization
NIPH	National Institute of Public Health
PCR	Polymerase chain reaction
PID	Pelvic inflammatory disease
QC	Quality control
RHC	Reproductive health clinic
RPR	Rapid plasma reagin
STD	Sexually transmitted disease
STI	Sexually transmitted infection
TB	Tuberculosis
TPPA	<i>Treponema pallidum</i> particle agglutination
TPHA	<i>Treponema pallidum</i> hemagglutination
UPP	Urine processing pouch
VCCT	Voluntary confidential counseling and testing

Executive summary

1.1. Objective and Methods

The objectives of this survey were: 1) to estimate the prevalence of gonorrhea, chlamydia, syphilis, and related risk behaviors among three sentinel groups; 2) to estimate HIV among men who have sex with men (MSM); and 3) to provide data for planning and management of sexually transmitted infection (STI) control and prevention programs.

This cross-sectional survey was conducted among 1,079 brothel-based female sex workers (FSWs), 623 police, and 548 MSM. Survey participation, restricted to persons aged at least 15 years, was voluntary and anonymous, and required witnessed verbal informed consent. The provinces included in the 2005 survey were selected purposively and included most of the provinces covered by the previous STI survey round to allow for comparability and construction of trends. Sampling methodologies included: stratified cluster sampling with equal probability for FSWs and police, and respondent driven sampling for MSM. Data were collected from April through August 2005.

Behavioral data were collected through face-to-face interviews conducted in the Khmer language by Provincial Health Department staff using standard questionnaires. Biological results were linked to self-reported behaviors.

The following specimens were collected: self-collected vaginal swabs, urine (males only), self-collected rectal swabs (MSM only), and venous blood. We tested for the following STIs: chlamydia, gonorrhea, and syphilis (all participants) and HIV (MSM only). Swabs and urine specimens were tested for chlamydia and gonorrhea using the BD ProbeTec strand displacement assay (a nucleic acid amplification assay). For purposes of offering treatment for syphilis, blood was tested in the field using the Abbott Determine® Rapid Syphilis TP assay. All blood specimens were again tested in the central laboratory for syphilis

using RPR and reactive specimens were confirmed by TPPA. Blood specimens from MSM were tested for HIV using Genscreen ELISA and reactive specimens were confirmed using the Chem-Bio HIV 1/2 Stat-Pak assay.

All FSWs in our sample were offered presumptive treatment for gonorrhea or chlamydia, i.e., 1 g azithromycin and 400 mg cefixime orally administered while under observation of the survey team doctor. Police and MSM were offered treatment if they reported STI symptoms. Participants whose syphilis rapid test was positive were informed about their test results, counseled about syphilis complications, and offered an intramuscular injection of 2.4 mU benzathine penicillin after ensuring the absence of known allergy to penicillin. Survey team doctors had received training on how to treat allergic reactions and had been provided with emergency medical kits.

1.2. Brothel-based female sex workers

FSW participants were young—80% were younger than 30 years old. About half had experienced a broken marriage, and most had received little education. Although a third of the FSWs in our sample reported selling sex for two or more years, 40% of the FSWs were newcomers to brothel-based sex work, having worked in this type of establishment for less than one year. FSWs reported working in the current city on average for 10 months, allowing sufficient time for an ongoing prevention program to reach its target multiple times. Because of the high turnover of brothel-based FSWs, HIV prevention education programs need to be offered continuously. The high turnover also suggests that FSWs may continue to play a leading role in the dynamics of Cambodia's HIV epidemic because new FSWs are likely to get infected with HIV while working in the sex industry

and continue to work during the highly contagious acute infection period, that is, when the probability of HIV transmission is very high.

More than half (54%) of all FSWs surveyed had ever had an abortion and 15% reported having had three or more abortions. Among those who ever had an abortion, 80% had their last abortion in the past year. These data indicate substantial exposure to unprotected sex as well as the need for family planning services. Such services for FSWs could help them prevent unwanted pregnancy, and provide counseling about prevention of mother-to-child transmission of HIV.

FSWs had, on average, 3.5 clients per day. In addition to clients, 58% of FSWs reported having non-paying partners: either a sweetheart (a non-paying, non-marital, and non-cohabiting *regular* partner) or a casual partner (a non-paying, non-marital, non-cohabiting, *non-regular* partner), or both. In the past three months, 18% of FSWs had sex with a male partner they knew had sex with other men, which indicates mixing between MSM and FSW populations and the potential for overlapping HIV and STI epidemics.

The percent of FSWs who reported consistent condom use (always using condoms) with clients in the past week or with their sweethearts in the past month was much lower than in 2003.¹ In 2005, consistent use of condoms with clients in the past week remained relatively high (80%), whereas consistent condom use with sweethearts in the past month remained insufficient at 25%. A large proportion of FSWs from provinces other than Phnom Penh and Siem Reap reported consistent condom use with clients, ranging from 90 to 97%. The vulnerability of FSWs and the fact that some may have difficulty negotiating condom use with clients was suggested, however, by the large proportion of FSWs who reported having been “forced” by a client in the past week not to use condoms. Education programs aimed at helping FSWs develop negotiation skills and policies that support the rights of FSWs to protect themselves are needed. About a third of the FSWs continued to work during menstruation, which increases the risk of both HIV acquisition² and transmission.³ FSWs may have little power to

negotiate with brothel owners and should receive some support from HIV prevention programs to advocate for sexual health standards on their behalf.

Almost half of FSWs did not consider themselves at higher risk for acquiring an STI compared with other Cambodian women. Those who reported that they had practiced anal sex or had clients “force” them not to use condoms reported feeling at increased risk, but self-perception of higher risk did not appear to be associated with any other sexual behaviors or inconsistent condom use in general. In fact, perception of higher risk was reported by 40% of FSWs who always used condoms with clients, but only by 20% who did not always use condoms with clients. HIV and STI education for FSWs should be more participatory to help them assess their risk for HIV and STI exposure.

Almost half of all FSWs had been tested for HIV and received their test results, among whom 81% received their results in the past year. This suggests a high demand for voluntary confidential counseling and testing (VCCT) services which are now integrated within Cambodia’s Continuum of Care Program, a national strategy for providing comprehensive HIV/AIDS services including prevention, counseling, testing, and care and treatment. Efforts to promote access and uptake of VCCT services by FSWs should be sustained.

Almost one quarter (24%) of FSWs were found by the survey to be infected with an STI. Chlamydia was the most common STI with a prevalence of 14%. Compared with 2001 survey estimates, estimates of gonorrhea, chlamydia, and syphilis prevalence in 2005 were virtually the same. Most FSWs sought STI treatment from public facilities. The trend in uptake of medical services among FSWs for STI treatment has continued to rise since 1997. The sustained high prevalence of STIs among FSWs despite increased uptake of medical services suggests that the STI diagnosis and treatment algorithm should be evaluated, as well as the quality of STI care provided to FSWs, the accuracy of self-reported consistent condom use, and the effectiveness of the 100% Condom Use Program (CUP) and enforcement of consistent condom use in brothels.

The prevalence of syphilis was low, except for in the northwestern provinces (Banteay Meanchey, Siem Reap and Battambang), where syphilis prevalence ranged from 4% to 7%. Special attention should be paid to syphilis screening among FSWs and potentially among pregnant women in this area of Cambodia.

FSWs who were found to be currently infected with an STI were more likely to have started selling sex within the past year and to have self-reported having had an STI episode in the past year. No association between recent unprotected sex (inconsistent use of condoms with either a client or sweetheart) and having an STI was found. Possible reasons for the lack of an association between unprotected sex and STI prevalence include: (1) over-reporting of consistent condom use among those FSWs with an STI, and (2) under-reporting of unprotected sex with clients in the past week (i.e., perhaps a much larger proportion of FSWs have unprotected sex than the 20% who reported inconsistent condom use with clients in the past week).

1.3. Police

Policemen in Cambodia represent an aging cohort of men. As police recruitment has been virtually frozen for the past several years, this occupational group includes only a few men younger than 30 years old. Almost all (96%) of policemen surveyed in 2005 were aged 30 years and older and most (92%) were married. Among all police, 41% reported having sex with multiple partners in the past year with 10% having had more than five partners during that time. FSWs were the most common type of non-marital partner reported by police—25% of police had sex with an FSW and 10% with a sweetheart in the past three months. The proportion of police who reported having sweethearts has increased since 2003.¹

Overall, 29% of police reported having sex with non-marital partners in the past three months and 8% reported unprotected sex with such a partner in the past three months. Policemen were more likely to use condoms with FSWs than with other partners. As a result, unprotected sex with sweethearts was the most frequently reported risky sexual behavior.

If female sweethearts are women from the low-risk general population, these women may be at risk of getting infected through sexual intercourse with their police sweethearts. If these female sweethearts are informal (non-brothel-based) FSWs, police may be at risk of getting infected through a relationship they believe to be safer than having sex with brothel-based FSWs. Accordingly, prevention messages targeting police should focus on the issue of condom use during sex with not only FSWs, but with sweethearts and other partners.

Among police surveyed, 66% believed that they were at low risk of acquiring an STI, although those who had unprotected non-marital sex believed that they were at higher risk than others. More than a third (37%) of police had been tested for HIV and received their test results.

Only 5% of police self-reported having had an STI in the past year. This relatively low prevalence of STI was validated by biological testing which found 2.1% prevalence of any STI among police. Chlamydia (2.1%) was the most common STI identified among police and gonorrhea (0.3%) was rarely found (which may be related more to unreliable performance of the test for gonorrhea than actual low prevalence). Syphilis prevalence was 0.9%. Men who had either gonorrhea or syphilis also had chlamydia. Having an STI was more likely among police who were not married (single, divorced, separated, or widowed), who had not attended secondary school, who had sex with a sweetheart in the past three months, or who did not use condoms consistently with FSWs.

1.4. MSM

The 2005 survey sampled MSM from three cities and data are presented either by survey location (Phnom Penh and the two provincial capital cities of Battambang and Siem Reap) or by self-reported gender, classified for the purpose of this report as transgender or other (non-transgender) MSM. Almost all MSM surveyed in 2005 were young—65% in Phnom Penh and 82% in the provincial cities were younger than 25 years old. About a quarter of MSM in Phnom Penh and almost a third in the two provincial cities were teenagers, between 15 and 19 years old. The fact that almost two thirds in

each survey location had attended secondary school suggests potential benefit if comprehensive HIV/AIDS education were provided at school. Very few MSM were married, which suggests that the sample captured “visible” MSM and not those MSM who may try to hide their male-to-male sexual activity from spouses. MSM sampled were not from the poorest socioeconomic strata—most reported spending a substantial amount of money for leisure in the past week (at least US\$10 in the capital and US\$5 in the provinces).

The MSM sampled did not appear to be from highly mobile or migrant populations. These MSM tended to have lived for a long time in their current city of residence and seldom moved across the country. Most MSM reported living with their families.

About a third of the MSM sampled were transgenders (defined as men who reported they perceived themselves as women)—34% in Phnom Penh and 38% in the provinces. Sex with women was rare among transgenders but common among other MSM. Almost half of the non-transgender MSM from Phnom Penh had sex with a woman in the past month. A substantial proportion of non-transgender MSM reported having had sex with FSWs in the past month: 22% of those from Phnom Penh and 29% of those from the provinces. Sex between MSM and FSWs is a pathway by which STIs, including HIV, can pass from one subpopulation to another. Compared with non-transgender MSM from the capital, a larger proportion of those from the provinces reported having sex with women and using condoms less consistently with these female partners, which could potentially result in more rapid transmission of STIs and HIV between subpopulations in the provinces than in Phnom Penh. Unprotected sex with women in the month before being interviewed was reported by 11% of non-transgender MSM from Phnom Penh and 24% of those from the provinces. Depending on survey location, 17% to 26% of non-transgender MSM had sex with female casual partners and 14% to 23% with their female sweethearts in the past month, suggesting that a sub-epidemic among MSM would also have consequences among women in the general population.

Both in Phnom Penh and in the provinces, the majority of MSM reported having had multiple

male partners in the past month and among these MSM, an overwhelming majority reported having had anal sex. In the past month, the majority reported having had sex with male sweethearts, and overall about half had casual male partners, and half had sold sex to a male customer. The definition of an MSM male sex worker should be reviewed, as most MSM surveyed reported selling sex, many of whom did not consider themselves to be sex workers. The risk of selling sex occasionally by opportunity as opposed to occupationally may be comparable to the risk of having sex with a casual partner.

Consistent condom use with male partners was low in the provinces (ranging from 19% to 23% depending on the type of partner) and did not vary by whether sexual partners were paid or were non-commercial partners. In Phnom Penh the percent of MSM who reported consistent condom use with male partners was higher (ranging from 49% to 66%) than in the provinces and the percent who always used condoms was higher during paid sex than during unpaid sex. Unprotected sex with a male partner in the past month was reported by 38% of Phnom Penh MSM and 83% of MSM from the provinces, suggesting that the potential for an explosive epidemic of HIV and STIs among MSM is especially high in the provinces. Lubricants were always used during receptive anal intercourse by 28% of Phnom Penh and only 14% of MSM in the provinces. Compared with MSM from the capital, more MSM from the provinces perceived themselves to be at risk for becoming infected with an STI. MSM-specific STI and HIV education, prevention, and care programs are urgently needed, especially in the provinces.

While MSM from the capital mostly meet partners in parks and on river banks, those from the provinces meet their partners at parties, concerts, in the streets or at temples. Access to MSM may be more difficult in the provinces than in the capital city.

Transgenders were more likely than other MSM to have receptive anal sex, and to provide oral sex. As a consequence of frequent unprotected anal sex, transgenders had a higher prevalence of rectal chlamydia than other MSM (12.0% versus 1.8%), suggesting a high vulnerability to HIV infection among transgenders.

The prevalence of HIV was high in Phnom Penh among transgenders (17%) and other MSM (5%). At the time of the survey, the HIV epidemic among non-transgender MSM appeared to be limited to Phnom Penh. STI epidemics are ongoing in Phnom Penh and in the provinces and in both MSM sub-populations, with 21% of transgenders and 5% of other MSM infected with a bacterial STI.

1.5. Conclusion

Prevalence of STIs among brothel-based FSWs is comparable to that in the region.⁴ However, prevalence has remained unchanged since 2001, despite an increase in national and multilateral efforts to provide FSWs with universal access to STI prevention and care. Data show that use of health care services for STI is on the rise among FSWs. The fact that STI prevalence has not declined suggests that STIs are not always diagnosed or adequately treated, or that some FSWs are not using condoms consistently and are being regularly reinfected. Innovative approaches are needed to increase participation of FSWs in STI control programs and to ensure accurate STI diagnosis, provision of appropriate treatment and counseling on the importance of treatment adherence. Programs encouraging participation of FSWs' partners (e.g., clients and sweethearts) to reduce their likelihood of serving as STI reservoirs for reinfection should be considered.

Among police, 8% reported having unprotected sex in the past three months and unprotected sex with a sweetheart (61%) was the most frequently reported risky sexual behavior. The proportion of police who reported having a sweetheart has increased since the last round of BSS conducted in 2003.¹ Police who were currently infected with an STI were more likely to be unmarried, less educated men who had sex with a sweetheart in the past three months, or who did not use condoms consistently with FSWs.

Among MSM, the prevalence of HIV is alarmingly high among transgenders and among non-transgender MSM from Phnom Penh. The potential for an explosive HIV epidemic in the provinces as suggested by the high prevalence of STIs and level of high risk behavior is also of great concern. Comprehensive information and health care packages tailored for transgenders and other MSM are urgently needed and would be an asset to STI control programs.

The fact that Cambodia's HIV epidemic is considered concentrated does not mean that HIV is confined within certain subpopulations and if contained in one group will not spread to others. This survey found mixing between groups at variable risk for HIV (e.g., frequent unprotected sex between non-transgender MSM and various groups of women). Because sexual connections cross group boundaries, the STI and HIV epidemics are not confined within certain subpopulations. Control of the STI epidemic among MSM as well as among FSWs and their partners is essential to reducing Cambodia's HIV epidemic.

II

Background and rationale

Sexually transmitted infections (STIs) are major causes of reproductive morbidity and mortality. Because many of the widely prevalent STIs also facilitate transmission of human immunodeficiency virus (HIV), STI control and prevention is believed to be an effective means of reducing HIV transmission. The proportion of new HIV infections attributable to STI cofactor effects—the population attributable fraction—is larger in populations or subpopulations with HIV infection in a growth phase than in populations where the HIV epidemic is mature.

Although the prevalence of HIV is estimated to have been 1.2% among adults from the general population in 2003, Cambodia's HIV epidemic is concentrated in certain high risk populations, including brothel-based female sex workers (FSWs), informal (i.e., non-brothel-based) FSWs, clients and sex partners of FSWs, and sex partners of clients. In order to monitor the HIV epidemic, plan interventions, and allocate resources adequately, the National Center for HIV/AIDS Dermatology and STDs (NCHADS) established a national surveillance system in 1996. The surveillance system gathers data on a regular basis to provide information on HIV prevalence and risk behaviors in sentinel subgroups of the Cambodian population.

Because HIV is a long-lasting infection, changes in incidence may be followed by several years of delay before changes in prevalence are detected. Therefore, HIV prevalence is neither a sensitive nor timely indicator of the proximal impact of interventions, especially when antiretroviral therapy (ART) becomes widely available. Conversely, because STIs can be treated easily and are usually of shorter duration than HIV, their prevalence in selected groups reflects the prevalence of recent sexual risk behaviors, as well as the impact of STI management programs. STIs are usually concentrated in core groups characterized by frequent unprotected sexual intercourse, frequent partner change, and concurrent sexual partnerships. Because these groups are often the main focus for interventions aimed at reducing HIV and STI transmission, measuring the prevalence of STI among such groups allows for monitoring the impact of these interventions.

In 1996, the first STI prevalence survey was conducted in Cambodia among FSWs, police and military personnel, and women attending reproductive health clinics (RHCs) in three major cities (Phnom Penh, Battambang, and Sihanouk Ville).⁵ The results were as follows:

Table 1. Prevalence estimates obtained from Cambodia STI Survey, 1996

STI	FSWs (n=437) %	Police/Military (n=332) %	RHC (n=314) %
Gonorrhea	35.0	17.0	3.0
Chlamydia	22.5	2.1	3.1
Syphilis (RPR)	14.0	6.6	4.0
Trichomonas	5.4	–	1.0
Bacterial vaginosis	31.5	–	12.7

An STI survey conducted in 2000 among 206 men who have sex with men (MSM) in Phnom Penh found that 5.5% had been exposed to syphilis, 4.8% presented with gonococcal urethritis, 7.2% with chlamydial urethritis, 0.3% with rectal gonorrhea, and 1.0% with rectal chlamydia.⁶ Compared with prevalence of bacterial STIs among police/military in 1996, prevalence of chlamydial urethritis among MSM was much higher, prevalence of gonococcal urethritis was much lower, and prevalence of syphilis was about the same.

Following the alarming level of STIs recorded in 1996 (table 1), and results of HIV serosurveys suggesting that Cambodia had the highest HIV prevalence documented in Asia, a second Cambodian STI prevalence survey was conducted in 2001 among brothel-based FSWs, male police and military personnel, and women attending RHCs from 7 provinces.⁷ This survey collected behavioral data, blood and urine specimens, as well as vaginal swabs. The 2001 results showed unexpectedly low prevalence of STIs (table 2). Compared with 2001 results among police/military, prevalence of all three bacterial STIs among MSM in 2000 was much higher.

Table 2. Prevalence estimates obtained from Cambodia STI Survey, 2001

STI	FSWs (n=141) %	Police/Military (n=165) %	RHC (n=451) %
Gonorrhea	14.2	0.0	0.0
Chlamydia	12.1	1.8	2.8
Syphilis exposure (RPR/TPHA)	5.7	3.0	1.3
Active syphilis (RPR titer \geq 1:8)	2.8	0.0	0.7
Chancroid	1.4	0.0	0.4
Herpes Simplex Virus (HSV-2)			
PCR positive ulcer	0.7	0.0	0.4
PCR positive vaginal swab	2.4	–	–
Trichomonas	2.1	–	2.7
Bacterial vaginosis	56.7	–	11.6
Candidiasis	6.0	–	25.7

To establish a baseline for monitoring the impact of a comprehensive, five-year prevention and care program being implemented in Banteay Meanchey province (in northwestern Cambodia on the Thai border), NCHADS, in collaboration with the US CDC Global AIDS Program (GAP), conducted an integrated HIV, STD, and behavioral survey in this province in 2003.⁸ The sentinel groups surveyed

included brothel-based FSWs, informal (entertainment-venue-based) FSWs (IFSWs), male and female casino workers, pregnant women attending antenatal care (ANC) clinics, and male police and military personnel. This survey found prevalence of STIs consistent with that recorded by the 2001 national survey (table 3).

Table 3. Prevalence estimates obtained from Banteay Meanchey Integrated HIV, STI, and Behavioral Survey, 2003

STI	Female sentinel groups				Male sentinel groups		
	FSWs (n=159) %	IFSWs (n=165) %	Casino workers (n=160) %	ANC (n=296) %	Military (n=248) %	Police (n=252) %	Casino workers (n=134) %
Gonorrhea	8.9	1.9	0.0	0.0	1.2	0.8	0.0
Chlamydia	15.3	16.2	1.3	1.0	2.4	0.8	1.5
Syphilis (TPHA)	7.6	0.0	0.0	2.0	7.3	6.4	0.0

Despite the low STI prevalence found in some sentinel groups in 2001 and 2003, data on STI are still needed for the ongoing monitoring of the HIV epidemic, as well as for monitoring STI management and prevention programs, which were developed and implemented in response to the HIV/AIDS epidemic in Cambodia. The 100% Condom Use Program

(CUP) is a national program which provides STI education to FSWs through outreach workers and requires compulsory monthly STI check-ups. While important financial efforts and human resources have been mobilized to develop and implement the 100% CUP, little is known about the program's impact.

III

Objectives

3.1. Primary objective

To estimate the prevalence of *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, and *Treponema pallidum* infections and related risk behaviors among sentinel groups, and HIV among MSM.

3.2. Secondary objective

To provide data for planning and management of STI control and prevention programs for FSWs and their clients, as well as MSM.

Methods

4.1. Survey design

A cross-sectional study design was used. Participation in the survey was voluntary and anonymous. Biological results were linked to self-reported behaviors.

4.2. Survey populations

Brothel-based female sex workers (FSWs) represent those at highest risk for STIs because of their large number of sexual partners. From establishments selected for this survey, all FSWs aged at least 15 years old were eligible to participate.

Men who have sex with men (MSM) are a heterogeneous group, which includes individuals who may differ substantially from each other with respect to sexual identity and behaviors. The STI survey conducted by FHI in 2000⁶ found a higher STI prevalence among MSM than among the police and military surveyed in 2001.⁷ In 2004, the visible MSM population in Phnom Penh was estimated to be about 1,500.⁹ Survey eligibility criteria for MSM were: biological males aged at least 15 years who reported having had anal sex with a man in the past year, and who were residing in the city where the survey was taking place.

Police have been included as a survey population in Cambodia's HIV sentinel surveys, behavioral surveillance surveys, and previous rounds of the STI survey. The police group historically has been considered to serve as a proxy for clients of FSWs.

4.3. Survey areas

The provinces included in the 2005 survey were selected purposively and included most of the provinces covered by the previous STI survey rounds to allow comparability and construction of trends over time. Provinces were not selected randomly and the selected STI survey provinces do not provide a nationally representative sample of the surveyed populations. Furthermore, data were collected in the provincial capitals only. Some provinces which had not been included in previous surveys were added because of a request by implementers of a focused STI control program for FSWs in those provinces.

Provinces included in Cambodia's STI surveys are shown in table 4.

Table 4. Provinces included in the Cambodia STI surveys, by year of survey

Provinces	1996	2001	2005
Phnom Penh	✓	✓	✓
Sihanouk Ville	✓	✓	✓
Battambang	✓	✓	✓
Banteay Meanchey	–	✓	✓
Kampong Cham	–	✓	✓
Pursat	–	✓	–
Kandal	–	✓	–
Siem Reap	–	–	✓
Koh Kong	–	–	✓
Prey Veng	–	–	✓

FSWs and police were sampled from every city selected for the survey, but sampling for MSM was restricted to Phnom Penh, Battambang and Siem Reap, where NGOs have ongoing interventions targeting MSM.

Table 5. Coverage of the 2005 STI survey, by province and sentinel group

Provinces	FSWs	Police	MSM
Phnom Penh	✓	✓	✓
Sihanouk Ville	✓	✓	–
Battambang	✓	✓	✓
Banteay Meanchey	✓	✓	–
Kampong Cham	✓	✓	–
Siem Reap	✓	✓	✓
Prey Veng	✓	✓	–
Koh Kong	✓	✓	–

4.4. Sample sizes

Sample size simulations were conducted using the EPITABLE statistical calculator of the Epi Info software, version 6.04 (CDC, Atlanta, 1997) to compute the sample sizes required to estimate prevalence rates from cross-sectional surveys. In order to obtain sufficient precision when aggregating data, sample size calculations were based on the prevalence of chlamydia, gonorrhea, and syphilis as measured in the 2000 (MSM) and 2001 STI surveys.

Table 6. Proposed sample sizes by province and survey group

Provinces	FSWs	Police	MSM
Phnom Penh	150	160	300
Sihanouk Ville	All	80	–
Battambang	All	80	124
Banteay Meanchey	100	80	–
Kampong Cham	All	80	–
Siem Reap	100	80	124
Prey Veng	All	80	–
Koh Kong	All	80	–

All FSWs working in the capital cities of Sihanouk Ville, Prey Veng, Koh Kong, Battambang, and Kampong Cham provinces were invited to participate in the survey. In these provinces, prevalence estimates are directly comparable with one another because they

are actual figures derived from a census (i.e., every FSW from every establishment was invited to participate). In the remaining provinces, where establishments were sampled, the STI prevalences among FSWs are sample-derived estimates.

4.5. Sampling strategies

Various sampling strategies were used depending on access to the sentinel groups and the possibility of establishing a sampling frame. Sampling methodologies included: stratified cluster sampling with equal probability for police and in some provinces for FSWs; census (take-all sampling of establishments and all FSWs in those establishments as described in section 4.4), and respondent-driven sampling for MSM. Participation was voluntary and witnessed verbal consent was obtained from all participants.

4.5.1. Brothel-based sex workers

In each province surveyed, the Provincial AIDS Office established the sampling frames by listing all urban brothels identified in the provincial capital and enumerating the number of FSWs selling sex in each identified establishment. In Phnom Penh, where new brothels open regularly while others close, the sampling frame was updated just before survey implementation with the support of NGOs providing services to FSWs.

In Phnom Penh, Siem Reap, and Banteay Meanchey, FSWs were selected through cluster sampling. A subset of establishments was randomly selected with equal probability for participation in the survey. Establishments were selected until sample size was achieved.

In the remaining provinces (i.e., Sihanouk Ville, Prey Veng, Koh Kong, Battambang, and Kampong Cham) a census approach was used. All establishments and all FSWs in each establishment were selected.

To be eligible for participation, FSWs had to be at least 15 years old and present in the selected establishments at the time of the survey visit.

4.5.2. Police

In each province surveyed, the Provincial AIDS Offices established the sampling frame by listing all urban-area bureau and district police stations located in the provincial capital.

The sampling methodology was a two-staged, stratified cluster sampling. The strata were the provinces. The clusters were represented by the bureau and district police stations. As it was not possible to

acquire or ascertain the number of policemen assigned to each office, clusters were sampled with equal probability. A fixed number of policemen were selected in each cluster. All policemen present at the time of the survey visit were eligible to participate. In offices with a large number of staff, the police officers present at the police station were selected randomly by drawing colored balls out of a black bag. Refusals to participate were not replaced.

4.5.3. MSM

Because there is no sampling frame available for MSM, survey participants were selected through respondent driven sampling. In each of the purposively selected provincial capitals, a set of “seeds” was selected by the NGOs working with MSM. The seeds included some transgender as well as non-transgender MSM, MSM of various age groups and various quarters of residence. Each seed was asked to recruit three MSM. Seeds received US\$3 per recruited individual, in addition to transportation costs to the survey-designated clinic. After being interviewed and providing biological samples, survey participants were given three coupons to give to friends or acquaintances they wished to recruit. Each coupon was numbered to identify the origin (i.e., sampling wave) of the recruiter. This procedure was repeated with each new survey participant until completion of sample size. Adequate numbering of the coupons allowed identification of networks involved in the recruitment.

4.6. STIs and laboratory procedures

One of the objectives of the survey was to estimate prevalence of three bacterial STIs (chlamydia, gonorrhea, and syphilis) among all survey participants, as well as HIV among MSM. Biological specimens collected and laboratory tests performed were:

- Vaginal swabs (from FSWs only) and rectal swabs (from MSM only) were self-collected using BD ProbeTec™ ET *Chlamydia trachomatis* and *Neisseria gonorrhoeae* (CT/GC) Amplified DNA Assay Endocervical Specimen Collection swabs.

- Urine specimens (from men only) were collected using BD sterile, plastic, preservative-free specimen collection cups to which the BD urine processing pouch (UPP) was added upon receipt in the lab.
- Urine and swabs were tested for *Neisseria gonorrhoeae* (NG) and *Chlamydia trachomatis* (CT) using the BD ProbeTec strand displacement assay (a nucleic acid amplification assay) within the BD-specified amount of time after collection. All reactive and borderline reactive specimens were retested.
- Blood specimens were tested for syphilis in the field (so that treatment could be offered) using Determine® Syphilis TP rapid test. Syphilis screening of all blood specimens was also performed in the laboratory by RPR. RPR-reactive specimens were confirmed by TPPA.
- Blood specimens from MSM were tested for HIV using Genscreen ELISA. Genscreen-reactive specimens were confirmed by Stat-Pak rapid test. Discordant results were considered negative.

Testing for NG, CT, syphilis, and HIV was performed by the National Center for Dermatology and STDs Laboratory, the NCHADS referral laboratory. After processing and testing swabs or urine for NG and CT, the specimen diluents were stored at -70° C. Adherence to standard operating procedures for specimen storage, handling, transport, and processing was documented.

Table 7. STIs surveyed and type of specimen collected, by sentinel population

Population	NG & CT (self-collected specimens)	Syphilis	HIV
FSW	Vaginal swabs	Venous blood	–
Police	Urine	Venous blood	–
MSM	Urine and rectal swabs	Venous blood	Venous blood

4.7. Survey procedures

Acceptability of questionnaires and self-collection of swabs were pre-tested among respective sentinel groups prior to survey implementation.

Identity of participants was protected by anonymity, i.e., their names were not recorded anywhere. Verbal informed consent was voluntary, and documented by a witness. All survey documents and specimens were labeled with only a survey number.

Data collection among FSWs took place in STI clinics. Where STI clinics were not available, rooms were rented to set up a temporary clinic for data collection. MSM were seen at the drop-in centers of collaborating NGOs. Police were seen in a room with adequate privacy located within the police station.

Syphilis screening test results were available on site almost immediately, but participants who did not wish to wait could claim their test result for the

duration of the survey by providing their personal identification number (PIN) card. Treatment was offered to individuals whose syphilis screening test was positive. Treatment for chlamydia and gonorrhea was provided according to national standards to all female participants (presumptive treatment) and to all male participants who reported STI symptoms (syndromic treatment). Because the NGO drop-in centers for MSM were not Ministry of Health approved Voluntary Confidential Counseling and Testing (VCCT) sites, results of HIV testing performed on site could not be provided to participants. Therefore, MSM who were tested for HIV were given a coupon to access VCCT centers to receive services, including HIV testing, free of charge.

4.8. Interviews

Same-sex interviewers administered questionnaires to participants face-to-face ensuring visual and auditory privacy. All questionnaires were pre-tested among respective survey populations and adapted as required prior to data collection. Interviews were conducted after collection of biological samples. Participants were told that they could refuse to answer any of the questions and could withdraw from the survey at any time. On average, it took about 30 minutes to provide informed consent and complete one interview.

4.8.1. Clinical procedures

Standard procedures were used for collection of clinical specimens and information about STI-related symptoms, and providing treatment. All personnel involved in carrying out clinical procedures were medical professionals.

Venous blood (8 ml) was collected by trained phlebotomists. Male participants provided first-void urine specimens. FSWs self-collected vaginal swabs and MSM self-collected rectal swabs.

As 20% of the brothel-based FSWs who participated in the 2001 STI survey were found to be infected with either *N. gonorrhoeae* or *C. trachomatis* and because these infections were asymptomatic in 70% of the cases, we believed that all FSWs should be treated for these two pathogens. All FSW survey participants were offered presumptive treatment according to national guidelines, i.e., 1 g of azithromycin and 400 mg cefixime orally and directly administered in front of the survey team doctor.

Because only 11% of the MSM tested in the 2000 MSM survey⁶ were found to be infected with either *N. gonorrhoeae* or *C. trachomatis*, presumptive treatment for these STIs was not proposed for all MSM. Instead, MSM who reported either dysuria or urethral discharge were offered a standard treatment according to national guidelines consisting of 1 g of azithromycin and 400 mg cefixime orally and directly administered in front of the survey team doctor. Likewise, police who reported symptoms were offered the same standard treatment according to the national guidelines.

All survey participants were tested for syphilis on site using Determine Syphilis TP and those with reactive tests were informed about their result, counseled about syphilis complications, and offered an intramuscular injection of 2.4 mU of benzathine penicillin after ensuring the absence of known allergy to penicillin. In case of known allergy to penicillin, survey participants were offered oral doxycycline 100 mg twice a day for 15 days after ensuring that the participant was not pregnant. In case of suspected or confirmed pregnancy the participant was offered treatment with oral erythromycin 500 mg, four tablets per day for 15 days. Infected individuals were counseled and requested to refer their sexual partners to the STI clinic for treatment. In addition they were provided free condoms and a demonstration on condom use.

The MSM group was the only group not previously tested for HIV in the 2003 HIV Sentinel Survey. Therefore, MSM were counseled on the advantages of being tested for HIV and received both a coupon granting them free access to VCCT services and a standard transportation fee to reach the VCCT clinic.

All survey participants were given health education materials that reviewed common STI symptoms and stressed the importance of STI treatment. In addition, all participants had the opportunity to learn their chlamydia and gonorrhea test results by presenting their PIN card at the specified clinic six weeks after specimen collection.

4.8.2. Composition of survey teams

Survey teams received specific training to collect data from one particular sentinel group. Regardless of group, each survey team was composed of a team leader (responsible for the overall supervision of the data collection at each site), a medical doctor/technical supervisor (in charge of supervising the prescription and administration of standard treatments), two interviewers of the same sex as the participant being interviewed (responsible for administering informed consent and collecting demographic and behavioral data), a nurse/paramedic

(responsible for collecting and labelling of biological samples), a laboratory technician (in charge of preparing blood specimen aliquots and performing onsite syphilis rapid tests), and a driver (responsible for the transportation of the survey forms, instruments, biological specimens, and specimen logs).

4.8.3. Data entry, processing and analysis

Questionnaires and laboratory forms were transported twice a week from the field with the specimens and stored in a locked filing cabinet in the Principal Investigator's office at NCHADS.

Double data entry was performed independently by NCHADS and NIPH using EpiData Software (freeware from the EpiData Association, Odense, Denmark). Data analysis was performed jointly by NCHADS and collaborating institutions (FHI and CDC) using Stata statistical software (Stata Corp., College Station, Texas). Stata takes into account cluster sampling and sampling weight when computing standard errors.

Data obtained using respondent driven sampling were first analyzed using the Respondent Driven Sampling Analysis Tool (RDSAT), which is software that takes into account recruiter network size in order to estimate the prevalence of a variable in the population. However, the software did not allow aggregation of survey site data (in order to increase sample size and therefore, precision of estimates) or cross tabulation of data. In this report, MSM data obtained from respondent driven sampling were pooled and analyzed using Stata. Demographic variables and prevalence percents obtained using Stata were compared to results obtained using RDSAT to ensure that this method of analysis would yield consistent results. Because of nonadherence to the recommendation that data obtained using RDS be analyzed with the sampling-specific software (RDSAT), the MSM data detailed in this report should be considered as results from a convenience sample obtained using RDS.

4.9. Ethical issues

Because of the age composition of the sentinel groups, the survey investigators were cognizant of the fact that some of the potential participants may be youth, aged between 15 and 18 years. The survey was designed to balance the maximal protection of

participants with the individual and community benefits provided by the survey. Informed consent was given verbally, was witnessed and was documented. No names were recorded and all documentation was entirely anonymous. Survey field workers were trained on confidentiality issues and required to sign the confidentiality assurance agreement designed for this survey. HIV testing (for MSM), STI assessment, and symptomatic STI treatment free of charge were also offered to eligible individuals who refused to participate in the survey, so that such standard-of-care benefits would not be perceived as being used to coerce individuals to participate.

4.10. Ethical review

The protocol, questionnaires, and consent and confidentiality assurance forms were submitted to and approved by the Cambodian Ministry of Health National Ethical Committee, the Protection of Human Subjects Committee of Family Health International, and CDC's Office of the Associate Director of Science, National Center for HIV/AIDS, STD, and TB Prevention.

4.11. Quality control

All specimens (urine and swab diluents) that were CT- or NG-reactive on testing by BD ProbeTec and a 10% random sample of nonreactive specimens from each province were selected and shipped by World Courier to CDC Atlanta. CDC Atlanta used real-time PCR to test specimens for CT and NG and laboratorians were blinded to Cambodia test results. CDC Atlanta returned the PCR results to Cambodia's Principal Investigators who compared results. A list of those specimens with discordant results was returned to CDC Atlanta. CDC Atlanta retested these specimens one or two times. The final result was considered the best two of three, if tested three times. A substantial proportion of discordant results appeared to be weakly reactive.

4.11.1. FSW specimens

Testing of vaginal swab specimens for both CT and NG was highly sensitive and specific when compared with CDC Atlanta PCR results, with a high predictive value of a positive test (table 8).

Table 8. Comparison of Cambodia and CDC Atlanta results for testing FSW vaginal swabs

Result	Gonorrhea (n=312)	Chlamydia (n=312)
True Positive, TP	131	138
False Positive, FP	4	7
True Negative, TN	172	156
False Negative, FN	5	11
FP/ Total Positive, %	3.0	4.8
FN/ Total Negative, %	2.8	6.6
Sensitivity, %	96.3	92.6
Specificity, %	97.7	95.7
Predictive Value Positive, %	97.0	95.2

4.11.2. MSM specimens

Performance characteristics of GC and CT testing of MSM specimens are shown in tables 9 and 10. Testing of rectal swab specimens for CT performed extremely well. Because the test for GC had only a moderate capacity (sensitivity) to detect gonorrhea, prevalence of rectal gonorrhea may be modestly underestimated.

Table 9. Comparison of Cambodia and CDC Atlanta results for testing MSM rectal swabs

Result	Gonorrhea (n=84)	Chlamydia (n=84)
True Positive, TP	7	27
False Positive, FP	1	1
True Negative, TN	75	56
False Negative, FN	1	0
FP/ Total Positive, %	12.5	3.6
FN/ Total Negative, %	1.3	0.0
Sensitivity, %	87.5	100.0
Specificity, %	98.7	98.2
Predictive Value Positive, %	87.5	96.4

Testing of MSM urine specimens for CT performed extremely well. However, sensitivity of GC testing of urine specimens was extremely poor. Indeed, only 40% of those specimens that were GC-reactive on PCR were detected by BD ProbeTec performed in Cambodia. Three quarters of those specimens that

were GC-reactive were not reactive on PCR, i.e., 75% of those persons whose urine specimen tested positive for GC by ProbeTec probably did not have urethral gonorrhea. In other words, only quarter of those specimens with a positive test were predictive of an actual urethral GC infection.

Table 10. Comparison of Cambodia and CDC Atlanta results for testing MSM urine specimens

Result	Gonorrhea (n=73)	Chlamydia (n=73)
True Positive, TP	2	9
False Positive, FP	6	1
True Negative, TN	62	63
False Negative, FN	3	0
FP/ Total Positive, %	75.0	10.0
FN/ Total Negative, %	4.6	0.0
Sensitivity, %	40.0	100.0
Specificity, %	91.2	98.4
Predictive Value Positive, %	25.0	90.0

4.11.3. Police specimens

Testing of urine specimens for CT performed well. Most specimens (83%) that were GC-reactive were false positive; therefore, estimates of gonorrhea prevalence among police are unreliable. Test performance characteristics are shown in table 11.

Table 11. Comparison of Cambodia and CDC Atlanta results for testing police urine specimens

Result	Gonorrhea (n=67)	Chlamydia (n=66)
True Positive, TP	1	0
False Positive, FP	5	0
True Negative, TN	60	66
False Negative, FN	1	0
FP/ Total Positive, %	83.3	–
FN/ Total Negative, %	1.6	0.0
Sensitivity, %	100.0	–
Specificity, %	92.3	100.0
Predictive Value Positive, %	16.7	–

4.12. Response rates and refusals

In Cambodia, the brothel-based FSW group is easily accessible for survey investigators and is characterized by a consistently high response rate. Of the 1,081 FSWs invited to participate, 99.8% agreed to participate (i.e., only 2 refusals) at the informed consent stage. Of 1,079 FSWs who agreed to participate, 99.7% agreed to provide a blood specimen and 99.8% agreed to provide vaginal swabs. In total, 99.2% of the FSWs invited to participate, agreed to participate and provide biological specimens and behavioral information.

The sampling of police was uneven between provinces. While sampling of police at the police stations was performed in a standard manner in large cities such as Phnom Penh, Siem Reap and Battambang, it proved more challenging in smaller cities where selected police stations were not always fully staffed. In addition, data collection in the southern provinces (e.g., Koh Kong) was conducted during rainy season when it is a challenge to mobilize police officers to the police stations. As a result, in some provinces, the police included in the sample represented only those who could be found at the police station at the time. Of the 623 police who agreed to participate, only 1 (0.2%) refused to provide blood.

MSM were recruited by their peers through respondent driven sampling. Of 548 MSM who reported to the survey clinic, all agreed to participate at the informed consent stage. All provided a blood specimen, only 1 (0.2%) did not provide urine, and 13 (2.3%) did not provide rectal swabs. In total, 97.4% of the MSM invited agreed to participate and provide biological specimens and behavioral information.

Behavioral results

5.1. Female sex workers

The FSW sample consisted of 1,079 women. In most provinces, all FSWs from urban-area brothels were included in the sample. In Phnom Penh, Banteay Meanchey, and Siem Reap, the FSW samples were selected using a two-stage cluster sampling strategy (table 12).

Table 12. FSW sample, by province

Provinces	Sample size	Percent of total sample	Sampling methodology
Battambang	179	17	Take all
Banteay Meanchey	88	8	Cluster sampling
Kampong Cham	115	11	Take all
Koh Kong	82	8	Take all
Phnom Penh	190	18	Cluster sampling
Prey Veng	100	9	Take all
Siem Reap	100	9	Cluster sampling
Sihanouk Ville	225	21	Take all
Total	1,079	100	

Of those who agreed to participate, three (0.3%) did not provide blood and two (0.2%) did not provide vaginal swabs. No sampling weight was applied for analysis because the sampling design provided a self-weighted sample. However, analyses were weighted to account for differences in FSW population size by province.

5.1.1. Demographic characteristics

Demographic characteristics of the FSW sample are presented in table 13. The mean age of FSWs was 25.1 years (95% CI [24.7 – 25.8]); 10% were teenagers and 19% were aged more than 30 years. About half were never married and the other half were separated or divorced. Only 9% had attended secondary school and 44% never had any formal education.

Table 13. Demographic characteristics of FSWs surveyed

		n=1,079 %
Age, in years	15-19	10
	20-24	45
	25-29	26
	30+	19
Marital status	Married, living together	3
	Married, not living together	2
	Divorced	47
	Widowed	4
	Never married	43
Schooling	No formal education	44
	Primary school	47
	Secondary school	9

5.1.2. Duration of selling sex and internal migration

Data on duration of selling sex (number of months since first working in brothel) and internal migration (i.e., moving residence from one province to another) among FSWs are presented in table 14. The mean duration of selling sex was 18.4 months (median 12 months); 40% had sold sex for less than a year, 67% for less than two years, and 33% for two or more years. A median duration of 12 months implies a high turnover and that every year about half of the FSWs are newcomers to the sex trade in Cambodia, and representing a large pool of STI- and HIV-susceptible women.

The majority (62%) of FSWs had been living in the current city for more than a year, but only 18% lived in the current city prior to selling sex. The proportion of sex workers who started selling sex in their city of current residence varied substantially by province (ranging from 6% in Kampong Cham and 7% in Prey Veng to 28% in Phnom Penh and 34% in Siem Reap). More than half (58%) had not seen their family in the past year and only 7% reported that they were not currently separated from their family. Most of the FSWs who reported not being

currently separated from their families were from Phnom Penh. In Phnom Penh a larger proportion of FSWs (10%) still lived with their family compared with FSWs (<4%) from all other provinces. The mean duration of working in the current city was 10 months, meaning that prevention programs have limited but sufficient time to reach all FSWs in their intervention area. The majority of FSWs had been living in another provincial capital in the past year; however data were not collected on whether the women had sold sex in these other cities.

Table 14. Duration of selling sex in brothels and internal migration among FSWs

		n=1,079 %
Number of months since started work in brothel	< 12 months	40
	12 -23 months	27
	24-59 months	27
	≥ 60 months	6
	Mean (months)	18.4
	Median (months)	12
Number of months spent away from family, past year	0 months	7
	1 to 11 months	35
	12 months	58
	Mean (months)	8.6
	Median (months)	12
Number of months lived in current city	< 6 months	35
	6 to 11 months	17
	12 months	48
	Median (months)	10
Number of months lived in current city	1	24
	2	59
	3 to 7	17
	Mean (number of cities)	2
	Median (number of cities)	2

5.1.3. Age at first sex and reproductive history

Average age at first sex among FSWs was 17.7 years old (median 18 years); 6% were younger than 15 years old at the time of first sex. More than two-thirds (70%) had ever been pregnant and 54% had ever had an abortion, which suggests that unwanted pregnancies are common. Of those who ever had an abortion, 52% had aborted in the past 6 months, revealing a substantial exposure to recent unprotected sex as well as unmet need for FSW-specific family planning services. Abortions were almost always performed in medical settings (93%). Forty percent of the FSWs had children.

Table 15. Age at first sex and reproductive history among FSWs

		n=1,079 %
Age at first sex (in years)	12 to 14	6
	15 to 19	78
	20 to 24	14
	25+	3
	Mean (years)	17.7
	Median (years)	18
Number of pregnancies	0	30
	1 to 2	42
	3 to 5	21
	6 to 15	7
Number of children	0	60
	1	23
	2+	17
Number of abortions	0	46
	1	27
	2	12
	3+	15
Time since last abortion*	< 6 months	52
	6 to 12 months	28
	> 12 months	20
	Mean (months)	11.3
	Median (months)	5
Facility used at last abortion*	Medical	93
	Traditional	7

*Of those who ever had an abortion

5.1.4. Sexual partners

Information about clients and other partners reported by FSWs is presented in table 16. On their last working day, FSW, on average, had sex with 3.5 clients (median=2). In the past year, 58% of FSWs had a sweetheart (a non-paying, non-marital, and non-cohabitating *regular* partner) and 21% had more than one sweetheart. In the past month, 45% of FSWs had sex with a sweetheart and 42% had sex with someone they considered a casual partner (a non-paying, non-marital, and non-cohabitating *non-regular* partner); in total, 57% had sex with a non-marital, non-paying partner (i.e., a sweetheart or casual partner). In the past three months, 18% of FSWs had sex with a male partner they knew had sex with other men. Among FSWs who had a sweetheart in the past 3 months, 96% reported having had sex with this partner (data not shown).

Table 16. Number and type of partners reported by FSWs

	n=1,079 %
Number of clients in last working day	
0	1
1 to 3	58
4 to 10	39
> 10	2
Mean (clients)	3.5
Median (clients)	2.0
Number of sweethearts in the past year	
No sweetheart	42
1	37
> 1	21
Sex with sweetheart, past month	
Yes	45
No	55
Sex with casual partner, past month	
Yes	42
No	58
Sex with MSM, past 3 months	
Yes	18
No	77
Don't know	6

5.1.5. Sexual behaviors and condom use

Among FSWs who reported sex with clients in the past week, only 80% used condoms consistently, which suggests that a substantial proportion of the FSWs are exposed to unprotected sex every week. Consistent condom use with clients ranged from 90% to 97% in all provinces except in Phnom Penh (74%) and Siem Reap (83%). This level of consistent condom use with clients in the past week was achieved despite the fact that 67% of FSWs reported having had a client “force” them not to use condoms during that same period of time. Several different explanations for these seemingly discordant results have been offered. The first explanation concerns translation of the word force. Some FSWs may have misinterpreted the question, “Has a client forced you

not to use condoms?” to mean, “Has a client *tried* to force you not to use condoms?” Several Cambodian colleagues from Phnom Penh reported that the word “force” means to apply strong pressure to persuade or convince but that the word itself does not mean such persuasion was successful. On the other hand, someone from a small village in Kampong Cham said that if someone forces you to do something, you *must* do it, you have no choice and you must not refuse. Another explanation may be that when asked about condom use with clients, FSWs who had been forced not to use condoms may not have counted such involuntary episodes as a lapse in condom use. In the future, questions about “force” should be followed by a question about whether being forced resulted in having unprotected sex with that client. In any event, having a client “force” them not to use a condom in the past week was most commonly reported by FSWs from Phnom Penh (79%) and Siem Reap (69%) and was greater among those who reported inconsistent condom use with clients in the past week (59%) than among those who reported always using condoms with clients in the past week (16%). Regardless of whether the question was misinterpreted or whether unprotected sex was not counted if they were forced not to use a condom, these data suggest that some FSWs may have difficulties negotiating condom use with some of their clients.

Among FSWs who reported having sex with casual partners or sweethearts in the past month, only 34% reported always using condom with their casual partners and even fewer (25%) with their sweethearts (table 17). Although the proportion of FSWs who always used condoms was larger with clients than with any other type of partner, unprotected sex with clients is likely to remain the FSW’s main risk factor for acquisition or transmission of HIV. This is because of the relatively large number of clients compared with number of other partners.

Table 17. Condom use and sexual practices reported by FSWs

	%
Condom use with client, past week	
Always	80
Not always	20
Forced not to use condom by client, past month	
Yes	67
No	33
Condom use with sweetheart, past month	
Always	25
Sometimes	32
Never	43
Condom use with partners, past month	
Always	34
Sometimes	54
Never	12
Number of days stopped working during menstruation, past month	
Did not stop	31
1 to 4 days	54
5 to 15 days	14
Anal sex, past 3 months	
Yes	11
No	89
Gave oral sex, past 3 months	
Yes	8
No	92

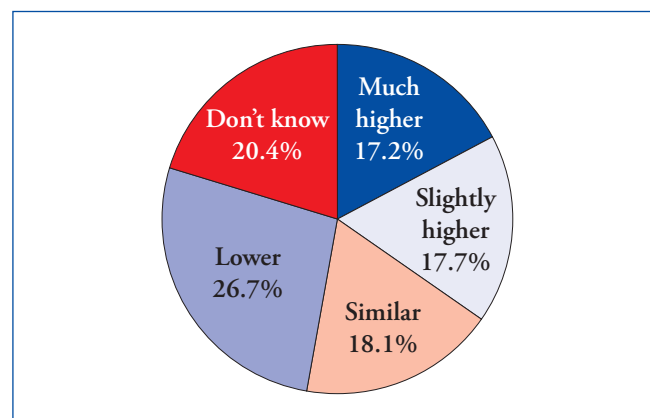
About a third of the FSWs did not stop having sex during menstruation. Anal sex in the past three months was reported by 11% of FSWs, almost all of whom were from Phnom Penh. An even smaller proportion (8%) of FSWs reported having performed oral sex in the past three months.

5.1.6. Risk perception

Figure 1 represents how FSWs perceived their risk of getting infected with a STI compared with other Cambodian women. The distribution of risk perception suggests that some FSWs may have a poor understanding of their risk for becoming infected.

A slight or much higher risk for STI acquisition was reported by 40% of FSWs who always used condoms with clients, but only by 20% who did not always use condoms with clients ($p < 0.001$) (data not shown). Perhaps those FSWs who always used condoms did so because they recognized the risk. Some risk factors related to increased perception of risk were having clients try to force them not to use condoms in the past week (73% of those who had clients try to force them felt at higher risk compared with 55% of those who did not have clients try to force them, $p < 0.001$) and having anal sex (89% of those who had anal sex versus 61% who did not, $p = 0.001$). Self-perception of risk did not appear to be associated with any other sexual behaviors or inconsistent condom use in general.

Figure 1. Self-perceived risk of acquiring an STI compared with other Cambodian women



5.1.7. Uptake of VCCT services

FSW uptake of HIV testing services is reported in table 18. Almost two thirds (65%) of FSWs have ever been tested for HIV, and of those tested, 69% reported receiving their test results. The proportion of FSWs who had ever been tested for HIV was substantial in every single province, showing that access to and use of testing services is widespread throughout the country. Almost one third (31%) of those tested never learned their HIV test results but the proportion varied by province: all FSWs tested for HIV in Kampong Cham, Prey Veng and Siem

Reap received their results; while only 78% of those tested in Banteay Meanchey and 59% of those tested in Phnom Penh had received their results. Previous behavioral surveillance surveys (BSS) have shown that many of the FSWs who had been tested were those who were tested in the context of HIV sentinel serosurveys for which HIV test results are not provided. For example, 15% of FSWs in 2003 who reported ever being tested had been tested for a survey.¹ Among those FSW who obtained their test results, 81% received their results within the past year.

Table 18. Uptake of VCCT services among FSWs

	n=1,079 %
Ever tested for HIV	
Yes, and received results	45
Yes, but did not receive results	20
No	35
When HIV test results were last received*	
6 months ago	61
7 to 12 months ago	20
13 months to 2 years ago	8
More than 2 years ago	11

* Among those who were tested for HIV and received their results

5.1.8. STI history and service uptake

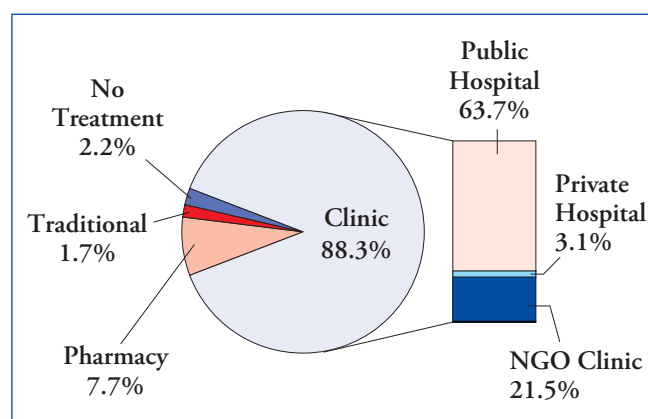
The self-reported history of STIs among FSWs is presented in table 19. About half of the FSWs reported having had an STI in the past year. FSWs who had been selling sex for a year or more were more likely to report an episode of STI than FSWs who had been working for a shorter period of time (52% versus 38%, $p < 0.001$). However, self reported STI among women are generally poorly correlated with actual STI morbidity. About half of the sex workers did not stop selling sex during their last STI episode.

Table 19. Self-reported history of STI among FSWs

	n=1,079 %
STI past year	
Yes	47
No	53
How long stopped sex during last STI episode	
Did not stop	46
1 to 3 days	16
4 to 10 days	21
Until the end of treatment	4
Until cured	13

Figure 2 presents the type of services used for treatment during the last STI episode. The majority (88%) used medical clinics, mostly provided by the public sector. Only 2% did not get treated and 8% self treated. There were some geographic differences in uptake of STI services. In most provinces, the overwhelming majority of FSWs received treatment from public health hospitals (98% in Banteay Meanchey, 97% in Battambang, 93% in Prey Veng). Compared with FSWs in these provinces, fewer FSWs sought treatment from public services in Koh Kong, Sihanouk Ville and Siem Reap, to the profit of both pharmacies and private doctors. In Phnom Penh, 57% received treatment from public services and another 30% from NGO clinics.

Figure 2. Services used by FSWs for STI treatment at last STI episode in the past year

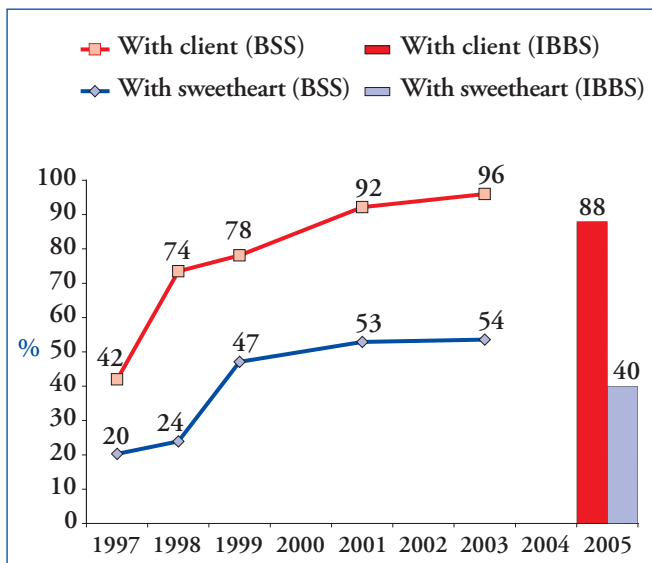


5.1.9. Trends

To ensure comparability of behavioral data the trend analysis was restricted to the five BSS provinces which were consistently studied since 1997, i.e., Phnom Penh, Battambang, Sihanouk Ville, Kampong Cham, and Siem Reap. Therefore, percents presented in this section may be slightly different than those detailed above, which are based on weighted results from all eight provinces included in the 2005 STI Survey. Furthermore, because province-specific FSW population size estimates were not available for each year from 1997 through 2003, the analysis of trends could not be weighted.

The proportion of FSWs who reported consistent condom use with clients rose sharply from 1997 to 2000 and reached its highest point estimate (96%) in 2003 (as estimated from BSS data). The 2005 STI

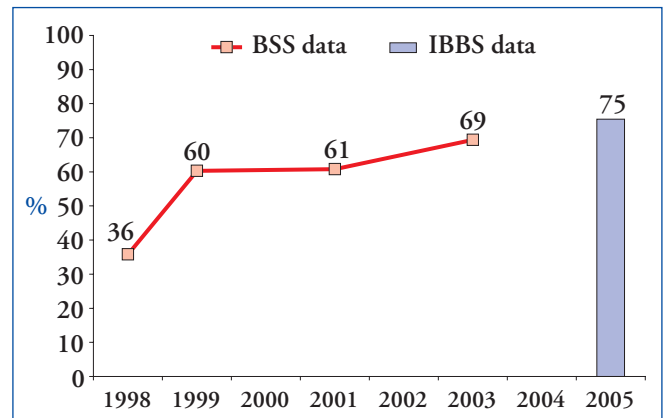
Figure 3. Consistent condom use by FSWs with clients (in past week) and with sweethearts (in past 3 months)



survey found that a smaller proportion (88%) of FSWs reported consistent condom use compared with that found in the 2003 BSS. A similar pattern in consistent condom use with sweethearts was observed (figure 3). Do these data represent a true decline in consistent condom use by FSWs? Possibly, but because of differences in BSS and STI Survey methodologies, the estimates may not be comparable. Perhaps the collection of a biological specimen resulted in fewer respondents trying to dissimulate their risk behavior than in the BSS for which no biological specimens are collected. That is, for the 2005 STI Survey, fewer FSWs may have reported always using condoms if they believed that laboratory testing would have shown otherwise. Results from a subsequent round of BSS (to be conducted in 2007) will be necessary before conclusions may be drawn about whether consistent condom use is decreasing or fluctuating around its plateau value.

As detailed in figure 4, the use of medical services for treatment of last STI symptoms has increased consistently since 1998.

Figure 4. Uptake of medical services by FSWs for treatment of last STI episode in the past year



5.2. Police

5.2.1. Demographic characteristics

Demographic characteristics of the police sample are presented in table 20. Police ranged in age from 20 to 57 years old (mean age= 39.6 years.) Only 4% of police were younger than 30 years old. Most (89%) police were currently married and living with their spouse. Among the 8% of police who were not currently married, 47% lived with their parents or relatives, 30% lived with friends or colleagues, and 21% lived on their own. All had attended primary school and 89% had attended secondary school.

Table 20. Demographic characteristics of police surveyed

	n=623 %
Age, in years	
20-29	4
30-39	47
40-49	45
50+	4
Marital status	
Married, living together	89
Married, not living together	3
Divorced/widowed	2
Never Married	6
Currently living with	
Wife	88
Parents/relatives	5
Friends/colleagues	4
Alone	3
Schooling	
No formal education	0
Primary school	11
Secondary school	84
University level	5

Internal migration data are presented in table 21. Most police had been settled in their current province of residence for some time— 92% had been living in the current province for more than 3 years. Most (70%) had spent the entire year together with their family and only 7% had been separated from their

family for more than 4 months. Only 15% had slept overnight in other communes in the past year. These data suggest that few police are transferred to other provinces or migrate temporarily throughout Cambodia.

Table 21. Recent internal migration reported by policemen surveyed

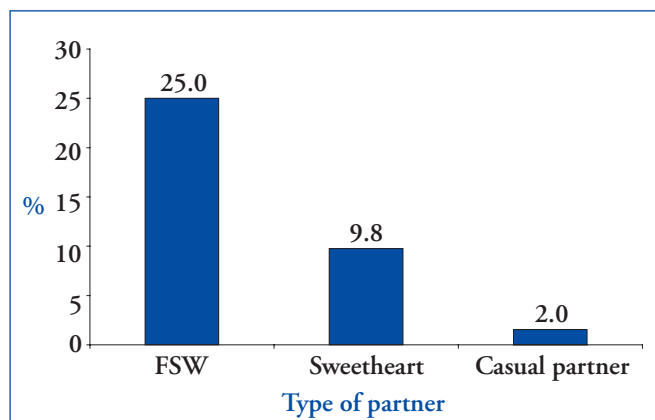
	n=623 %
Time lived in current province	
< 3 years	8
≥ 3 years	92
Number of months lived away from family, past year	
Never lived away from family	70
1 to 3 months	23
4 to 12 months	7
Number of other communes lived, past year	
Never lived in other communes	85
≥ 1	15

5.2.2. Sexual behaviors

Men from the police sample reported having had their first sexual intercourse on average at 23 years of age (median=23 years).

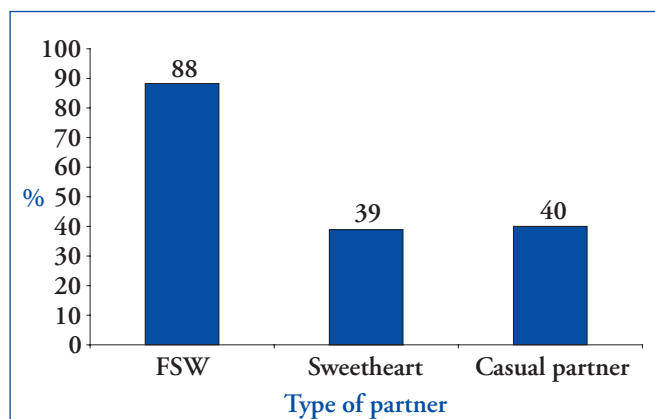
Among married policemen, 95% had sex with their wife in the past year. Among all police, 41% reported having had sex with multiple partners in the past year and 10% had more than five sexual partners during that period of time. FSWs were the most frequently reported type of non-marital partner with whom police had sex in the past 3 months (Figure 5). Sex with sweethearts was much less commonly reported than sex with FSWs, and casual sex was rare, reported by only 2% of the police. In total, 29% of the police reported having had non-marital partners in the past three months.

Figure 5. Proportion of policemen who reported sex with non-marital-partners in the past three months, by type of partner



A large proportion (88%) of police reported consistent condom use in the past three months with FSWs, but only about 40% of the police reported consistent condom use with either casual partners or sweethearts (figure 6).

Figure 6. Proportion of police who reported always using condoms in the past three months, by type of partner



In total, 8% of all the police reported having unprotected sex with a non-marital partner in the past three months: 6% had unprotected sex with a sweetheart, 3% had unprotected sex with a FSW, and 1% had unprotected sex with a casual partner.

About two thirds (66%) of police perceived themselves to be at low or no risk for STI infection (figure 7). Only 16% of the police felt they were at high risk of being infected with an STI. Those who had unprotected sex with a non-marital partner in the past three months were more likely to perceive themselves at high risk for acquiring an STI compared with those who did not have unprotected sex (58% versus 24%, $p < 0.001$).

Figure 7. Self-perceived risk of acquiring an STI

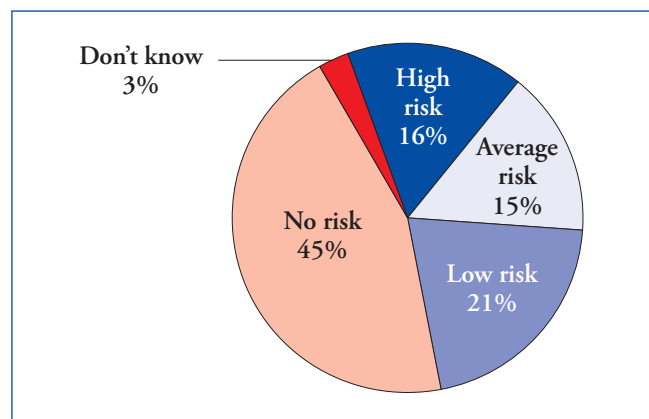


Table 22 shows that almost two thirds (66%) of policemen had been tested for HIV. However, 44% of those tested never received their test results. In total, 37% of policemen had been tested for HIV and learned their serostatus.

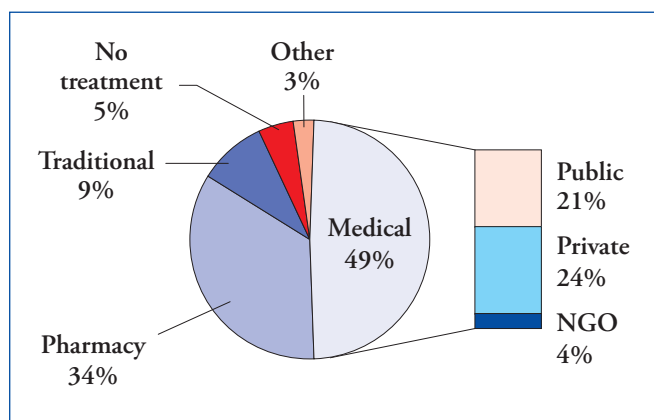
Table 22. Uptake of VCCT services among police

		n=623 %
Ever tested for HIV		
	Yes	66
	No	34
When HIV tests were last received*		
	Never received HIV test results	44
	6 months ago	7
	7 to 12 months ago	9
	13 months to 2 years ago	21
	More than 2 years ago	18

*Of those ever tested for HIV

One quarter of police reported ever having had an STD and 5% reported having had STI symptoms in the past year. About half sought treatment at a medical facility and about a third sought over-the-counter drugs from a pharmacy for self-treatment (figure 8).

Figure 8. Place where police sought treatment for the last episode of STI in the past year

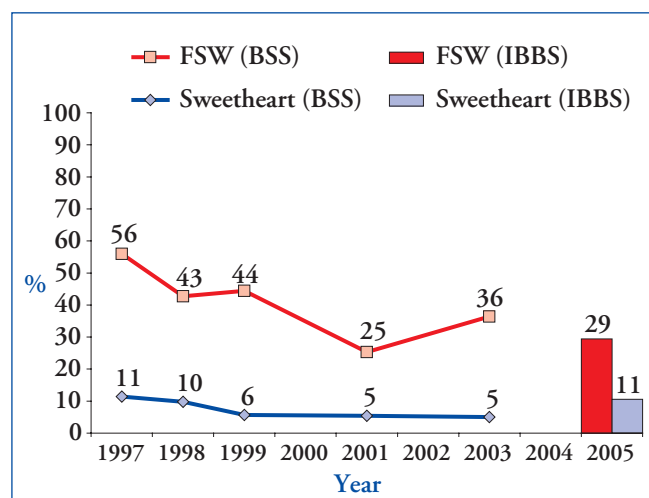


5.2.3. Trends

To ensure comparability of behavioral data, the trend analyses were restricted to the five BSS provinces which were consistently surveyed since 1997, i.e., Phnom Penh, Battambang, Sihanouk Ville, Kampong Cham, Siem Reap. Therefore, percents presented in this section may be slightly different than those detailed above which are based on results from all eight provinces.

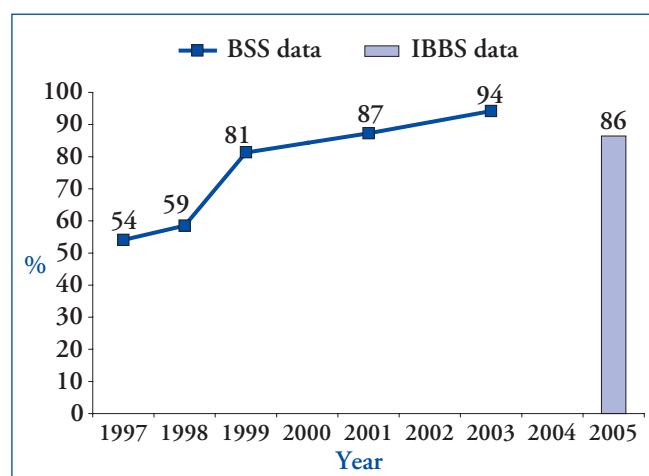
The trend in the proportion of police who reported having had sex with an FSW in the past three months seems to be stabilizing around 30%. Time series data analysis suggests that this result varies depending on the period of data collection. The proportion tends to be higher when data are collected after or around the time of a major national celebration during which many men visit FSWs. Since 1999, the proportion of police who reported having sex with their female sweetheart had stabilized around 5%, but in 2005 reached the highest level in several years (11%), the same as previously recorded in 1997 (figure 9).

Figure 9. Trends in the proportion of police who reported sex with non-marital partners in the past 3 months, by partner type and survey



The trend in consistent condom use with FSWs appears to be declining slightly from the very high 94% estimated in 2003 to 86% in 2005 (Figure 10). However, it is plausible that the 2003 BSS may have slightly overestimated consistent condom use, and that in the 2005 IBBS, respondents may have been less likely to overestimate this behavior. If this is the case, then perhaps consistent condom use has stabilized around the 2005 estimate of 86%.

Figure 10. Trends in consistent condom use with FSWs among police, by survey



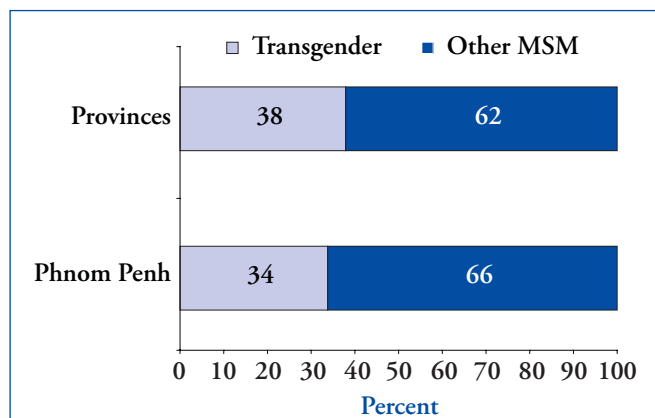
5.3. MSM

The MSM component of the STI Survey was conducted in Cambodia’s capital, Phnom Penh, and the capital cities of two provinces, Battambang and Siem Reap, and enrolled 548 MSM (299 [55%] from Phnom Penh and 249 [45%] from the provinces). All participants provided a blood specimen, 1 (0.2%) did not provide urine and 13 (2%) did not provide rectal swabs.

5.3.1. Demographic characteristics

MSM were asked whether they considered themselves to be men or women or both. Those who reported that they considered themselves to be women are classified here as transgenders; those who reported that they considered themselves to be men, or both men and women, or that they did not know are classified as “non-transgender” or “other MSM”. The proportion of MSM classified as transgender was about the same in Phnom Penh (34%) as in the provinces (38%) (figure 11).

Figure 11. Percent distribution of MSM gender in the survey sample, by survey location



The MSM sampled were young—23 years old, on average (median=22 years), and 28% were teenagers, aged 15-19 years. Demographic characteristics by survey location are detailed in table 23. MSM from Phnom Penh were older than those from the provinces (mean age was 24 years versus 22 years old, p-value<0.001). Few MSM had ever been married—10% of MSM in Phnom Penh and 4% in the provinces—and about the same proportions had children (9% of MSM in Phnom Penh and 3% in the provinces). The majority of MSM were educated: 64% in Phnom Penh and 68% in the provinces had attended at least secondary school. In Phnom Penh, a quarter of MSM were students, 19% unemployed, 17% vendors, and 10% hairdressers. In the provinces, 27% of MSM were students, 19% farmers, 15% vendors, 13% unemployed, and 9% hairdressers. Most (82%) of the MSM who were hairdressers were transgenders. Regardless of survey location, 21% of the transgenders were hairdressers. In Phnom Penh, 6% of MSM reported making a living from selling sex compared with 2% of MSM in the provinces. Among those who reported selling sex as a profession, 59% were transgenders. The proportion of MSM who lived with their family was lower in Phnom Penh (72%) compared with those in the provinces (83%). A similar proportion of the transgenders and other MSM were living together with their family. The amount of money spent on leisure in the past week was larger among Phnom Penh MSM compared with those in the provinces—half of the Phnom Penh MSM had spent at least US\$10 whereas half of those in the provinces had spent at least US\$5 for leisure in the past week.

Half of the Phnom Penh MSM had had sex by age 17 years, and half of the MSM from the provinces reported first sex by age 18. Overall, mean age at first sex was 17.6 years.

Table 23. Demographic characteristics of MSM, by survey location

	Phnom Penh n=299 %	Provinces n=249 %
Age, in years		
15-19	26	31
20-24	39	51
25-29	18	12
30+	17	6
Mean (years)	24.2	22.0
Median (years)	22	21
Marital status		
Currently married	5	3
Divorced/widowed	5	1
Never married	90	96
Number of children		
No children	92	97
At least one child	9	3
Schooling		
No formal education	14	3
Primary school	21	29
Secondary school	55	66
University level	9	2
Mean (years of schooling)	7.4	7.9
Median (years of schooling)	8	8
Profession		
Unemployed	19	13
Student	25	27
Farmer/laborer	7	19
Seller	17	15
Private company/NGO worker	11	5
Military/police	0	1
Government staff	3	2
Hairdresser	10	9
Mototaxi driver	2	2
Sex worker	6	2
Other	0	4
Currently living with		
Wife	4	2
Parents/relatives	68	81
Friends/colleagues	17	12
Alone	11	5
Money spent for leisure in past week, in USD		
< \$2	4	17
\$2 to \$10	62	56
\$11 to \$50	33	27
\$51 to \$200	1	0
Mean	\$15.20	\$13.10
Median	\$10	\$5

5.3.2. Internal migration

Almost all (94%) Phnom Penh MSM had been living in the capital city for at least the past three years and most (70%) MSM from provinces had spent their entire life in their current city of residence. Only 13% of those from Phnom Penh had lived in another city in the past year, whereas 49% of MSM from the provinces did so. Regardless of the survey location, over 60% of MSM have lived in other communes in the past year. In the past year, Phnom Penh MSM had lived in an average of 2 communes, whereas MSM from the provinces had lived in an average of 3.7 communes; most MSM had lived together with their family while about one quarter had spent more than three months away from their family. These data suggest that overall, MSM in the survey sample were not highly mobile (table 24).

Table 24. Internal migration among MSM, by survey location

	Phnom Penh n=299 %	Provinces n=249 %
Time lived in current city		
Less than 3 years	6	15
3 years or more	51	14
Entire life	43	70
Number of cities lived in, past year		
Never lived in other city	87	51
Lived in at least one other city	13	49
Mean number of cities lived in, past year	1.2	2.1
Number of communes lived in, past year		
Never lived in other communes	36	31
Lived in at least in one other commune	64	69
Mean	2.0	3.7
Median	2	3
Number of months spent away from family, past year		
Never lived away from family	58	56
1 to 3 months	13	19
4 to 12 months	29	26
Mean number of months spent away from family, past year	3.1	2.8

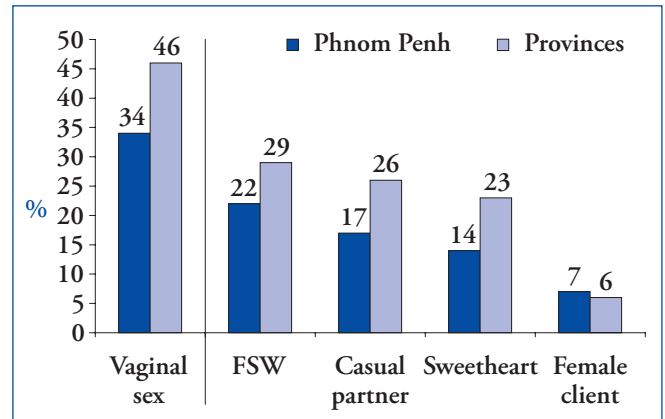
5.3.3. Sex with female partners

a. Partnerships

In Phnom Penh as well as in the provinces, about 40% of MSM reported they had sex with women in the past year, and 10% had more than 5 female sexual partners in the past year. Sex with women was rare among transgenders (5%) but far more common (> 40%) among other MSM.

Female partners of other (non-transgender) MSM are presented in Figure 12. Among other MSM, 34% from Phnom Penh and 46% of those from the provinces reported having had vaginal sex in the past month. Among married MSM, however, 61% reported that they had not had sex with their wife in the past month. FSWs were the most common female partners reported by non-transgender MSM—22% of those from Phnom Penh and 29% of those from the provinces had sex with an FSW in the past month. Such regular sexual contact between MSM and FSW populations clearly indicates the link between the two populations and a potential bridge for spreading HIV from a high prevalence population to a highly vulnerable population. Depending on survey location, 17% to 26% of non-transgender MSM reported having had sex with a casual female partner in the past month, and 14% to 23% had sex with their female sweetheart in the past month. Those from the provinces were more likely than those from Phnom Penh to have had sex with a FSW, a casual female partner, or a female sweetheart. This could possibly mean that a substantial proportion of MSM from the provinces have sex with either women or with men because they have difficulty finding the partner of the preferred gender. Another explanation for why more MSM in the provinces have sex with women is that possibly peer pressure or desire to adhere to social norms is stronger in the provinces.

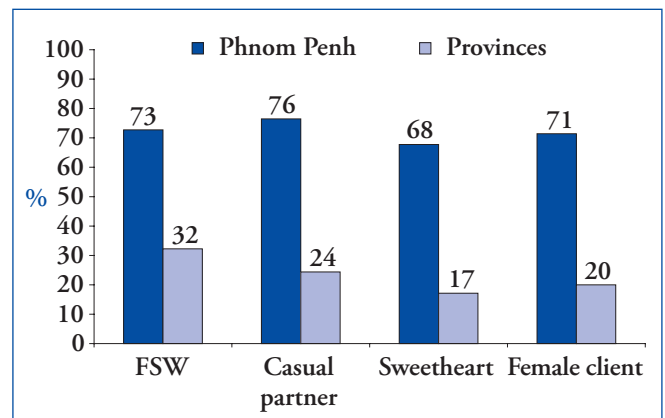
Figure 12. Percent of non-transgender MSM who reported sex with women in the past month, by type of female partner and survey site



b. Condom use

Condom use by MSM with female partners is shown in Figure 13. In Phnom Penh, consistent condom use with female partners ranged from 68-76% depending on the type of female partner. Among MSM in the provinces, heterosexual contact was largely unprotected as only 17-32% of MSM reported always using condoms with their female partners in the past month.

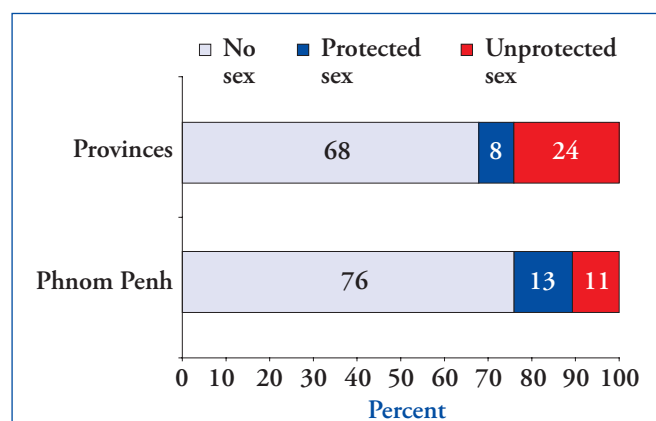
Figure 13. Percent of MSM who reported consistent condom use with female partners in the past month, by partner type and survey site



In both the capital city and in the provinces, the proportion of MSM who reported consistent use of condoms with FSWs was substantially lower than that reported by FSWs and police. As detailed in figure 13, condom use decision did not appear to be related to type of partner as condom use with FSWs and other female partners was similar within a geographic setting.

Figure 14 represents the sexual risk taken by non-transgender MSM with female sexual partners: 11% of the non-transgender MSM from Phnom Penh and 24% from the provinces reported having unprotected sex with female partners in the past month.

Figure 14. Percent of other (non-transgender) MSM who reported sexual risk with female partners in the past month, by survey location



5.3.4. Sex with male partners

a. Partnerships

The number of male partners reported by MSM survey participants is shown in table 25. MSM reported having a substantial number of male sexual partners per month—19% of Phnom Penh MSM and 13% from the provinces reported having more than 5 male partners in the past month. Depending on the survey location, 63-68% of MSM reported having had multiple male partners in the past month,

and about 25% had multiple male partners in the past week. Among MSM who reported having had male-to-male sex in the past month, 75% from Phnom Penh and 93% from the provinces reported having had anal sex in the past month.

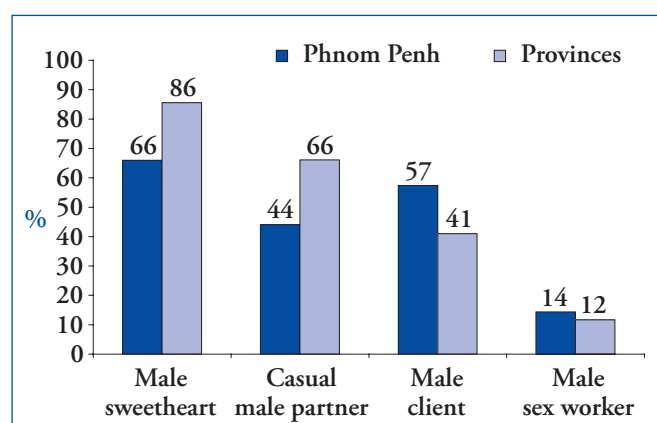
Table 25. Number of male partners in the past month and in the past week reported by MSM, by survey location

	Phnom Penh n=299 %	Provinces n=249 %
Number of male sexual partners, past month		
0	8	0
1	24	37
2 to 10	61	57
> 10	7	6
Mean (number of partners)	4.0	3.7
Median (number of partners)	3	2
Number of male sexual partners, past week		
0	41	27
1	35	48
> 1	24	25
Number of male partners with whom had anal sex, past week		
0	57	32
1	27	48
> 1	16	20

The types of male partners with whom MSM reported having had sex in the past month are detailed in figure 15. Although transgenders were more likely than other MSM to sell sex to male clients (56% versus 47%, $p=0.04$), similar proportions of transgenders and other MSM reported having sex with other male partner types. In both the capital city and the provinces, male sweethearts were the most commonly reported male partners;

66% of Phnom Penh MSM and 86% of MSM from the provinces had sex with their male sweetheart in the past month. Clients (57%) were the second most frequently reported type of male partner among Phnom Penh MSM whereas casual partners (66%) were the second most frequently reported type of male partner among MSM from the provinces. Many MSM sell sex by opportunity but do not make a living out of this activity, which may explain why 57% of MSM from Phnom Penh and 41% of MSM from the provinces reported having sold sex in the past month, but only 6% and 2% reported working as a male sex worker, respectively. In both the capital and the provinces 12% to 14% of MSM had bought sex from a male sex worker.

Figure 15. Percent of MSM who reported sex with men in the past month, by type of male partner and survey site



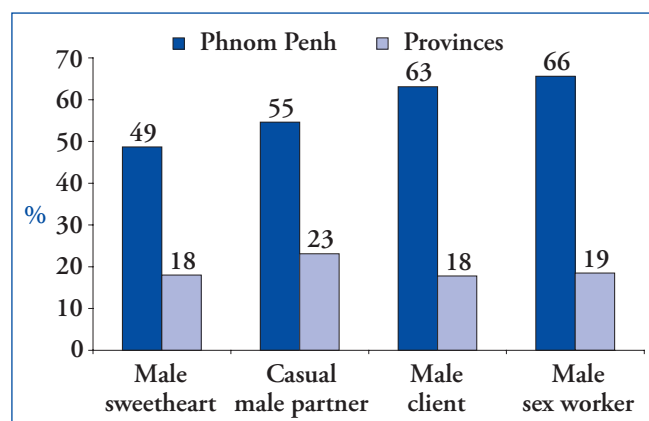
b. Condom use

Condom use behaviors with male partners are presented in figure 16. Consistent condom use was higher in the capital city than in the provinces regardless of partner type.

In Phnom Penh, 66% of MSM always used condoms with male sex workers and 63% with male clients, but only 49% always used condoms with their male sweethearts. In the provinces, only 18-23% MSM used condoms consistently with their male partners, and there were no significant differences between condom use with commercial and non-commercial partners.

Unprotected sex with a male partner in the past month was reported by 38% of Phnom Penh MSM and 83% of MSM from the provinces. Overall, transgenders were more likely than other MSM to have had unprotected sex with male partners in the past month (70% versus 52%, $p=0.001$).

Figure 16. Percent distribution of consistent condom use among MSM who reported sex with men in the past month, by type of partner and survey location



5.3.5. Sexual practices

Because sexual practices of MSM appeared to vary with self-reported gender identity, analyses of sexual practice were stratified by gender identity as detailed in table 26.

Most transgenders (87%) had receptive anal sex in the past month, but few (11%) had practiced insertive anal sex during the same time period. Conversely, the majority of non-transgender MSM (62%) practiced insertive anal sex and only 36% had receptive anal sex in the past month.

Transgenders were more likely than non-transgender MSM to have given oral sex to their male partners in the past month (72% versus 40%). Among MSM who provided oral sex, 61% of transgenders and 47% of other MSM received semen in the mouth.

Table 26. Sexual practices reported by MSM, by self-reported gender

	MSM self-reported gender		
	Transgender n=193 %	Other MSM n=348 %	
Insertive anal sex, past month	Yes	11	62
	No	89	38
Receptive anal sex, past month	Yes	87	36
	No	13	64
Gave oral sex to male partner, past month	Yes	72	40
	No	28	60
Gave oral sex to male partner, past month	n=137 %	n=139 %	
Received semen in the mouth, past month	Yes	61	47
	No	39	53

5.3.6. Lubricant use

MSM from both Phnom Penh and the provinces reported using lubricant more frequently for insertive anal sex than for receptive anal sex (table 27). More Phnom Penh MSM (28%) always used lubricant for receptive anal sex than did MSM in the provinces (14%).

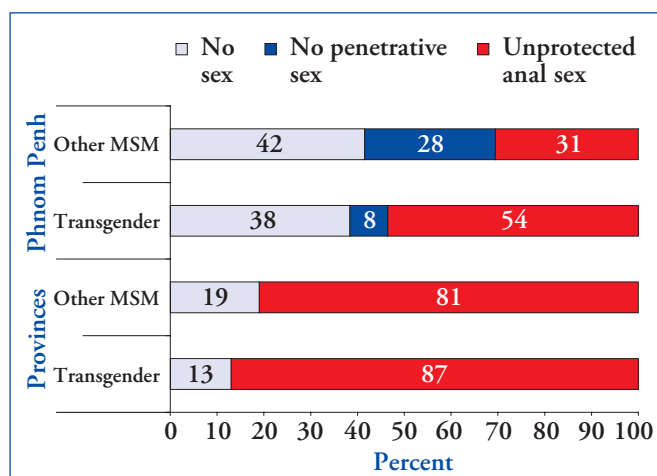
5.3.7. Sexual risk with male partners

When taking into account all male partners and the frequency of reported condom use, 38% of Phnom Penh MSM and 83% of MSM from the provinces had unprotected sex with male partners in the past month. In Phnom Penh, non-penetrative (i.e., neither anal insertive nor anal receptive intercourse) sex was reported by 21% of MSM, whereas less risky non-penetrative sex was not reported by MSM from the provinces. In Phnom Penh, unprotected anal sex in the past month was reported by more than half (54%) of the transgenders compared with less than one third (31%) of other MSM (figure 17). In the provinces, unprotected anal sex in the past month was reported by most transgenders (87%) and other MSM (81%). Among non-transgender MSM who had unprotected sex with a woman in the past month, 46% in the provinces and 13% in Phnom Penh also had unprotected sex with a man.

Table 27. MSM lubricant use by survey location

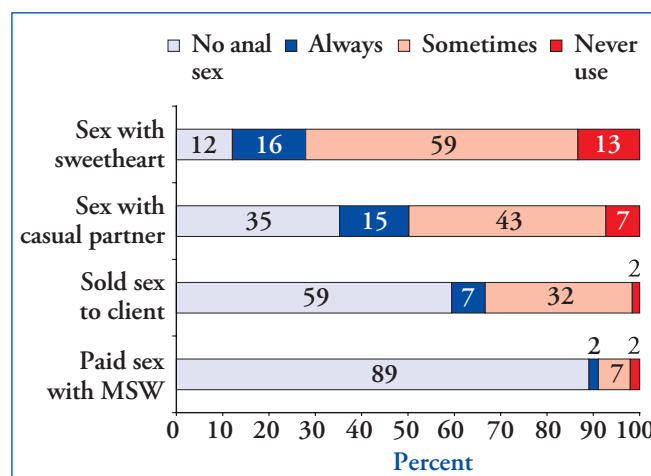
	Phnom Penh	Provinces
Use of lubricant during insertive anal sex, past month (among MSM who practiced insertive anal sex in the past month)	n=97 %	n=146 %
Always	33	19
Not always	67	81
Use of lubricant during receptive anal sex, past month (among MSM who had receptive anal sex in the past month)	n=160 %	n=138 %
Always	28	14
Not always	72	86

Figure 17. Sexual risk with male partners in the past month reported by MSM, by gender identity and survey location



About 45% of MSM from both Phnom Penh and the provinces reported having had receptive anal sex in the past month. However, MSM from the provinces may be at higher risk for STIs than those from the capital city because of their relatively lower frequency of consistent condom use with male partners. Figure 18 presents the percent of MSM from the provinces who were exposed to body fluids (i.e., the percent who reported using condoms only sometimes or never) in the past month, by partner type: 72% were exposed to body fluid during unprotected sex with their male sweetheart, 50% during sex with a male casual partner, 34% during sex with a client (i.e., while selling sex to a man), and 9% during sex with a male sex worker (i.e., when buying sex from a man). Figure 18 clearly illustrates that prevention messages about reducing sexual risk with male partners should be developed.

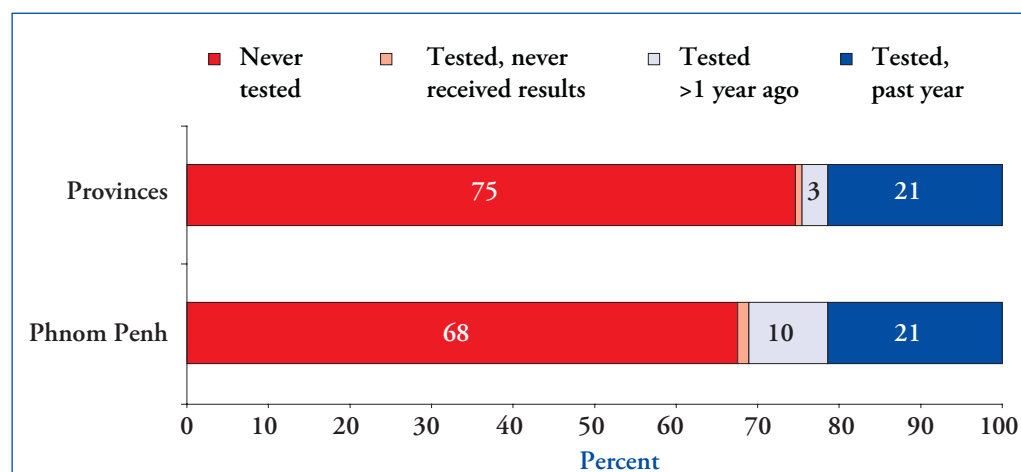
Figure 18. Consistent condom use during anal sex in the past month reported by MSM from the provinces, by male partner type



5.3.8. HIV testing

Data on the uptake of voluntary (not survey-related) HIV testing services among MSM are presented in figure 19. The majority of MSM never sought their HIV serostatus: 68% of those from Phnom Penh and 75% of those from the provinces had never been tested. Of the 160 MSM who sought testing, almost all (96%) received their test result. Most of those tested for HIV had been tested in the past year. Among all MSM from Phnom Penh and the provinces, 21% had been tested for HIV within the past year and learned their results. Among those MSM who had ever been tested, 66% from Phnom Penh and 83% from the provinces had their last test within the past year and learned their results.

Figure 19. Uptake of HIV testing services among MSM, by survey location



5.3.9. STI knowledge, occurrence, and service uptake

The percent of MSM who reported having had an STI in the past year was higher among Phnom Penh MSM (18%) than among MSM from the provinces (11%). However, MSM from Phnom Penh (32%) were less likely than MSM from the provinces (66%) to perceive themselves to be at high or very high risk of contracting an STI (figure 20).

5.3.10. Meeting places

Places where MSM had met male partners in the past six months are detailed in figure 21. Phnom Penh MSM mostly met partners in parks, on river banks, and at parties, while those from the provinces met their partners at parties, at concerts, in parks, in the streets, or at temples.

Figure 20. MSM’s self-perceived risk of acquiring an STI, by survey location

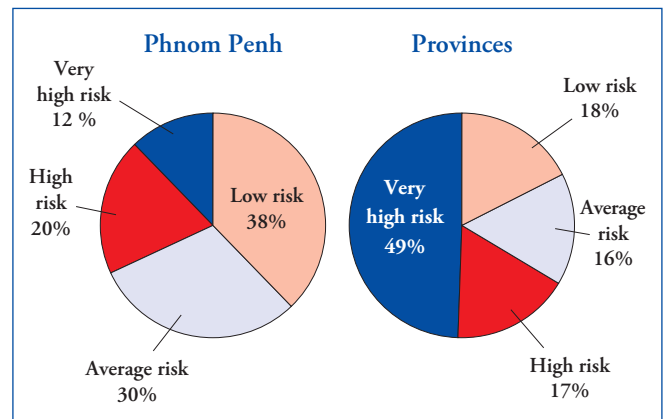
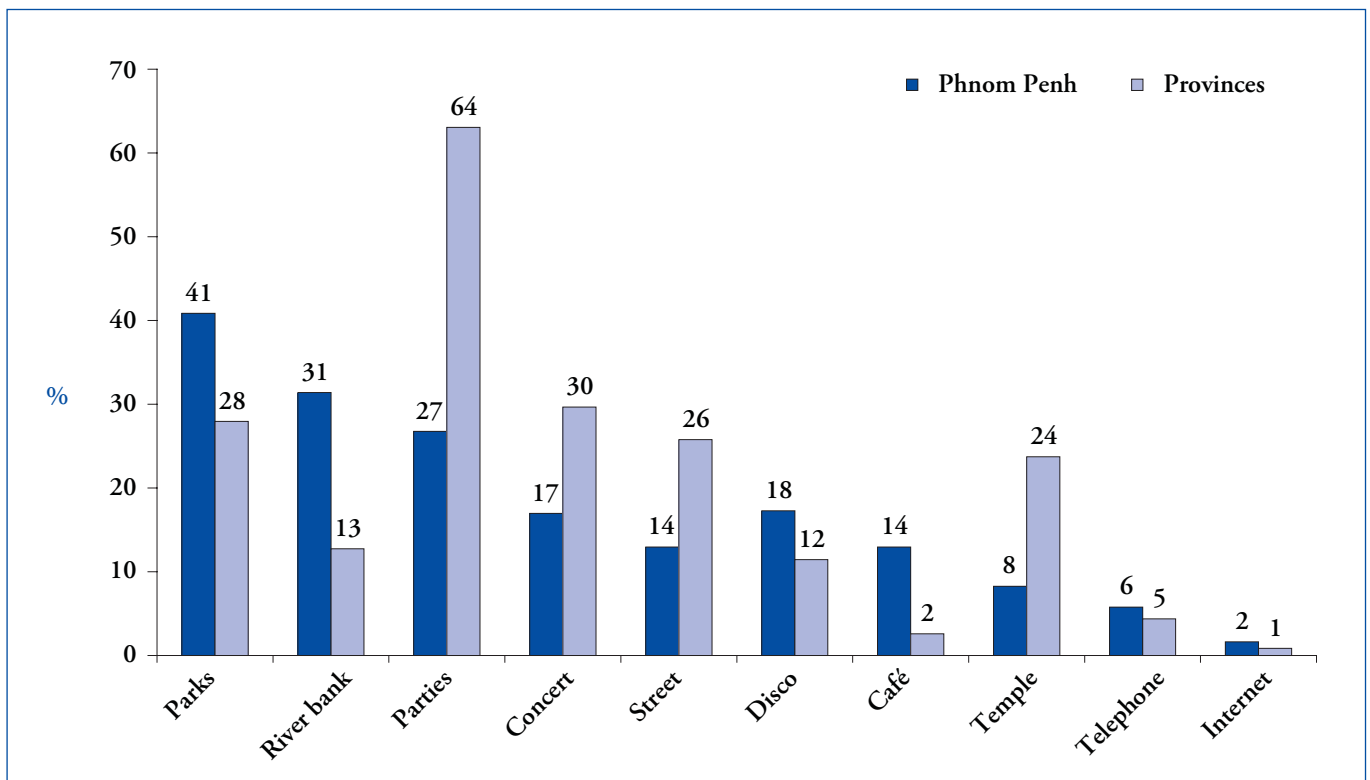


Figure 21. Places visited by MSM when seeking partners in the past six months, by survey site



Prevalence of sexually transmitted infections

6.1. Chlamydia

Because *C. trachomatis* is commonly transmitted by asymptomatic individuals,¹⁰ it often remains undetected and causes considerable morbidity (especially in women), despite being both curable and preventable. In addition, women infected with *C. trachomatis* present an increased risk for acquiring HIV during intercourse with an HIV-infected partner.¹¹

The crude prevalence of chlamydia among sentinel groups in 2005 is presented in figure 22.

The prevalence of chlamydia among FSWs was in the lower range of that reported for FSWs in the region,⁴ suggesting that the STI control program, which includes condom promotion and STI treatment for FSWs, has been effective in sustaining the reduction in prevalence from 22.5% in 1996 to 14.2% in 2001. The prevalence of chlamydia among police was intermediate between the 1996 and 2001 results and the prevalence of rectal chlamydia among MSM was quite high.

6.2. Gonorrhea

In women, *N. gonorrhoeae* causes genital tract infections which are asymptomatic in 75% of cases.¹²

Gonorrhea is curable and preventable. Susceptibility to gonococcal infection varies by ethnic group independently of socio-economic status.¹³ In addition to multiple partnerships, risk factors include early onset of sexual activity, low socio-economic status, and use of hormonal contraception.¹⁴ The rectal mucosa is infected in 35-50% of women with gonococcal cervicitis and is a frequent infection in homosexual men.¹⁴ Rectal gonorrhea among women is usually due to auto-contamination by vaginal secretions and is often asymptomatic, whereas among men, direct inoculation through receptive anal intercourse is prone to lead to proctitis.¹⁴ Gonorrhea is usually concentrated in high-risk groups and particularly in MSM.¹⁵ The prevalence of gonorrhea among sentinel groups in 2005 is presented in figure 23.

The prevalence of gonorrhea among FSWs was in the regional range for FSWs.⁴ In our sample, gonorrhea was more common among FSWs than among MSM. However, the prevalence of gonorrhea may have been underestimated among police and MSM, because of technical limitations encountered (see sections 4.11.2 & 4.11.3). Therefore, making any inferences about gonorrhea among men is difficult.

Figure 22. Crude prevalence of chlamydia among STI Survey sentinel groups in 2005

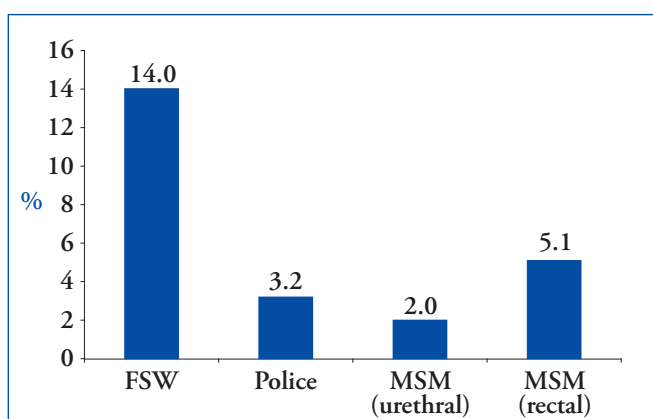
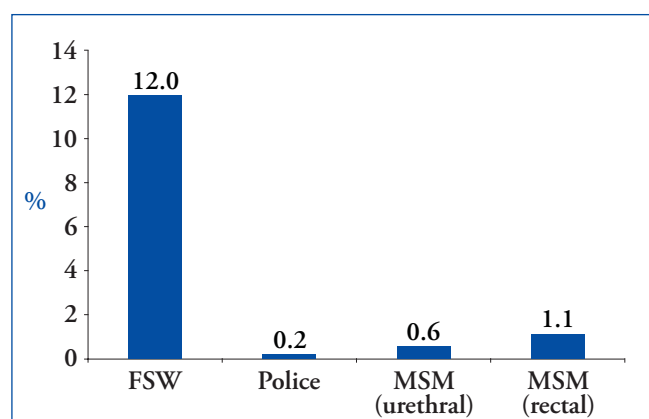


Figure 23. Crude prevalence of gonorrhea among STI Survey sentinel groups in 2005

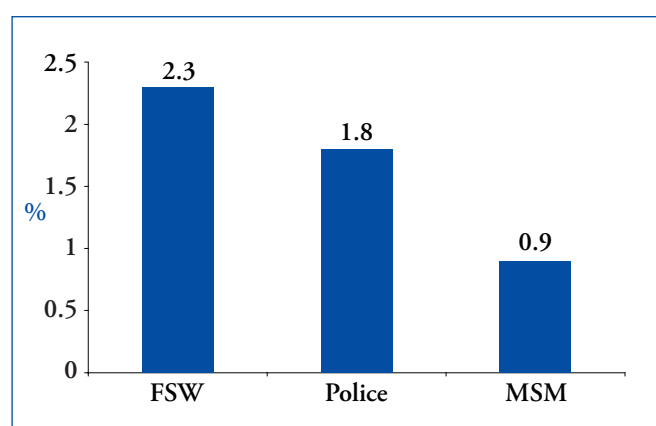


6.3. Syphilis

Syphilis is a lethal disease that can be acquired sexually, perinatally (i.e., transmitted from mother to child), or by sexual intercourse, and less frequently, parenterally (e.g., through transfusion of contaminated blood). Syphilis is endemic in under-privileged populations that live in remote areas with poor access to health care services.¹⁶ Despite being a disease that is easy and inexpensive to treat, syphilis remains a significant disease burden for both adults and children in many developing countries. Moreover, primary syphilis is a genital ulcerative disease that increases the risk of HIV acquisition or transmission.¹⁷

The syphilis testing methodology used in this survey for estimating prevalence was a screening RPR test with TPPA confirmation of a reactive test. This standard methodology does not differentiate recently treated syphilis from active syphilis. The crude prevalence of syphilis among sentinel groups in 2005 is shown in figure 24.

Figure 24. Crude prevalence of syphilis among STI Survey sentinel groups in 2005



With a syphilis prevalence of 2.3% among FSWs, Cambodia is among those countries on the Indochina peninsula with a high prevalence of syphilis. However, syphilis prevalence appears to be controlled to a sub-epidemic level. In the northwestern provinces (Banteay Meanchey, Siem Reap and Battambang) syphilis prevalence among FSWs was as high as 7%, which is worrisome as it suggests that FSWs continue to practice unprotected sex and that STI services offered to FSWs in this region, including syphilis diagnosis and treatment, are underused or suboptimal.

6.4. Prevalence of STIs by sentinel group

6.4.1. Female sex workers

Prevalence of STIs among FSWs by province is presented in table 28.

Table 28. STI prevalence among FSWs by province

City/province	Gonorrhoea %	Chlamydia %	Syphilis %	Any STI %
Phnom Penh	14.3	13.8	1.6	24.9
Kampong Cham	6.1	12.2	1.7	18.3
Prey Veng	3.0	10.0	0.0	11.0
Battambang	12.9	19.6	6.7	30.7
Banteay Meanchey	19.3	11.4	6.8	31.8
Siem Reap	7.1	15.2	4.0	20.2
Koh Kong	13.4	17.1	2.4	29.3
Sihanouk Ville	14.7	12.0	2.7	21.8
TOTAL	11.9	14.0	3.2	23.7

Chlamydia was the most common STI identified among FSWs and varied by province, ranging from 10-20%. Gonorrhea prevalence ranged from 3-19%. Syphilis prevalence also varied by province and as mentioned above, was highest in the northwestern provinces (i.e., Battambang, Banteay Meanchey and Siem Reap). The total syphilis prevalence shown in table 28 is different from the crude syphilis prevalence shown in figure 24 because the data have been weighted. Weighting had a minimal effect on gonorrhea and chlamydia prevalence.

a. Factors associated with the occurrence of any STI

Data were analyzed to identify factors associated with the occurrence of any STI, defined as having a positive test for chlamydia, gonorrhea or syphilis. Associations between infection with any STI and selected demographic and behavioral characteristics among FSWs are presented in table 29.

Table 29. Association between testing positive for any STI and demographic and behavioral characteristics among FSWs

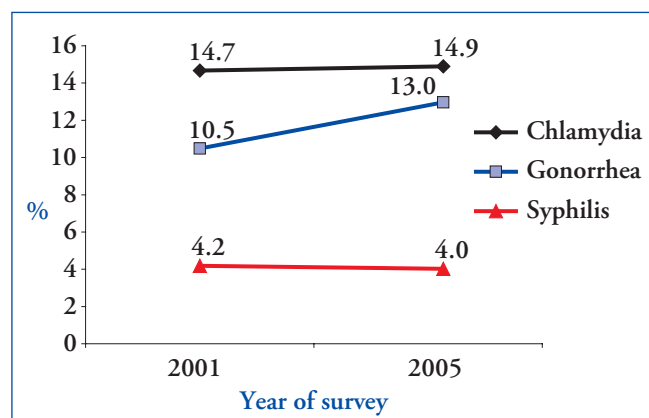
	Any STI		Chi-square p value	
	% Positive	% Negative		
Age, in years				
	15-19	24.2	75.8	0.60
	20-24	24.7	75.3	
	25-29	23.4	76.6	
	30+	18.8	81.3	
Schooling				
	No formal education	22.6	77.4	0.23
	1 to 5 years	26.1	73.9	
	≥ 6 years	20.1	79.9	
Duation of selling sex				
	≤ 12 months	25.9	74.1	0.02
	> 12 months	19.8	80.2	
Sex with sweetheart, past month				
	Yes	23.6	76.4	0.93
	No	23.8	76.2	
Condom use with sweetheart				
	Always	19.6	80.4	0.13
	Not always	25.9	74.1	
Condom use with casual partner, past month				
	Always	23.6	76.4	0.47
	Not always	27.5	72.5	
Condom use with client, past month				
	Always	23.7	76.3	0.92
	Not always	24.1	75.9	
Had an STI in the past year				
	Yes	27.7	72.3	0.007
	No	20.7	79.3	

The prevalence of any STI among FSWs did not vary significantly by age or level of education. Those who began selling sex in the past year were more likely to be infected with an STI than those who had been selling sex for a longer period of time (26% versus 20% respectively, p -value=0.02), suggesting that FSWs new to the sex trade are more vulnerable to STI (i.e., to unprotected sex). Having had sex with a sweetheart in the past three months was not associated with higher prevalence of STIs. Although not statistically significant, the prevalence of STIs was higher among FSWs who did not always use condoms with their sweethearts than among those who reported always using condom with their sweethearts (26% versus 20% respectively, p -value=0.13). Prevalence of STIs was comparable between FSWs who reported always using condoms with clients and those who reported inconsistent use, suggesting poor reporting of this behavior. Because investigation teams included individuals who promote condom use by FSWs at the provincial level, it is plausible that some of the FSWs provided what they perceived to be the “correct” answer, regardless of their behaviors, in order to please interviewers—a common phenomenon in behavioral research known as “social desirability bias”. On the other hand, the percent of FSWs who reported always using condoms with clients in the past week (figure 3) was the lowest reported since the 2000 BSS, and the discussion in section 5.1.9 suggests that fewer FSWs report always using condoms in surveys for which biological specimens are collected. Finally, those who reported having had an episode of STI in the past year were more likely than others to be infected at the time of the survey (28% versus 21% respectively, p -value=0.007).

b. Comparison with 2001 STI prevalence estimates

Analyses of differences in STI prevalence by survey year were conducted using data from those provinces included in both the 2001 and the 2005 rounds: Phnom Penh, Kampong Cham, Battambang and Banteay Meanchey. Comparison of STI prevalence by survey year is shown in figure 25.

Figure 25. Comparison of STI prevalence among FSW, 2001 and 2005

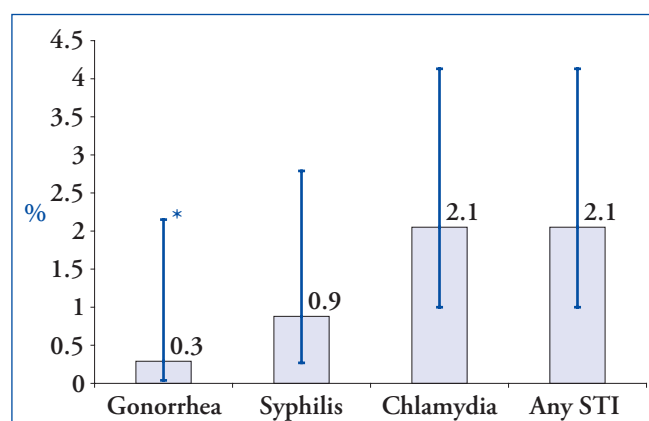


Prevalence of syphilis and chlamydia remained unchanged between 2001 and 2005. The prevalence of gonorrhea increased from 10.5% to 13.0% but this difference was not statistically significant.

6.4.2. Police

STI prevalence estimates among police are shown in figure 26. Prevalence of STIs among police was too low to allow disaggregation of data by province. Prevalence of gonorrhea was likely underestimated because of poor sensitivity of the laboratory testing methodology. That being said, chlamydia was the most common STI found among police.

Figure 26. Prevalence of STIs among police, 2005



* 95% confidence interval

a. Factors associated with the occurrence of any STI

Data were analyzed to identify factors associated with the occurrence of any STI, defined as having a positive test for chlamydia, gonorrhea or syphilis. Associations between infection with any STI and selected demographic and behavioral characteristics among police are presented in table 30.

Table 30. Association between testing positive for any STI and demographic and behavioral characteristics among police, 2005

	Any STI		No STI		Chi-square p value	
	(n)	%	(n)	%		
Age, in years						
	20-24	(0)	0.0	(5)	100.0	–
	25-29	(2)	11.8	(15)	88.2	
	30+	(17)	2.8	(583)	97.2	
Marital status						0.009
	Married	(14)	2.5	(555)	97.5	
	Divorced/separated/widowed	(2)	13.3	(13)	86.7	
	Never Married	(3)	8.3	(33)	91.7	
Schooling						0.04
	Primary school	(5)	6.9	(67)	93.1	
	Secondary school/University	(14)	2.6	(534)	97.5	
Sex with sweetheart, past 3 months						0.001
	No sex with sweetheart	(13)	2.3	(548)	97.7	
	Sex with sweetheart	(6)	9.8	(55)	90.2	
Condom use with sweetheart, past 3 months						0.22
	Always	(1)	4.6	(21)	95.5	
	Not always	(5)	15.2	(28)	84.9	
Sex with FSW, past year						0.18
	No	(9)	2.3	(376)	97.7	
	Yes	(10)	4.3	(225)	95.7	
Condom use with sex workers, past 3 months						0.045
	Always	(3)	2.2	(133)	97.8	
	Not always	(2)	11.1	(16)	88.9	
Place last treated for STI						–
	Never had STI	(14)	3.0	(454)	97.0	
	Public hospital/NGO clinic	(0)	0.0	(38)	100.0	
	Traditional/Pharmacy/Private clinic	(5)	4.9	(97)	95.1	
	No treatment/other	(0)	0.0	(11)	100.0	

Prevalence of any STI was higher among police who were divorced, widowed, or not married, or who were separated from their wives, and men who had not attended secondary school. Sweethearts appear to play an important role in STI transmission among police as policemen who had sex with their sweethearts in the past 3 months were more likely to have an STI (10%) than those who did not (2%)

(p-value=0.001). Sex with FSWs in the past year did not appear to be a major risk factor for having an STI, probably because 75% of police used condoms consistently with FSWs. However, inconsistent use of condoms with FSWs was associated with higher prevalence of STI compared with consistent use (11% versus 2%, p-value=0.05). Although STI prevalence was much higher among men who

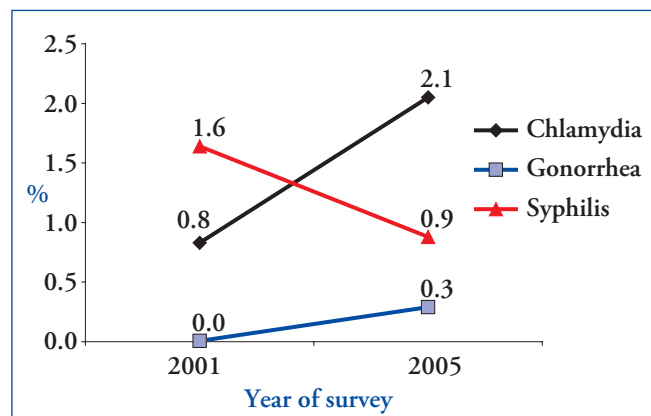
reported inconsistent condom use with a sweetheart in the past three months than among those who always used condoms with a sweetheart (15% vs. 5%, respectively), the difference was not statistically significant because of small numbers.

Among the 19 policemen with a current STI, 14 (74%) reported that they never had an STI. Of 468 men who reported never having an STI, 14 (3%) were currently infected. In addition, 5% of those who reported being treated by providers other than by public or NGO services in the past year were still infected at the time of the survey (i.e., they were either not cured or had become reinfected). Sexual health services targeting men should be better promoted to attract those who may not seek appropriate treatment and to increase consultations among those who might go untreated or receive suboptimal treatment because of ignorance or denial.

b. Comparison with 2001 STI prevalence estimates

Differences in STI prevalence by survey year were analyzed after restricting the sample to provinces surveyed in both the 2001 round and the 2005 round: Phnom Penh, Kampong Cham, Battambang and Banteay Meanchey. Comparison of STI prevalence among police by survey year is presented in figure 27.

Figure 27. Comparison of STI prevalence among police, 2001 and 2005

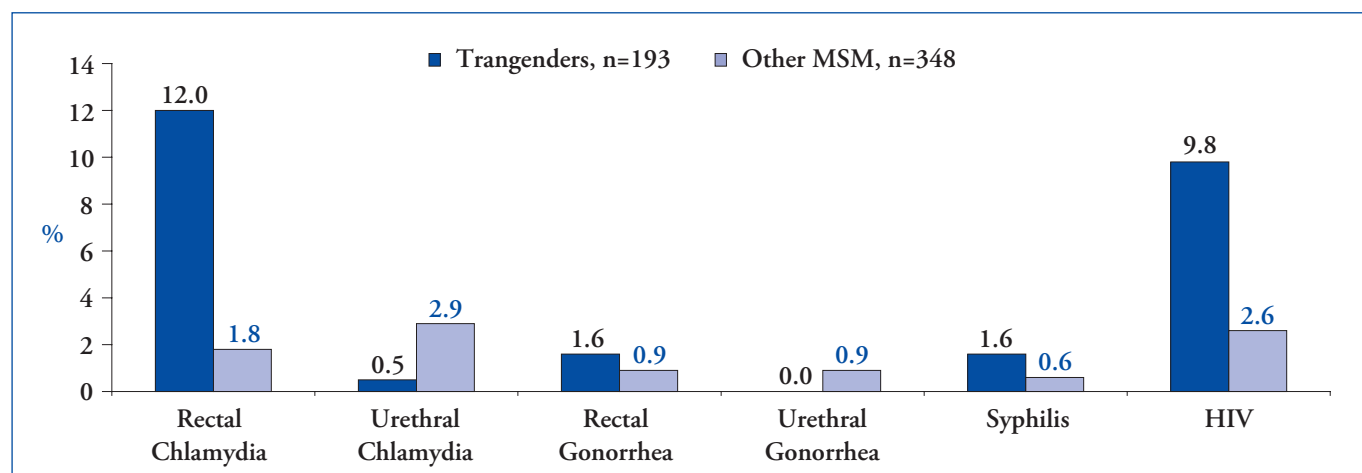


Prevalence of gonorrhea among police remained very low (but results are unreliable because of poor test performance). Compared with 2001, 2005 prevalence of syphilis was lower and prevalence of chlamydia was higher.

6.4.3. MSM

Because of problems encountered in respondent driven sampling of MSM, the sample obtained was not a probability sample and therefore it is not possible to calculate the precision (i.e., confidence intervals) of the prevalence estimates using standard statistical packages. The MSM population in Cambodia is a heterogeneous group including transgenders and other MSM who differ in their sexual behaviors, therefore prevalence estimates are stratified by MSM self-reported gender identity in figure 28.

Figure 28. Prevalence of STIs among transgenders and other MSM in 3 Cambodian cities, 2005



Transgenders were more likely than other MSM to have an STI. Among transgenders, the prevalence of rectal chlamydia (12.0%) is higher than the prevalence of any other bacterial STI among MSM. Furthermore, 21% of transgenders had at least one bacterial STI, compared with 7% of other MSM. The prevalence of HIV among transgenders was high (9.8%) which suggests that among surveyed groups this group is the most vulnerable to HIV after FSWs.

Figure 29 presents the prevalence of STI among MSM from Phnom Penh compared with that of MSM from the provinces. In both Phnom Penh and the provinces, rectal chlamydia was the most common bacterial STI. Although gonorrhea prevalence may be underestimated because of poor test performance, that chlamydia prevalence was higher than gonorrhea is a consistent pattern in the region and similar to that observed in an STI survey among MSM in Phnom Penh in 2000. Except for rectal chlamydia, all STIs are less prevalent among MSM from the two provincial cities than among those from Phnom Penh. HIV prevalence was very high among Phnom Penh MSM (8.7%), whereas the prevalence of HIV was low in the provinces (0.8%).

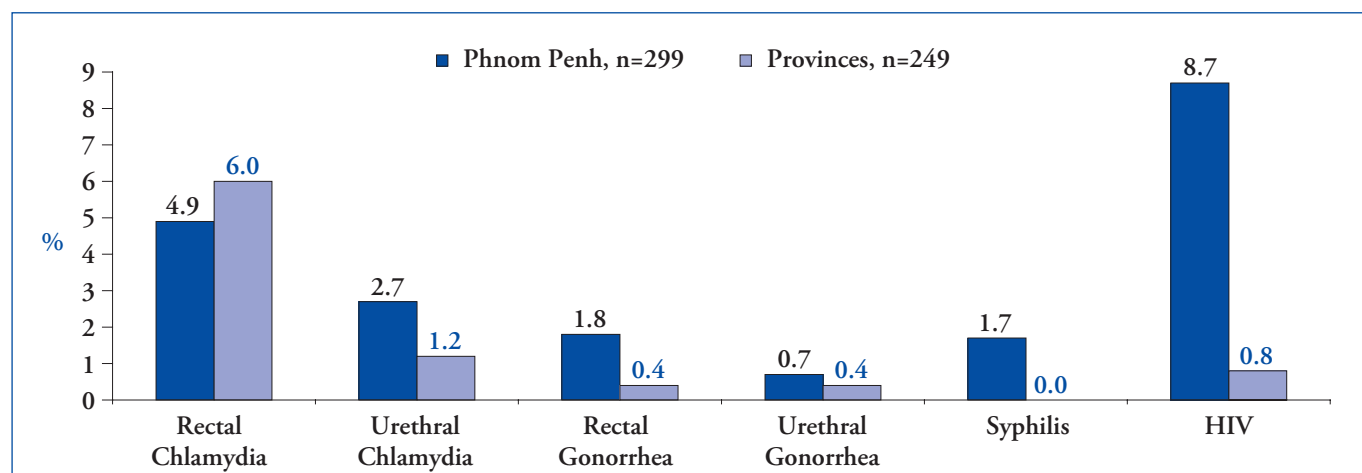
In Phnom Penh, HIV prevalence was especially high among transgenders (17%) but also high among other MSM (5%). In the two provincial cities, two of the transgenders (2%) and none of the non-transgender MSM had HIV. These data suggest that the HIV sub-epidemics among MSM in Cambodia have flourished in the capital and among transgenders.

Because both variables “survey location” and “gender identity” are strongly associated with STI and HIV prevalence it is not possible to disentangle the effect of these using a simple analysis method. Therefore, it is proposed to examine the associations between STI and HIV prevalence and behavioral characteristics using a multiple regression model. By adjusting for the effect of each characteristic included in the model, this method allows conclusions to be drawn about the effect of a specific characteristic. Because of small numbers, these analyses were conducted with the variable “any STI” which refers to infection with one or more of the following: *N. gonorrhoeae*, *C. trachomatis*, *T. pallidum*, or HIV.

When STI prevalence among non-transgender MSM was adjusted for survey location, no association with demographic or behavioral characteristics were found, except that MSM who had sex with an FSW in the past month were 5.1 times more likely than those who did not to have an STI (95% CI 1.2 – 22.2; $p=0.03$). The association of STI prevalence among non-transgender MSM and sex with FSWs suggests that the FSW population in Phnom Penh may be serving as a source of infection for bisexually active men.

When the transgender group was stratified by survey location, the numbers were too small to analyze the association of demographic or behavioral characteristics with STI prevalence.

Figure 29. Prevalence of STIs among MSM, by survey location



Conclusion and recommendations

7.1. FSWs

Estimates of STI prevalence among brothel-based FSWs are within the range of regional averages.⁴ However, prevalence is the same as in 2001 despite national and multilateral efforts to increase FSWs' access to STI prevention and care services. Program data and behavioral data collected by this survey clearly indicate that use of health care services for STIs by FSWs is on the rise. The fact that STI prevalence is still high four years after the previous survey suggests that FSWs are not always adequately treated for their STI or that reinfection may be common. Innovative approaches are needed to increase FSWs participation in STI prevention programs and to ensure appropriate and effective treatment on a regular basis, beginning as soon as they start work in a new establishment. In addition to having 60 to 80 clients per month, more than half of all FSWs had a sweetheart or casual partner with whom they seldom used condoms. STI control programs should be encouraged to recruit participation of groups which may serve as reservoirs for STI reinfection of FSWs, e.g., sweethearts and local police.

The high turnover of FSWs is a challenge to programs providing FSW sexual health education, prevention, and care. Because prevention messages must be delivered regularly to reach all women, including those who only recently started working, intensive and continuous prevention efforts targeting the FSW population are justified. FSW turnover also may impact the dynamics of the HIV epidemic as newly infected individuals are more likely to transmit the HIV virus during their acute infection period. Survey data showed that FSWs who are new to the sex trade industry are more prone to have an STI than their longer-working peers, suggesting that "new" FSWs are more vulnerable to infection or less likely to have been treated successfully. Rapid enrollment of "new" FSWs in the local prevention

program may be a key to success for STI control and prevention.

A substantial proportion of FSWs had unprotected sex as indicated by the finding that a third of all FSWs had had an abortion in the past year. FSWs may have little negotiation power when it comes to their health. Compared with FSWs from other provinces, a larger proportion of FSWs from Phnom Penh and Siem Reap had unprotected sex with clients suggesting that they may have had greater difficulty negotiating condom use with their clients. Policies to enhance support for the rights of FSWs to use condoms as well as education programs aimed at helping FSWs to develop negotiation skills are needed. Agreement between HIV prevention programs and establishment (brothel) managers could help develop or raise sexual health standards for brothel-based FSWs.

Self-perceived risk for becoming infected with an STI compared with other Cambodian women was not a very sensitive indicator for either risk behavior or current infection. Participatory sessions with FSWs are needed to help them evaluate their own risk for infection and educate them about their options for risk reduction.

Syphilis prevalence among FSWs was as high as 7% in the northwestern provinces suggesting that the syphilis control program needs to be strengthened in this area of the country.

Promotion of HIV testing among FSWs appears to have been successful as almost one half of FSWs have been tested for HIV and received their test results and among these women, 81% have received their results in the past year. Efforts to encourage FSWs to know their HIV serostatus and to access the full range of VCCT services should be sustained.

7.2. Police

The sentinel group of policemen surveyed comprised mostly middle-aged married men (about 40 years old, on average). Overall, 29% of police reported having had non-marital partners in the past three months, and 8% reported having had unprotected sex with such a partner in the past three months. Although the proportion of police who had sex with FSWs (25%) in the past three months was much larger than the proportion who had sex with a sweetheart (10%) during the same time period, 88% always used condoms with FSWs whereas only 39% used condoms consistently with sweethearts. In total, the prevalence of any STI among police was 2.1%. Among police who reported that they had never had an STI, 3% were currently infected. Prevention programs targeting police should explore innovative messages to address issues of risk assessment, sexual health, and the importance of consistent condom use with all non-marital partners.

7.3. MSM

Results of this survey suggest that transgender MSM, as a group, are highly vulnerable to HIV and other STIs—a large proportion of transgender MSM reported practicing several high risk behaviors (e.g., unprotected receptive anal sex), and a high prevalence of STIs, including rectal chlamydia, was found. Non-transgender MSM reported having a large number of partners, both male and female, including FSWs and women from the general population. Because of their frequent practice of unprotected sex with other men and FSWs, non-transgender MSM may serve as a bridge for transmission of HIV and STIs between two or more subpopulations. Their sexual encounters with FSWs establish clear epidemiologic links for the transmission of STI between FSWs and MSM.

The prevalence of rectal STIs among MSM in our sample was higher than that of urethral infections. Training and guidance of physicians to diagnose and treat rectal STIs among MSM should be included in STI curricula. Developing comprehensive sexual health information and ensuring the availability of health care for transgenders and other MSM would be an asset to Cambodia's STI control program.

HIV prevalence was high among both transgender (17%) and non-transgender MSM (5%) in Phnom Penh. STIs are also prevalent among these two populations as 21% of transgender and 5% of other MSM were carrying one or more bacterial STIs. Except for rectal chlamydia, STI prevalence was lower among MSM in the provinces than among those in Phnom Penh.

Because of their distinctly different behavioral profiles, transgender and non-transgender MSM should be included as separate sentinel groups in future rounds of surveillance.

7.4. Intersecting epidemics

The fact that Cambodia's HIV epidemic is considered concentrated does not mean that HIV is confined within certain subpopulations and if contained in one group will not spread to others. This survey found mixing between groups at variable risk for HIV (e.g., frequent unprotected sex between non-transgender MSM and various groups of women). Because sexual connections cross group boundaries, the STI and HIV epidemics are not confined within certain subpopulations. Control of the STI epidemic among MSM as well as among FSWs and their partners is essential to reducing Cambodia's HIV epidemic.

References

1. Sopheab H, Morineau G, Gorbach P. *Cambodia 2003 Behavioral Surveillance Survey*. Phnom Penh: National Center for HIV/AIDS, Dermatology, and STDs; 2005.
2. Lazzarin A, Saracco A, Musicco M, Nicolosi A. Man-to-woman sexual transmission of the human immunodeficiency virus: risk factors related to sexual behavior, man's infectiousness, and woman's susceptibility. *Arch Intern Med*. 1991;151:2411-2416.
3. European Study Group on Heterosexual Transmission of HIV. Comparison of female to male and male to female transmission of HIV in 563 stable couples *BMJ*. 1992;304:809-813.
4. Bourne C, Donovan B. Epidemiology of sexually transmitted infections in Asia and the Pacific. In: Kumar B, Gupta S, eds. *Sexually transmitted infections*. New Delhi, India: Elsevier Press; 2005:44-56.
5. Ryan C, Gorbach P. *HIV and sexually transmitted diseases in Cambodia: prevalence of infections, evaluation of treatment flowcharts, and assessment of risk and health-seeking behavior*. Seattle: University of Washington; 1996.
6. Girault P, Saidel T, Song N, et al. *Sexual behavior, STIs and HIV among men who have sex with men in Phnom Penh, Cambodia, 2000*. Phnom Penh: Family Health International; 2002.
7. Leng HB, Wantha SS, Sun LP, et al. *2001 Cambodia STI Prevalence Survey*. Phnom Penh: National Center for HIV/AIDS, Dermatology and STDs; 2001.
8. Sopheab H, Neal J. *Integrated HIV, STD and Behavior Surveillance Survey in Bantey Meanchey Province, Cambodia*. Phnom Penh: National Center for HIV/AIDS, Dermatology, and STDs; 2003.
9. Morineau G, Ngak S, Sophat P. *When you fall in love you have to pay for it. Men who have sex with men in Phnom Penh, Cambodia. Population size and sex trade*. Phnom Penh: Family Health International; 2004.
10. Quinn TC, Gaydos C, Shepherd M, et al. Epidemiologic and microbiologic correlates of Chlamydia trachomatis infection in sexual partnerships. *JAMA*. 1996;276(21):1737-1742.
11. Plummer FA, Simonsen JN, Cameron DW, et al. Cofactors in male-female sexual transmission of human immunodeficiency virus type 1. *J Infect Dis*. 1991;163(2):233-239.
12. McCormack WM, Stumacher RJ, Johnson K, Donner A. Clinical spectrum of gonococcal infection in women. *Lancet*. 1977;1(8023):1182-1185.
13. Low N, Daker White G, Barlow D, Pozniak AL. Gonorrhoea in inner London: results of a cross sectional study. *BMJ*. 1997;314(7096):1719-1723.

14. Hook EW, Handsfield HH. Gonococcal infections in the adult. In: Holmes K, Mardh P-A, Sparling F, et al., eds. *Sexually transmitted diseases*. 3rd edition. New York: McGraw-Hill; 1999:451-466.
15. Quinn TC, Corey L, Chaffee RG, Schuffler MD, Brancato FP, Holmes KK. The etiology of anorectal infections in homosexual men. *Am J Med*. 1981;71(3):395-406.
16. Meheus A, Antal GM. The endemic treponematoses: not yet eradicated. *World Health Stat Q*. 1992;45(2-3):228-237.
17. Cameron DW, Simonsen JN, D'Costa LJ, et al. Female to male transmission of human immunodeficiency virus type 1: risk factors for seroconversion in men. *Lancet*. 1989;2(8660):403-407.

For additional information please contact:

FHI Cambodia

#11, Street 302, Sangkat Boeng Keng Kang I
Phnom Penh, Cambodia
Mail: P.O.Box 2586
Phnom Penh III (Post Boeung Pralit)

National Center for HIV/AIDS, Dermatology and STDs

#266, Road 1019,
Phnom Penh Thmey Quarter, Russey Keo District
Phnom Penh, Cambodia
<http://www.nchads.org>