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Young Women Engaged in Sex Work in Phnom Penh, Cambodia, Have High Incidence of HIV and Sexually Transmitted Infections, and Amphetamine-Type Stimulant Use: New Challenges to HIV Prevention and Risk

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Abstract

Objectives—To estimate prevalence and incidence of HIV and sexually transmitted infections (STI) and associated risk factors among young women working as sex workers (SWs) in Phnom Penh, Cambodia.

Methods—A prospective study of young (<29 years) women working as SWs in brothels, entertainment establishments, and freelance. Sociodemographics, sexual risk, and use of amphetamine-type stimulants (ATS) (“yama” and “crystal”) were assessed by self-report. HIV and STI (*Chlamydia trachomatis* and *Neisseria gonorrhoeae*) testing were conducted on blood and urine specimens, respectively.

Results—Baseline prevalences of HIV, *C. trachomatis*, and *N. gonorrhoeae* were 23%, 11.5%, and 7.8%, respectively. HIV incidence was 3.6 per 100 person-years (95% confidence interval [CI], 1.2%–11.1%); STI incidence was 21.2 per 100 person-years (95% CI, 12.6%–35.8%). At baseline, 26.5% reported recent ATS use. HIV infection was associated with freelance SW (adjusted odds ratio, 5.85; 95% CI, 1.59–21.58) and younger age of first sex (<15 years; adjusted odds ratio, 3.06; 95% CI, 1.01–8.46). Incident STI was associated with duration (per year) of SW (adjusted hazard ratio, 1.1; 95% CI, 1.1–1.2) and recent yama use (adjusted hazard ratio, 3.9; 95% CI, 1.5–10.3).

Conclusions—HIV and STI infection rates were high among SWs working in various settings; freelancers had highest risk. ATS use was associated with incident STI. Venue of sex work and drug prevention should be considered in prevention programs.

Cambodia has one of Asia's most severe HIV epidemics, with heterosexual sex as the main transmission route.^{1,2} Factors contributing to the epidemic include poverty, high levels of sexually transmitted infections (STI), widespread patronage of female sex workers (SWs),

and a highly mobile workforce.^{1,3-5} Crucial progress has been made to reduce HIV risk, especially number and frequency of commercial sex transactions and condom use promotion,⁶ and HIV prevalence declined from 2.0% (2001) to 1.6% (2005) in the adult population.^{1,7} However, HIV prevalence has been consistently highest among brothel-based SWs, peaking at 45.8% in 1998, then with noticeable declines to 21.4% and 14% in 2003 and 2006, respectively. Overall, HIV prevalence among SWs working in indirect sex establishments (entertainment and drinking establishments such as beer gardens, nightclubs, karaoke, restaurants, and massage parlors) was lower, 18.4% in 1998 and 11.7% in 2003, but higher (26%) in some areas.⁸ STIs followed the same trend until 2001.⁹

The declines have been attributed in large part to the 100% condom use campaign. Since its implementation in 2001, SWs reported increase in consistent condom use with clients, but not with nonpaying partners, like “sweethearts” and casual partners.^{9,10} Limitations in program targeting, STI services, and other factors, including the mobility of female SWs, have been noted to have detracted from the consistent success of that campaign.⁹

Drug use, particularly amphetamine-type stimulants (ATS), has emerged as a potential significant problem among SWs in Cambodia, and Asia overall.¹¹⁻¹⁵ A pill form of methamphetamine is widely produced, trafficked, and used in Southeast Asia and is known as “yama” in Cambodia (it is called “Yaba” in Thailand which means “crazy drug” in Thai). The tablets generally contain about 25% methamphetamine. “Crystal” (also known as “ice”) refers to a crystalline form of higher purity methamphetamine (generally about 85%), which is more addictive. Although yama pills are swallowed, both forms are usually melted and the vapors inhaled, with rapid neurologic effects.^{16,17} ATS use has been associated with risky sexual-and drug-related behaviors and incident STI and HIV among many groups in Southeast Asia,¹⁸⁻²¹ and there are concerns that escalating ATS use might lead to an increase in HIV and STI rates.

This study reports on HIV and STI in a cohort of young SWs, the Young Women's Health Study (YWHS), conducted in Phnom Penh, Cambodia. We examine prevalence and incidence of infections and associated risk factors, including ATS use, in this population.

Methods

Study Setting

The YWHS was a prospective study of young women engaged as SWs in a variety of settings in Phnom Penh, Cambodia. It was conducted by a multidisciplinary collaborative prevention research group comprised of academic, governmental, and community HIV prevention specialists from the United States, Australia, and Cambodia.

Study Population and Recruitment

Inclusion criteria were as follows: women aged 15 to 29 years; understanding of spoken Khmer; ethnic Cambodian; reported 2 different sexual partners in the last month or engaged in transactional sex (sex in exchange for money, goods, services, or drugs) within the last 3 months; plans to stay in Phnom Penh area for 12 months; and able to provide voluntary informed consent.

Field assistants from the Cambodia Women's Development Association were trained to conduct recruitment, to provide study information, and to conduct eligibility screening. Women were recruited from: (1) YWHS information meetings held by Cambodia Women's Development Association; (2) neighborhood-based outreach visits; and (3) referrals by previous participants or other community groups, and screened for eligibility using a brief screening interview. Eligible women who expressed interest in enrollment were consented

as a group at a community location used by various SW organizations. Enrolled participants were given appointment cards to present to the YWHS clinic site in Toul Svay Prey, a neighborhood near downtown Phnom Penh. Participants were offered free transportation, and were given US \$5 and condoms at each study visit.

Data Collection

Between June 2007 and June 2008, data were collected during quarterly visits. A structured questionnaire was administered verbally by trained interviewers in Khmer at baseline and quarterly visits, which included sociodemographic characteristics, occupational and sexual risk history, and alcohol and ATS use. HIV testing occurred at each visit and for STI infection (*Chlamydia trachomatis* [CT] and *Neisseria gonorrhoeae* [GC]) at the 3- and 12-month visits. STI treatment was provided at no cost, and women with HIV infection were referred for free medical evaluation and treatment where indicated. Contact information was collected to facilitate participant tracking and maximize follow-up.

HIV and STI Testing

HIV serology was performed using 2 rapid tests; Uni-Gold Recombigen HIV rapid HIV test (Trinity Biotech USA, Jamestown, NY) and the Clairview HIV 1/2 STAT-PAK (Inverness Medical Diagnostics, Waltham, MA). HIV-positive and discordant samples were confirmed by HIV-1 immunoblot. CT and GC were assessed from urine samples using BD ProbeTec strand displacement amplification assay (Becton Dickinson, Sparks, MD) at the NCHADS STD laboratory. HIV testing occurred at the Cambodian National Institute of Public Health laboratory.

Ethical Review

The study protocol was reviewed and approved by the Institutional Review Board of the Committee on Human Research at University of California, San Francisco, the Cambodian National Ethical Committee, and the University of New South Wales Human Research Ethics Committee.

Measures

Outcome variables were HIV and STI (CT and GC) prevalence and incidence. Sociodemographic variables included age, marital status, education, and income. Women were surveyed regarding their current (last 30 days) base (sex venue) of work, duration of sex work (years), and whether they currently had an employer (manager, boss, or supervisor). At the time this study was conducted, SWs in Cambodia were categorized as brothel-based (direct SWs) and non-brothel-based (indirect SWs), which included those working in entertainment establishments and “freelance,” outside of entertainment establishments, in private apartments, streets, and parks. In this study, we categorized women as brothel-based, entertainment-based, freelance, and multiple (women who were reported working in more than 1 category). Sexual exposure variables included age of first sex, recent (last 30 days) sexual activity, including number of partners and condom use with paying partners (clients with whom respondents traded sex for money, goods, or drugs) and nonpaying partners. Condom use was classified as “consistent” if the participant reported always using a condom. Alcohol abuse was assessed by asking the number of days in which participants reported being drunk or affected by alcohol in the past month. Ever and recent ATS use (last 3 months) was assessed with questions regarding use of yama and “crystal” (“ice”).

Analyses

Prevalences of HIV and STI (GC and CT) were calculated using exact binomial confidence intervals (CIs). HIV incidence rate was calculated as number of new seroconversions per 100 person-years (PY) of observation assuming Poisson distribution. The duration of risk for HIV infection was defined as time from enrolment to the last negative HIV test among women who remained HIV uninfected, or the midpoint between the last negative and first positive HIV-test result among women who seroconverted. STI incidence was similarly calculated using newly detected positive GC and CT infections. Bivariate logistic regression analyses were performed to determine associations between sociodemographic, occupational, sexual, and alcohol or drug use exposures and prevalent HIV and STI. Multivariable logistic regression analysis was used to identify independent correlates of prevalent HIV, including variables significant in the bivariate analyses ($P < 0.10$), known confounders (age, education), known risk factors (number of sexual partners), and those hypothesized a priori to be associated (including ATS use and type of sex work). We used a backward stepwise approach in which all variables nonsignificant at $P < 0.05$ were removed manually at each step, but keeping potential confounders in the model. Similarly, Cox proportional hazard regression analyses were used to identify and assess exposures independently associated with incident STI. Multivariable analyses were not conducted to assess predictors of HIV incidence because of the small sample size and of HIV seroconversions. Analyses were performed using STATA 9.0 (STATA, College Station, TX).

Results

Of the 200 women presented for the baseline study visit, 160 (80%) gave their consent. The proportions followed were as follows: 81% at the 3-month visit, 75% at 6 months, 70% at 9 months, and 63% at 12 months. No significant differences in sociodemographic, occupational, sexual, or drug use exposures were observed between women who lost to follow-up ($n = 59$; 37%) and those followed up. At baseline, 37 women (23%; 95% CI, 20.0%–26.7%) tested HIV-positive. Three new HIV infections were detected among 107 of 123 (87%) initially seronegative women who were followed up, with a total of 84.0 PY, for an estimated incidence of 3.6 per 100 PY (95% CI, 1.2%–11.1%). The prevalence of CT and GC (at 3-month visit) was 11.5% (95% CI, 6.0%–17.1%) and 7.8% (95% CI, 3.5%–12.3%), respectively. Incidence of STI (CT and GC combined) was 21.2 per 100 PY (95% CI, 12.6%–35.8%), 6.1 per 100 PY (95% CI, 2.3%–16.1%) for GC, and 18.2 per 100 PY for CT (95% CI, 10.3%–32.0%).

Table 1 shows sociodemographic, occupational, and behavioral factors and associations with prevalent HIV infection. Participants' median age was 25 years (range, 16–29), almost half (40%) had no education, and half (49.4%) were widowed, divorced, or separated. Among women who reported working as SWs for a median of 4.3 years, most (71.2%) were working freelance or in the entertainment service sector at enrolment. Older age and fewer years of education were significantly associated with HIV prevalence. Women who worked as freelance SWs had higher odds of HIV infection compared with entertainment-based SWs, and those who reported having a boss or manager had lower odds of HIV than those who did not. Freelance SWs and women who reported working in multiple venues were also older (median, 25 and 26 years, respectively) and had a longer history of employment as SWs (median, 51 and 65 months, respectively) compared with women working in the entertainment sector (median, 22 years and 36 months as SWs) and in brothels (median, 24 years 52 months as SWs). The median monthly income reported was 400,000 Riel (US \$100.00), with 88.1% reporting that their primary income was from regular SW clients. Women who reported that they first had sex at a younger age and those who reported more sex partners had higher odds of HIV infection. Consistent condom use varied by partner

type: a majority (85.7%) reported always using condoms with paying partners, but only 20.6% reported consistent use with nonpaying partners. Alcohol abuse was prevalent; 23.7% reported of being affected by alcohol or being drunk for more than 20 days during the last month, which was inversely associated with prevalent HIV. Any ATS use “ever” was reported by 43.8%, specifically yama by 40.6% and “crystal,” 23.1%.

With respect to prevalent STI, no significant associations were observed with any of the sociodemographic, occupational, or behavioral exposures in bivariate analyses (Table 2) The relative risk of incident STI was significantly higher among freelance SWs, women with a longer length of employment as SWs, having a boss or manager, and recent yama use.

Table 3 shows results of multivariable analyses. Variables independently and significantly associated with prevalent HIV included the following: working as a freelance SW compared with entertainment-based, first sex at younger age, and ever been tested for HIV. Incident STI was associated with increasing years of SW and recent yama use.

Discussion

HIV prevalence and incidence among SWs remain very high in Cambodia, and STI rates were also elevated as seen elsewhere in the region.^{22–26} The results, especially those showing highest risk among SWs working in freelance and multiple sex work venues, poses new challenges for HIV prevention in Phnom Penh. Little is known about the SW “career” trajectories of women in this context, including with age or other factors. Many young women in Cambodia face difficult economic and social circumstances,²⁷ and may migrate from one SW venue to another. Recent reports support this.^{4,5,28} Laws enacted in 2008 to combat sex trafficking, outlaw prostitution, and forced brothel closures; as a result, SW typology has been undergoing significant change.

Similar to other reports in Asia and elsewhere, suggesting that street-based SWs (compared with entertainment and brothel-based) may be more susceptible to HIV, as they earn less from each customer, have sex with higher numbers of partners, and are more likely to use drugs,^{29–34} our results in the Cambodian context show that freelance SWs are the most vulnerable group. Women working in streets and parks may have fewer options and be subject to greater pressures, resulting in more unsafe sex and greater likelihood of having HIV- or STI-infected partners compared with women working in other venues. In bivariate analyses, having a boss, manager, or employer (which freelance SWs may be less likely to have) was protective for HIV and STI. Employers may provide a less-risky work environment for women, and potentially better access to condoms.³⁵ Furthermore, freelance SWs in our study tended to be older and report longer duration of sex work, accounting for greater HIV infection. Cambodia's status and success in restraining the HIV epidemic remains exemplary, but these results show the need for continued efforts and resources. The National Institute for HIV, AIDS, Dermatology and STDs (NCHADS) in Cambodia is already actively working with national and international nongovernmental partners to address this challenge, through the implementation of outreach and peer education services, targeting women in the entertainment service area, access to free and confidential STI and HIV testing and reproductive health services,²⁸ and strategies that promote the continuum of prevention to treatment services.³⁶

This is the first study to assess ATS use and examine associations with HIV and STI outcomes in Cambodian women. The high self-reported levels of ATS use and strong association with STI underscores the need to address ATS use as an important risk exposure in the sex or entertainment industry. Prevention efforts therefore need to be focused on

sexual behaviors and increasing understanding of risk associated with drug use, especially ATS.

Our study has several limitations that should be considered when interpreting the results. Although retention was high and there were no significant differences between women retained in the study and those lost to follow-up, the sample size was small which limited the power of the multivariate analyses and the precision of our estimates. Moreover, inferences from HIV prevalence data are limited. STI incidence may have been underestimated, as women acquiring infections during follow-up may have sought treatment elsewhere. Data on sexual behaviors and alcohol or drug use on the basis of self-report and by face-to-face interviews may be subject to recall problems and social desirability bias. However, this would result in conservative estimates of risk, biased toward the null. Finally, participants in this study were not sampled probabilistically; therefore, our results may not be generalizable to all young women in sex work in Phnom Penh or Cambodia. Nevertheless, our study subject included women from a wide range of sex work venues and captured a wide breadth of this occupational group in Phnom Penh.

Despite these limitations, our findings offer important insights for HIV and STI prevention for young women engaged in SW in Cambodia. Despite years of condom use promotion, inconsistent condom use remains the norm with nonpaying partners, generally husbands and boyfriends, consistent with other studies.^{9,37–39} New prevention strategies to address these relationship complexities, including programs targeting men and couples may be needed. It is notable that a high proportion of participants had been tested for HIV. Resources for HIV prevention and care, including access to highly active antiretroviral therapy, have increased tremendously in Cambodia.⁴⁰ Nevertheless, the findings coincide with significant economic and policy changes that highlight the need for urgent attention to vulnerable young women in Cambodia. The recent intensification of anti-trafficking efforts could result in further increases in risk exposure and reduced access to prevention. Within this context, there is an urgent need for both effective behavioral and biomedical interventions and an enabling environment committed to their implementation, so as to reduce the effect of the HIV epidemic on this highly vulnerable population.

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References

1. NCHADS. Annual Report. Vol. 2006. National Centre for HIV/AIDS, Dermatology and STDs; Cambodia: 2006. Ministry of Health National Center for HIV, AIDS, Dermatology and STDs. Available at: <http://www.nchads.org/report.php> [Accessed December 18, 2008]
2. Saphonn V, Parekh BS, Dobbs T, et al. Trends of HIV-1 seroincidence among HIV-1 sentinel surveillance groups in Cambodia, 1999–2002. *J Acquir Immun Defic Syndr*. 2005; 39:587–592.
3. Charles M. HIV epidemic in Cambodia, one of the poorest countries in Southeast Asia: A success story. *Expert Rev Anti Infect Ther*. 2006; 4:1–4. [PubMed: 16441203]
4. UNIAP. Exodus to the sex trade? Effects of the global financial crisis on women's working conditions and opportunities. Cambodia: United Nations Inter-Agency Project on Human Trafficking (Phase III). Report. Available at: http://www.no-trafficking.org/reports_docs/siren/siren_cb-04.pdf [Accessed August 31, 2009]

5. Plummer R. The sex industry in Cambodia: The traffic police. *The Economist*. Jun 11.2009
6. Saphonn V, Sopheab H, Sun LP, et al. Current HIV/AIDS/STI epidemic: Intervention programs in Cambodia, 1993–2003. *AIDS Educ Prev*. 2004; 16:64–77. [PubMed: 15262566]
7. UNAIDS. [Accessed December 4, 2007] Global summary of HIV and AIDS epidemic in 2007. Available at:http://www.unaids.org/en/HIV_data/2007EpiUpdate/default.asp
8. Kim AA, Sun LP, Chhorvann C, et al. High prevalence of HIV and sexually transmitted infections among indirect sex workers in Cambodia. *Sex Transm Dis*. 2005; 32:745–751. [PubMed: 16314771]
9. Sopheab H, Morineau G, Neal JJ, et al. Sustained high prevalence of sexually transmitted infections among female sex workers in Cambodia: High turnover seriously challenges the 100% Condom Use Programme. *BMC Infect Dis*. 2008; 8:167. [PubMed: 19077261]
10. Gorbach PM, Sopheab H, Chhorvann C, et al. Changing behaviors and patterns among Cambodian sex workers: 1997–2003. *J Acquir Immune Defic Syndr*. 2006; 42:242–247. [PubMed: 16639348]
11. Ahmad K. Asia grapples with spreading amphetamine abuse. *Lancet*. 2003; 361:1878–1879. [PubMed: 12788585]
12. Kulsudjarit K. Drug problem in southeast and southwest Asia. *Ann N Y Acad Sci*. 2004; 1025:446–457. [PubMed: 15542748]
13. Farrell M, Marsden J, Ali R, et al. Methamphetamine: Drug use and psychoses becomes a major public health issue in the Asia Pacific region. *Addiction*. 2002; 97:771–772. [PubMed: 12133111]
14. Vongsheree S, Sri-Engam P, Ruchusatsawat N, et al. High HIV-1 prevalence among metamphetamine users in central Thailand, 1999–2000. *J Med Assoc Thai*. 2001; 84:1263–1267. [PubMed: 11800299]
15. Razak MH, Jittiwutikarn J, Suriyanon V, et al. HIV prevalence and risks among injection and noninjection drug users in northern Thailand: Need for comprehensive HIV prevention programs. *J Acquir Immun Defic Syndr*. 2003; 33:259–266.
16. Barr AM, Panenka WJ, MacEwan GW, et al. The need for speed: An update on methamphetamine addiction. *J Psychiatry Neurosci*. 2006; 31:301–313. [PubMed: 16951733]
17. McKetin R, Kozel N, Douglas J, et al. The rise of methamphetamine in Southeast and East Asia. *Drug Alcohol Rev*. 2008; 27:220–228. [PubMed: 18368602]
18. Melbye K, Khamboonruang C, Kunawarak P, et al. Lifetime correlates associated with amphetamine use among northern Thai men attending STD and HIV anonymous test sites. *Drug Alcohol Depend*. 2002; 68:245–253. [PubMed: 12393219]
19. Sattah MV, Supawitkul S, Dondero TJ, et al. Prevalence of and risk factors for methamphetamine use in northern Thai youth: Results of an audio-computer-assisted self-interviewing survey with urine testing. *Addiction*. 2002; 97:801–808. [PubMed: 12133118]
20. Buavirat A, Page-Shafer K, van Griensven GJ, et al. Risk of prevalent HIV infection associated with incarceration among injecting drug users in Bangkok, Thailand: Case-control study. *BMJ*. 2003; 326:308. [PubMed: 12574043]
21. Beyrer C, Razak MH, Jittiwutikarn J, et al. Methamphetamine users in northern Thailand: Changing demographics and risks for HIV and STD among treatment-seeking substance abusers. *Int J STD AIDS*. 2004; 15:697–704. [PubMed: 15479508]
22. Nguyen VT, Nguyen TL, Nguyen DH, et al. Sexually transmitted infections in female sex workers in five border provinces of Vietnam. *Sex Transm Dis*. 2005; 32:550–556. [PubMed: 16118603]
23. Tran TN, Detels R, Long HT, et al. HIV infection and risk characteristics among female sex workers in Hanoi, Vietnam. *J Acquir Immun Defic Syndr*. 2005; 39:581–586.
24. Limpakarnjanarat K, Mastro TD, Saisorn S, et al. HIV-1 and other sexually transmitted infections in a cohort of female sex workers in Chiang Rai, Thailand. *Sex Transm Infect*. 1999; 75:30–35. [PubMed: 10448339]
25. Davies SC, Otto B, Partohudoyo S, et al. Sexually transmitted infections among female sex workers in Kupang, Indonesia: Searching for a screening algorithm to detect cervical gonococcal and chlamydial infections. *Sex Transm Dis*. 2003; 30:671–679. [PubMed: 12972788]
26. van Griensven GJ, Limanonda B, Chongwatana N, et al. Socio-economic and demographic characteristics and HIV-1 infection among female commercial sex workers in Thailand. *AIDS Care*. 1995; 7:557–565. [PubMed: 8652691]

27. Marten L. Commercial sex workers: Victims, vectors, or fighters of the HIV epidemic in Cambodia. *Asia Pac Viewp*. 2005; 46:21–34.
28. FHI. [Accessed October 1, 2009] SMARTgirl Program to Reduce Risk and Inspire Behavior Change. Available at: http://www.fhi.org/en/CountryProfiles/Cambodia/res_SMARTgirl.htm#
29. Hsieh YH, Hsun Chen C. Modelling the social dynamics of a sex industry: Its implications for spread of HIV/AIDS. *Bull Math Biol*. 2004; 66:143–166. [PubMed: 14670534]
30. Minh TT, Nhan DT, West GR, et al. Sex workers in Vietnam: How Many, how risky? *AIDS Educ Prev*. 2004; 16:389–404. [PubMed: 15491951]
31. Nemoto T, Iwamoto M, Colby D, et al. HIV-related risk behaviors among female sex workers in Ho Chi Minh City, Vietnam. *AIDS Educ Prev*. 2008; 20:435–453. [PubMed: 18956984]
32. Dandona R, Dandona L, Gutierrez JP, et al. High risk of HIV in non-brothel based female sex workers in India. *BMC Public Health*. 2005; 5:87. [PubMed: 16111497]
33. Choi SY, Holroyd E. The influence of power, poverty and agency in the negotiation of condom use for female sex workers in mainland China. *Cult Health Sex*. 2007; 9:489–503. [PubMed: 17687674]
34. Alary M, Worm AM, Kvinesdal B. Risk behaviours for HIV infection and sexually transmitted diseases among female sex workers from Copenhagen. *Int J STD AIDS*. 1994; 5:365–367. [PubMed: 7819358]
35. Oladosu M. Consistent condom use dynamics among sex workers in Central America: 1997–2000. *J Biosoc Sci*. 2005; 37:435–457. [PubMed: 16082856]
36. Ministry of Health. Health Strategic Plan 2008–2015. Cambodia: Available at: <http://www.moh.gov.kh/files/dphi/HSP0815En.pdf> [Accessed November 5, 2009]
37. Wong ML, Lubek I, Dy BC, et al. Social and behavioural factors associated with condom use among direct sex workers in Siem Reap, Cambodia. *Sex Transm Infect*. 2003; 79:163–165. [PubMed: 12690144]
38. Tran TT, Le CL, Nguyen TL. Factors associated with inconsistent condom use among female sex workers in Nha Trang, Vietnam. *Asia Pac J Public Health*. 2008; 20:370–378. [PubMed: 19124331]
39. Wang C, Hawes SE, Gaye A, et al. HIV prevalence, previous HIV testing, and condom use with clients and regular partners among Senegalese commercial sex workers. *Sex Transm Infect*. 2007; 83:534–540. [PubMed: 17942575]
40. NCHADS. National Centre for HIV/AIDS, Dermatology and STDs; Cambodia: Strategic plan for HIV/AIDS and STI prevention and care in the health sector in Cambodia 2008–2010. Available at: <http://www.nchads.org/PMR/strategic/strategic%20plan%202008-10%20en.pdf> [Accessed November 5, 2009]

Table 1
Selected Socio-Demographic and Risk Characteristics and Associations With Prevalent HIV Infection Among 160 High-Risk Women Participating in the Young Women's Health Study in Phnom Penh, Cambodia

Characteristic	Prevalence of Characteristic		Prevalent HIV Infection		OR (95% CI)
	N/Median	%/IQR	N/Median	%/IQR	
Overall			37	23.13	
Age (yr)		25 (21–27)	26 (24–28)	1.17 (1.04–1.31) ^{*†}	
16–18	13	8.1	1	7.8	1.0
19–24	64	40	12	18.8	2.8 (0.3–23.4)
25–29	83	51.8	24	28.9	4.9 (0.6–39.6)
Marital status					
Never married	57	35.6	9	15.8	1.0
Married—living together	24	15	6	25	1.78 (0.55–5.70)
Widowed/divorced/separated	79	49.4	21	28.4	2.06 (0.87–4.89)
Education (yr)		2 (0–4)		2 (0–2)	0.74 (0.61–0.89) ^{*†}
None	64	40.0	26	40.63	4.11 (0.85–19.89)
Primary (1–6 yr)	82	51.25	9	10.98	0.74 (0.14–3.84)
Secondary (7+ yr)	14	8.75	2	14.29	1.0
Type of sex venue (last 30 d)					
Entertainment	51	31.9	5	9.8	1.0
Brothel	23	9.2	4	17.4	1.94 (0.47)
Freelance	59	39.3	22	37.3	5.47 (1.89–15.84) [‡]
Multiple	27	16.9	5	19.2	2.62 (0.72–9.59)
Length of employment as SW (yr)		4.3 (2.5–6.3)	4.3 (2.7–5.9)	0.95 (0.85–1.05)	
Have a manager, boss, or supervisor					
No	82	53.6	24	29.3	1.0
Yes	71	46.4	10	14.1	0.40 (0.17–0.9) [‡]
Age at first sex					
15	32	20.1	12	37.5	2.45 (1.06–5.66) [‡]
>15	127	79.9	25	19.7	1.0

Characteristic	Prevalence of Characteristic			Prevalent HIV Infection			OR (95% CI)
	N/Median	%/IQR	%/IQR	N/Median	%/IQR	%/IQR	
No. sex partners in last 30 d		30 (10-90)		44 (20-100)			
10	45	28.1	6	13.3	1.0		
11-50	53	33.1	16	30.2	2.81 (1.0-7.96) [‡]		
50	62	38.8	15	24.2	2.07 (0.74-5.85)		
Condom use with last paying partner							
Consistent (always)	108	85.7	25	23.2	1.0		
Inconsistent	18	14.3	6	33.3	1.66 (0.57-4.87)		
Condom use with last non-paying partner							
Consistent (always)	7	20.6	1	14.3	1.0		
Inconsistent	27	79.4	5	18.5	1.36 (0.13-14.0)		
Ever tested for HIV							
No	58	36.5	19	18.8	1.0		
Yes	101	63.5	18	31.0	1.94 (0.92-4.10)		
No. days drunk (last mo)		5 (1-20)		2 (1-10)	0.96 (0.91-0.99) ^{*‡}		
0-4	89	55.6	27	30.3	1.0		
5-19	33	20.6	6	18.2	0.51 (0.19-1.38)		
>20	38	23.7	4	10.5	0.27 (0.09-0.84) [‡]		
Yama use last 3 mo							
No	120	75.0	25	20.8	1.0		
Yes	40	25.0	12	30.0	1.63 (0.73-3.65)		
Crystal/ice use last 3 mo							
No	133	86.4	29	21.8	1.0		
Yes	21	13.6	4	19.1	0.84 (0.26-2.70)		
Ever used any drug prior to/during sex							
No	109	68.1	22	20.2	1.0		
Yes	51	31.9	15	29.4	1.64 (0.77-3.53)		

* Variable use as continuous.

[‡] P 0.01.

[†]*P* 0.05.

HIV indicates human immunodeficiency virus; OR, odds ratio; CI, confidence interval; IQR, interquartile range; SW, sex workers.

Table 2
Selected Socio-Demographic and Risk Characteristics and Associations With Prevalent and Incident STI Among 130 High-Risk Women Participating in the Young Women's Health Study in Phnom Penh, Cambodia

Characteristic	Prevalent STI			Incident STI*			
	N/Median	%IQR	OR (95% CI)	N/Median (IQR)	PY	Incidence/100 py (95% CI)	HR (95% CI)
Overall	20	15.4		14	66.0	21.2 (12.6–35.8)	
Age (yr)	22 (20–27)		0.9 (0.8–1.0) [§]			24.5 (23–27)	
16–18	1	10.0	1.0	0	6.1	0	1.0
19–24	11	21.6	2.5 (0.3–21.7)	7	27.2	25.8 (12.3–54.1)	1.0
25–29	8	11.6	1.2 (0.1–10.6)	7	33.0	21.2 (10.1–44.5)	1.2 (0.5–3.2)
Marital status							
Never married	7	15.2	1.0	3	20.7	14.5 (4.7–45.0)	1.0
Married—living together	8	25.8	1.9 (0.6–6.0)	5	16.0	31.3 (13.0–75.1)	2.2 (0.6–8.4)
Widowed/divorced/separated	5	9.4	0.6 (0.2–2.0)	6	29.6	20.3 (9.1–45.1)	1.3 (0.3–4.9)
Education							
None	5	9.1	1.0	6	26.7	22.5 (10.1–50.1)	1.0
Primary (1–6 yr)	13	21.0	2.7 (0.9–8.0)	8	33.6	23.8 (11.9–47.7)	1.1 (0.4–2.8)
Secondary (7 + yr)	2	15.4	1.8 (0.3–10.6)	0	6.1	0	—
Type of SW venue (last 30 d)							
Entertainment	5	12.2	1.0	2	25.7	7.8 (1.9–31.1)	1.0
Brothel	2	15.4	1.3 (0.2–7.7)	0	1.8	0	—
Freelance	9	18.0	1.6 (0.5–5.2)	11	26.8	26.8 (22.7–74.2)	5.0 (1.2–20.9) [‡]
Multiple	4	15.4	1.3 (0.3–5.4)	1	12.0	12.0 (1.2–58.9)	1.2 (0.1–12.3)
Length of employment as SW (yr)	3.9 (2.0–6.7)		1.0 (0.9–1.1) [§]	5.1 (4.1–9.4)	40.4	29.7 (16.9–52.3) [‡]	1.1 (1.1–1.2) ^{§¶}
Have a manager, boss, or supervisor							
No	11	15.5	1.0	12	38.5	31.2 (17.7–55.0)	1.0
Yes	9	15.3	1.0 (0.4–2.6)	2	27.8	7.2 (1.8–28.7)	0.2 (0.1–0.9) [‡]
Age at first sex							
15	4	15.4	1.0	4	11.8	34.0 (12.8–90.6)	1.0
>15	16	15.5	1.0 (0.3–3.3)	10	53.8	18.6 (10.0–34.5)	0.6 (0.2–1.6)

Characteristic	Prevalent STI				Incident STI*			
	N/Median	%/IQR	OR (95% CI)	N/Median (IQR)	PY	Incidence/100 py (95% CI)	HR (95% CI)	
No. sex partners in last 30 d	25 (7-55)	1.0 (1.0-1.0) [†]				32.5 (6-53)		
10	6	14.3	1.0	3	32.3	9.3 (3.0-28.7)	1.0	
11-50	8	21.6	1.7 (0.5-5.3)	8	23.6	33.9 (17.0-67.8)	3.0 (0.8-10.8)	
>50	6	11.8	0.8 (0.2-2.7)	3	10.4	29.0 (9.3-89.8)	2.1 (0.4-10.1)	
Condom use with last paying partner								
Consistent (always)	10	11.6	1.0	9	43.1	20.9 (10.9-40.2)	1.0	
Inconsistent	3	25.0	2.5 (0.6-10.9)	0	5.0	0	—	
Condom use with last non-paying partner								
Consistent (always)	2	28.6	1.0	2	4.4	45.0 (11.2-100.0)	1.0	
Inconsistent	5	20.8	0.7 (0.1-4.5)	3	11.9	25.3 (8.2-78.0.4)	0.4 (0.1-2.2)	
Ever tested for HIV								
No	6	14.0	1.0	1	24.1	4.2 (0.6-29.5)	1.0	
Yes	14	16.3	1.2 (0.4-3.4)	13	41.5	31.3 (18.2-53.9)	6.9 (0.9-51.6)	
No. days drunk (last month)	1.5 (1-22)	1.0 (0.9-1.1) [†]		3 (0.5-27.5)				
0-4	16	17.0	1.0	11	47.5	23.2 (12.8-41.8)	1.0	
5-19	0	0.0	—	1	8.1	12.4 (1.7-87.7)	0.5 (0.1-3.5)	
>20	4	18.2	1.1 (0.3-3.6)	2	10.7	18.6 (4.7-74.5)	0.8 (0.2-3.5)	
Yama use last 3 mo								
No	14	14.9	1.0	8	57.0	14.0 (7.0-28.1)	1.0	
Yes	6	16.7	1.1 (0.4-3.2)	6	9.3	64.5 (29.0-100.0)	3.8 (1.5-9.6) [§]	
Crystal use last 3 mo								
No	16	15.8	1.0	10	55.6	18.0 (9.7-33.4)	1.0	
Yes	4	13.8	0.9 (0.3-2.8)	4	10.6	38.0 (14.1-100.0)	2.1 (0.8-5.8)	
Ever used any drug prior during sex								
No	13	14.1	1.0	7	48.2	14.5 (6.9-30.5)	1.0	
Yes	7	18.4	1.4 (0.5-3.8)	7	18.1	38.7 (18.4-81.1)	2.5 (0.9-6.6)	

* Incident STI was assessed in participants who were followed (n = 94).

[†] P 0.05.

[‡]Length of employment comparison made between greater than 30 months versus less than 30 months.

[§]*P* 0.01.

[#]Variable use as continuous.

STI indicates sexually transmitted; IQR, interquartile range; OR, odds ratio; CI, confidence interval; PY, person years; HR, hazard ratio; SW, sex worker; HIV, human immunodeficiency virus.

Table 3
Variables Independently Associated With Prevalent HIV (A) and Incident STI (B) in Young High-Risk Women Participating in the Young Women's Health Study, Phnom Penh, Cambodia

Exposure Variable	A. Prevalent HIV	
	Adjusted Odds Ratio	(95% CI)
Age (per year)	1.23	1.06 to 1.43 [*]
Education (per year)	0.83	0.68 to 1.02
Type of sex venue (last 30 d)		
Entertainment	1.0	—
Brothels	1.85	0.36 to 9.48
Freelance	5.85	1.59 to 21.58 [*]
Multiple	3.60	0.78 to 16.55
Age at first sex (≤ 15 vs. >15 yr)	3.06	1.01 to 8.46 [†]
No. sex partners in last 30 d		
10	1.0	—
11–50	3.32	0.90 to 12.3
50	1.24	0.33 to 4.66
Ever tested for HIV (yes vs. no)	3.93	1.52 to 10.18 [*]
	B. Incident STI	
Exposure Variable	Adjusted Hazard Ratio	(95% CI)
Age (per year)	1.06	0.94 to 1.19
Education (per year)	0.99	0.82 to 1.18
Length of employment as SW (yr)	1.12	1.05 to 1.19 [*]
Yama use last 3 mo (yes vs. no)	3.90	1.47 to 10.34 [†]
No. sex partners in last 30 d		
10	1.0	—
11–50	1.80	0.50 to 6.52
50	1.51	0.33 to 7.02

^{*}*P* 0.01.

[†]*P* 0.05.

HIV indicates human immunodeficiency virus; STI, sexually transmitted infections; CI, confidence interval; SW, sex worker.