Published in final edited form as:
AIDS Behav. 2009 October ; 13(5): 873–880. doi:10.1007/s10461-008-9499-5.

Correlation Between HIV and Sexual Behavior, Drug Use, Trichomoniasis and Candidiasis Among Female Sex Workers in a Mekong Delta Province of Vietnam

Thuong Vu Nguyen,
Pasteur Institute, Ho Chi Minh City, Vietnam

Department of Epidemiology, UCLA School of Public Health, 71-269 CHS, Box 951772, Los Angeles, CA 90095-1772, USA

Nghia Van Khuu,
Pasteur Institute, Ho Chi Minh City, Vietnam

Phong Hoai Truong,
Department of Health, Soc Trang, Vietnam

Anh Phuong Nguyen,
Center for HIV/AIDS Prevention and Control, Soc Trang, Vietnam

Lien Xuan Thi Truong, and
Pasteur Institute, Ho Chi Minh City, Vietnam

Roger Detels
Department of Epidemiology, UCLA School of Public Health, 71-269 CHS, Box 951772, Los Angeles, CA 90095-1772, USA

Roger Detels: detels@ucla.edu

Abstract

To determine the prevalence of HIV and correlates of HIV infection among female sex workers (FSWs) in Soc Trang province, Vietnam, a survey of 406 FSWs in Soc Trang province was conducted between May and August, 2003. The participants were interviewed, using a standardized interview, to obtain information about sociodemographic and behavioral characteristics, and gynecologic and sexually transmitted infection (STI) history. The prevalence of HIV was 3.3%. An increased risk for HIV was associated with ever using illicit drugs, direct sex work, early sexual debut, age of FSWs, and infection with candidiasis and trichomoniasis. Reduced likelihood of HIV was only associated with withdrawal as a contraceptive method. A strong association of HIV with drug use and candidiasis and trichomoniasis infection among FSWs was found. Needle/syringe exchange, STI treatment, and methadone programs targeting FSWs should be implemented, and should include 100% condom use promotion.

Keywords

Female sex workers (FSWs); Drug use; Sexually transmitted infections (STIs); HIV; Vietnam

Correspondence to: Roger Detels, detels@ucla.edu.

Introduction

HIV has become one of the most important public health problems in Vietnam since the first case was detected in 1990. The epidemic of HIV has occurred primarily in high-risk groups such as injecting drug users (IDUs) and female sex workers (FSWs) (National Committee for Prevention and Control of AIDS, Drug and Sex Work 2007). The role of FSWs in transmitting HIV to the community through their clients has been reported (Miller 2003; WHO 2005). Unfortunately, HIV was still increasing in this population in some major cities, including Ha Noi (14.2%) and Can Tho (33.9%), in 2006 (National Committee for Prevention and Control of AIDS, Drug and Sex Work 2007; Pasteur Institute, Ho Chi Minh City 2008).

Soc Trang is one of the poorest provinces of the Mekong Delta area in southern Vietnam. The nearby city of Can Tho has experienced an increasing HIV prevalence in FSWs (Pasteur Institute, Ho Chi Minh City 2008). The HIV prevalence among FSWs in Soc Trang was 2.25% in 2002 and 3.23% in 2003 (unpublished data from the HIV sentinel surveillance by the Pasteur Institute, Ho Chi Minh City, 2003), and a high prevalence of sexually transmitted diseases (STDs) was observed in male STD patients who were more likely to see FSWs in this province (Thuy et al. 1999). The number of FSWs has increased in Soc Trang province, with many coming from other Mekong Delta provinces (informal communication with local health officials). Indeed, high mobility by FSWs was observed in some Mekong Delta provinces near Soc Trang. In An Giang and Kien Giang, one fourth to one half of FSWs reported coming from other places (Nguyen et al. 2005). These observations suggested that Soc Trang is at risk for an epidemic of HIV. Recently, several projects have been implemented in Soc Trang to reduce transmission of HIV in this high-risk population.

This study was conducted to determine the prevalence and correlates of HIV infection in FSWs, in order to provide key information for designing and implementing HIV preventive measures in Soc Trang. This study provides a profile of risk factors for HIV among FSWs in Soc Trang that may be relevant for other Mekong Delta provinces in Vietnam.

Methods

Participants and Data Collection

Four hundred and six FSWs in Soc Trang were identified, using mapping information for “hot spots” where FSWs received their clients, and they were invited to participate in a cross-sectional study between May and August, 2003.

In each hot spot, convenience sampling was used to recruit FSWs, since there is no existing list of FSWs. The interviewers enrolled FSWs after obtaining agreement from the owners of establishments and the FSWs themselves. Informed verbal consent was obtained from all participants. The details about the methods used have been published elsewhere (Nguyen et al. 2008).

FSWs in the study were classified either as direct FSWs [income only from selling sex, and working on the streets, in parks, at bus stops, on boats, on ferry piers, in brothels (houses where FSWs lived, received clients and had sex with them), at small cafés and at guesthouses], and indirect FSWs (income from both selling sex and their employment in hotels, restaurants, massage parlors, karaoke lounges, bars, and barbershops). Using EPI-INFO version 6.04d (CDC, USA and WHO 2001), the sample size required was calculated to be 356, and rounded up to 400, based on the estimated prevalence of gonorrhea (10%) and chlamydia (30%), plus an additional 10% to allow for refusals and damage or loss of specimens (Nguyen et al. 2008). The sample size mentioned above (400) was sufficient to

recognize a prevalence of HIV of 3.0%, with an alpha level of 0.05 and the desired precision of 2% (least acceptable prevalence as low as 1% and as high as 5%).

Information on socio-demographic characteristics, sexual behavior, healthcare-seeking behavior, and history of sexually transmitted infections (STIs) in participants was elicited in an interview with trained peer educators. After the interviews, peer educators referred the participants to an STI examination room of the Center for Social Diseases of Soc Trang province for speculum examination and collection of blood specimens and cervical fluid.

Free treatment was provided to those found to be infected, using the WHO STD case management guidelines. FSWs were also given STD/HIV education and counseling.

Laboratory Methods

Blood samples were sent to the Provincial Center for Preventive Medicine in Soc Trang for detection of HIV by SFD (Bio-Rad, Tokyo, Japan) and syphilis by a rapid plasma reagent (RPR; Bio-Rad). Positive sera were stored at −20°C, then sent to the Pasteur Institute in Ho Chi Minh City (PI-HCM) every two weeks for HIV confirmation with two ELISA tests (Murex HIV 1.2.0, Abbott, Dartford, UK; Genscreen HIV K V.2, Bio-Rad, Marnes La Coquette, France) and syphilis confirmation with the *Treponema pallidum* hemagglutination assay (TPHA; Bio-Rad). Candidiasis and *Trichomonas vaginalis* were detected by immediate direct microscopy of a saline wet preparation at the Center for Social Diseases. Bacterial vaginosis was diagnosed using Amsel criteria, meeting any three of the four following criteria: (1) homogeneous vaginal discharge; (2) whiff test positive (fishy odour when adding potassium hydroxide solution to vaginal secretions); (3) presence of clue cells (>20%) on microscopy; and (4) vaginal pH greater than 4.5.

Cervical fluid was collected using tampons, which were placed into a tube with physiological sodium chloride (0.9%), stored at −20°C, and then transferred to a cool box for delivery to the Pasteur Institute Ho Chi Minh City (PIHCM) at 2-week intervals. These cervical specimens were tested for *Neisseria gonorrhea* (GC) and *Chlamydia trachomatis* (CT) by polymerase chain reaction (PCR; AMPLICOR, Roche).

Data Analysis

Data were entered into Epi-info version 6.04d (CDC, USA and WHO 2001). Odds ratios (with 95% confidence intervals) were used to measure the magnitude of the association of HIV with selected socio-demographic, sexual behavioral, gynecologic and STI history variables, and current infection with selected STIs. Any variables known to have biologic plausibility for increasing the risk of HIV or having a P value < 0.25 by chi-square or Fisher exact tests in univariate analysis (for association with HIV) were included in the multivariate regression models, using backward elimination. In the full multivariate model, the variable with the highest corresponding P value was removed from the model, and then the log likelihood ratio test was performed to compare the reduced and the full model. If the log likelihood ratio test gave a P value ≤ 0.05, the removed variable would be retained in the model.

Results

Four hundred and six FSWs agreed to be interviewed, of whom 97% (395/406) underwent speculum examination and gave specimens for testing. We only analysed the data of these participants. The major reasons for refusing speculum examination were menstruation, fear of specimen collection, and of going to a hospital.

Selected socio-demographic characteristics, sexual behaviors, and history of STIs have been reported else where (Nguyen et al. 2008). In brief, most of the study participants were 20–39 years old (Table 1). Slightly more than 80% were Kinh ethnicity (the majority in Vietnam). The majority had a low educational level; i.e., level 1 (grade 1–5) or lower. Approximately one-quarter had been married or cohabited. Less than half were direct sex workers. Nearly 6% had engaged in first sex at age 15 years or younger. More than 77% reported consistent condom use with clients in the last month. Withdrawal was used as a contraceptive method by 33.8%. Almost 9% reported having ever used illicit drugs. The prevalences of STIs were gonorrhea and/or chlamydia, 54.9%; trichomoniasis, 8.9%; bacterial vaginosis, 28.9%; and syphilis, 3.8% (Table 2). In addition, 12.2% of the women had candidiasis.

The prevalence of HIV was 3.3% (95% CI 1.8–5.7%). The prevalence increased with age—1.7, 3.2, 3.0, and 10% in those aged 16–19, 20–29, 30–39, and 40–49 years, respectively. Compared with the reference groups, the prevalence of HIV was significantly higher in those who were permanent residents in the study area (5.1 vs. 1.1%), were direct sex workers (6.5 vs. 0.5%), had an early sexual debut (13.0 vs. 2.7%), had used illicit drugs (20.0 vs. 1.7%), and had vaginal candidiasis (10.4 vs. 2.3%). The prevalence of HIV was higher in those who had trichomoniasis (8.6 vs. 2.8%) or were seropositive for syphilis (13.3 vs. 2.9%), but lower in those who had used withdrawal as a contraceptive method (0.8 vs. 4.5%) than in the corresponding reference group (Tables 1, 2).

Table 3 presents several selected socio-demographic factors, sexual behaviors, and prevalence of STIs among direct versus indirect sex workers and ever versus never using illicit drugs. Direct sex workers were older (30–39 and 40–49 years), had less education, earlier sexual debut, more clients, higher consistent condom use with clients, more illicit drug use, and more frequently reported ever having had an STI and having more selected STIs and candidiasis. Those who ever used illicit drugs were younger, more likely to live alone, and to have had an early sexual debut, lower consistent condom use with clients, a higher rate of gonorrhea, bacterial vaginosis, and syphilis, but a lower chlamydia rate than those who never used drugs.

In multivariate analysis, increasing age was associated with a higher prevalence of HIV (aOR = 1.1, 95% CI 1.01–1.26); when age was increased by one year, the odds of HIV were increased 1.1-fold (Table 3). Early sexual debut (aOR = 7.0, 95% CI 1.05–44.0), direct sex work (aOR = 15.1, 95% CI 1.14–200.4), ever using illicit drugs (aOR = 87.5, 95% CI 10.1–753.5), and having trichomoniasis (aOR = 11.7, 95% CI 1.43–95.2) or candidiasis (aOR = 15.4, 95% CI 2.55–93.1) were associated with a higher likelihood for HIV infection. The use of withdrawal as a contraceptive method was associated with a lower likelihood of HIV (aOR = 0.07, 95% CI 0.006–0.94) (Table 4).

Discussion

The prevalence of HIV among FSWs in Soc Trang (3.3%) was lower than in some of the other Mekong Delta provinces of Vietnam (4–7%) (Thuong et al. 2005). Given the high prevalence of STIs among FSWs in this study, 54.9% for gonorrhea and/or chlamydia, 8.9% for trichomoniasis (determined by wet mount), and 28.9% for bacterial vaginosis, the epidemic of HIV among FSWs in Soc Trang is likely to spread further in the next few years.

The correlation between HIV and age was consistent with other studies in Cambodia, India and the Congo (Dandona et al. 2005; Sopheab et al. 2003; Vandepitte et al. 2007). Older age may reflect more life-time sex partners and a higher probability that some are infected with HIV.

Although the proportion of FSWs who engaged in sex before the age of 15 was not high (<6%), sexual debut at an early age was found to increase the risk for HIV infection in FSWs. This was also observed in other studies in Vietnam (Thuong et al. 2005) and Zimbabwe (Pettifor et al. 2004). Early sexual debut probably reflects low awareness of safer sex practices, higher number of life-time sexual partners, and longer period of being sexually active. Moreover, at this early age, the cervical and vaginal mucosa are still immature and more vulnerable to HIV infection. Delay in sexual debut should be integrated as a message in health education to raise awareness of the risk of early sexual debut on infection with HIV and other STIs among women who are likely to engage in commercial sex. In addition, if the sex industry is regulated, then age at initiating sex work (assumed as same as age at first sex) can be controlled.

Nearly half (>47%) of FSWs in this study were direct sex workers. Engaging in direct sex work is more likely to result in HIV infection. Brothel- and street-based sex workers (included as direct sex workers in our study) and other direct sex workers have been shown to have a higher risk for HIV and other STIs (Limpakarnjanarat et al. 1999; Rehle et al. 1992; Shahmanesh et al. 2008). Direct sex workers have been shown to be more likely to acquire herpes simplex virus 2 (HSV-2), which facilitates both HIV infection and transmission (O'Farrell et al. 2006). In our sub-analysis (not shown in the tables), direct sex workers were more likely to have lower education levels, more clients, be older, and more likely to have used illicit drugs. In addition, direct sex workers received lower payments for each sexual encounter, thus possibly having clients who were poorer, had lower levels of education, and had a higher risk of HIV. Most of these observations are consistent with other studies (Gorbach et al. 2006; Minh et al. 2004).

About one-third of the participants used withdrawal as one of their contraceptive methods, and this practice was found to be protective against infection with HIV in this study. In a longitudinal study of HIV transmission by heterosexual partners, De Vincenzi et al. (1994) found that consistent withdrawal before ejaculation protected the female partner against HIV infection; infected ejaculated fluid is less likely to come in contact with cervical and vaginal mucosa. However, withdrawal is unlikely to protect the partners of infected sex workers. Therefore, consistent condom use is still the most effective method for HIV/STI prevention.

In this study, ever using illicit drugs was found to present a much higher risk for HIV infection than other risk factors, including STIs. Over 40% (15/37) of those having ever used drugs reported current drug use. Heroin was used by over 87% of those reporting current illicit drug use (data not shown). Informal communication with several sex workers revealed that FSWs are likely to under-report current use of illicit drugs because they fear arrest if the information is released. Our findings were consistent with several other studies in South America (Bautista et al. 2006), China (Xu et al. 2008), and Ho Chi Minh City, Vietnam (Nguyen et al. 2004). It is likely that HIV was transmitted via injection, particularly when sharing needles and/or syringes with infected persons. In our study, we did not ask about drug injection, but we believe that the majority of study participants reporting drug use injected heroin. This pattern was also found in the two largest cities of Vietnam, Ho Chi Minh and Hanoi (Nguyen et al. 2004; Tran et al. 2005). It is probable that drug use increases risky sexual behaviors, such as less consistent condom use with clients (Lau et al. 2007; Surratt 2007). In our study, we found that those who had ever used illicit drugs were less likely to consistently use condoms when having sex with clients (data not shown).

A high prevalence of STIs was found in the current study. Although syphilis seropositivity was highly associated with HIV in univariate analysis, it was not found to be associated in multivariate analysis. However, trichomoniasis and candidiasis were significantly associated with a higher likelihood of HIV infection. Several studies also found that both of these

vaginal infections increased the risk of HIV infection (Hester and Kennedy 2003; McClelland et al. 2007; Van Der Pol et al. 2008; van de Wijgert et al. 2008). Both of these infections can cause vaginal inflammation, which disrupts the vaginal mucosa and increases vulnerability to HIV. Furthermore, vaginal trichomoniasis and candidiasis attract CD4-bearing lymphocytes, which are targets of HIV (Fidel 2005; Hester and Kennedy 2003; McClelland et al. 2005). Finally, both trichomoniasis and HIV can share a common route of transmission and sexual risk behaviors. However, because this was a cross-sectional study, we could not eliminate the possibility that HIV infection increased the risk of vaginal candidiasis and trichomoniasis. This would be explained by higher susceptibility to genital tract infections due to immunosuppression in persons infected with HIV (Guenthner et al. 2005).

Several limitations existed in this study. First, the exact number of FSWs in each hot spot was not known. Therefore, convenience sampling within each hot spot was used. Selection bias could have occurred if non-participants were different from participants for both prevalence of HIV and specific socio-demographic and behavioral factors. Second, sensitive information about behaviors such as illicit drug use and sexual practices were possibly under-reported; however, this might be mitigated by the interviewers, who were peer educators. Third, this cross-sectional design could not distinguish temporal relationships between factors of interest and HIV infection. Lastly, given the low proportion of exposures, such as illicit drug use and early sexual debut, the regression statistics might be unstable.

Although the prevalence of HIV in FSWs in Soc Trang province was not high compared with other nearby provinces, the high prevalence of STIs suggests the potential for increasing numbers of HIV infections in this area unless effective intervention is implemented. Enhancing the existing STI control program would be one of the most feasible ways to reduce risk of HIV infection. Vaginal candidiasis and curable STIs such as syphilis, gonorrhea, chlamydia, and trichomoniasis should be treated among FSWs, using free-of-charge mobile STI clinics and WHO-recommended periodic syndromic STD management, including promotion of partner treatment (Johnston and Mabey 2008; WHO 2003). Moreover, HIV/STI health education, counseling and testing, access to HIV treatment, and a 100% condom use program should be combined with needle/syringe exchange and methadone programs targeting FSWs. To facilitate these programs, it is recommended that the sex industry be regulated, as has been successfully done in neighboring Cambodia and Thailand (Rojanapithayakorn 2006).

Acknowledgments

This study was funded by Service Laïque de Coopération au Développement, Belgium, and partially supported by NIH Fogarty International Center grant D43 TW000013. This work could not have been achieved without the help and support of all the staff involved, particularly: Dr. Huu Ngoc Tran, Dr. San Hoang Le, Ms. Phuong Kim Thi Tran, Mr. Phuc Duy Nguyen, and Dr. Tram Thu Thi Luong (The AIDS Programme of the Pasteur Institute, Ho Chi Minh City); Dr. Toan Minh Le (Soc Trang Center for HIV/AIDS Control and Prevention); Drs. An Ngoc Tran and The Thi Nguyen (Soc Trang Center for Social Diseases); Dr. Truc Thanh Thi Le and Dr. Thuc Van Nguyen (Hospital for Dermato-Venereology, Ho Chi Minh City); and Marie-Claire Rabier (SLCD, Belgium). We also thank Wendy Aft (UCLA Department of Epidemiology) and Boi-Thanh Thuc Nguyen for editing assistance.

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Table 1

HIV prevalence by selected socio-demographic factors and sexual behaviors in FSWs, Soc Trang, 2003

Variable	Frequency (and percentage) for each variable category	HIV prevalence (%)
Age		
16–19	59 (15.0)	1.7
20–29	248 (62.9)	3.2
30–39	67 (17.0)	3.0
40–49	20 (5.1)	10.0
Ethnicity		
Kinh	317 (80.3)	3.2
Other	78 (19.7)	3.8
Permanent residence		
Local site (Soc Trang)	217 (54.9)	5.1
Other provinces	178 (45.1)	1.1
Education		
Low education (grade 1–5 or lower)	252(63.8)	3.2
Higher education	143(36.2)	3.5
Marital status		
Single (living alone)	299 (75.7)	3.3
Married/cohabiting	96 (24.3)	3.1
Have a boyfriend		
Yes	212 (53.7)	3.3
No	183 (46.3)	3.3
Sex work		
Direct	185 (46.8)	6.5
Indirect	210 (53.2)	0.5
Duration of sex work		
≥6 months	362 (91.9)	3.6
<6 months	32 (8.1)	0
Ever worked outside Vietnam		
Yes	9 (2.3)	11.1
No	386 (97.7)	3.1
Early sexual debut		
Yes (≤15 years old)	23 (5.8)	13.0
No (>15 years old)	372 (94.2)	2.7
Number of clients/month		
≥16	207 (52.4)	3.9
<16	188 (47.6)	2.7
Payment per sexual transaction		
≤4 USD	112 (28.5)	5.4

Variable	Frequency (and percentage) for each variable category	HIV prevalence (%)
>4 USD	281 (71.5)	2.5
Condom use with clients		
Consistent	307 (77.7)	2.9
Inconsistent	88 (22.3)	4.5
Used illicit drugs		
Ever	35 (8.9)	20.0
Never	359 (91.1)	1.7

Table 2

HIV prevalence by obstetric and gynecologic history and current infections with STIs in FSWs, Soc Trang, 2003

Variable	Frequency (and percentage) for each variable category	HIV prevalence (%)
Contraceptive method		
Oral contraceptive		
Yes	30 (8.1)	0
No	340 (91.9)	3.5
Intrauterine device (IUD)		
Yes	83 (22.4)	4.8
No	287 (77.6)	2.8
Withdrawal		
Yes	125 (33.8)	0.8
No	245 (66.2)	4.5
Vaginal douching		
Ever	300 (75.9)	3.7
Never	95 (24.1)	2.1
Pregnancy termination		
Ever	95 (24.1)	4.2
Never	300 (75.9)	3.0
Reported ever having an STI		
Ever	98 (25.9)	3.1
Never	281 (74.1)	3.2
Current infection with STIs by laboratory diagnosis		
Gonorrhea and/or chlamydia		
Positive	217(54.9)	3.7
Negative	178 (45.1)	2.8
Trichomoniasis		
Positive	35 (8.9)	8.6
Negative	360 (91.1)	2.8
Bacterial vaginosis		
Positive	114 (28.9)	4.4
Negative	281 (71.1)	2.8
Serology for syphilis		
Positive	15 (3.8)	13.3
Negative	379 (96.2)	2.9
Candidiasis by laboratory diagnosis		
Presence	48 (12.2)	10.4
Absence	347 (87.8)	2.3

Table 3

Selected socio-demographic factors, sexual behaviors, and current STI prevalence varied by direct vs. indirect sex workers and ever vs. never using illicit drugs

Variables	Types of sex workers				Illicit drug use			
	Direct		Indirect		Ever		Never	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Age								
16–19	33	17.8	26	12.4	6	17.1	53	14.8
20–29	85	45.9	163	78.0	25	71.4	222	62.0
30–39	48	25.9	19	9.1	4	11.4	63	17.6
40–49	19	10.3	1	0.5	0	0	20	5.6
Permanent residence at local site (Soc Trang)	126	68.1	91	43.3	20	57.1	197	54.9
Low education level (grade 1–5 or lower)	138	74.6	114	54.3	20	57.1	232	64.6
Living alone	120	64.9	179	85.2	30	85.7	269	74.9
Direct sex work					20	57.1	165	46.0
Early sexual debut (before or at 15 years old)	18	9.7	5	2.4	3	8.6	20	5.6
Number of clients per month								
Mean	22.4		14.5		15.5		18.5	
Median	28		12		12		16	
Range	4–56		1–81		4–40		1–81	
Withdrawal as a contraceptive method	51	29.3	74	37.8	7	25.0	118	34.6
Consistent condom use with clients	151	81.6	156	74.3	21	60.0	285	79.4
Used illicit drug	20	10.8	15	7.2				
Reported ever having an STI	68	37.6	30	15.2	8	24.2	90	26.1
Presence of STIs by laboratory diagnosis								
Gonorrhea	29	15.7	30	14.3	7	20.0	52	14.5
Chlamydia	98	53.0	93	44.3	13	37.1	177	49.3
Trichomoniasis	19	10.3	16	7.6	3	8.6	32	8.9
Bacterial vaginosis	58	31.4	56	26.7	15	42.9	99	27.6
Serology for syphilis	14	7.6	1	0.5	4	11.4	11	3.1
Candidiasis by laboratory diagnosis	24	13.0	24	11.4	5	14.3	43	12.0

No. Number

Table 4

Adjusted correlates of HIV infection in FSWs

Variable	Crude OR		Adjusted OR[d]	
	Point estimate	95% CI	Point estimate	95% CI
Age	1.03[c]	(0.96, 1.11)	1.1[*]	(1.01, 1.26)
Permanent residence at local site (Soc Trang)	4.7[a,*]	(1.15, 31.48)		
Low education (grade 1–5 or lower)	0.90[b]	(0.29, 3.1)		
Direct sex work	14.5[**]	(2.5, 314.1)	15.1[*]	(1.14, 200.4)
Early sexual debut (≤15 years old)	5.43[b,*]	(1.12, 20.32)	6.8[*]	(1.07, 43.6)
≥16 clients/month	1.47[a]	(0.47, 5.02)		
Payment ≤ 4 USD per sexual transaction	2.2[b]	(0.68, 6.97)		
Consistent condom use with clients	0.63[b]	(0.19, 2.42)		
Used illicit drugs	14.7[b,**]	(4.4, 48.8)	87.3[**]	(10.1, 751.8)
Contraceptive method				
Intrauterine device (IUD)	1.77[b]	(0.45, 5.99)		
Withdrawal	0.17[b]	(0.01, 1.03)	0.07[*]	(0.006, 0.90)
Concurrent infections by laboratory diagnosis				
Gonorrhea and/or Chlamydia	1.32[a]	(0.42, 4.52)		
Trichomoniasis	3.28[b]	(0.69, 11.93)	11.7[*]	(1.43, 95.3)
Bacterial vaginosis	1.57[b]	(0.46, 4.94)		
Serology for syphilis	5.15[b]	(0.71, 23.38)		
Candidiasis	4.93[b,*]	(1.4, 15.84)	15.4[**]	(2.55, 93.3)

95% CI, 95% confidence interval

[a] Chi-square test,

[b] Fisher exact test,

[c] Wald test from logistic regression,

[d] adjusted OR in the final model from multivariate analysis

[*] $P < 0.05$,

[**] $P < 0.01$