Alcohol Use and Sex Risk Behaviors Among HIV-Infected Female Sex Workers (FSWs) and HIV-Infected Male Clients of FSWs in India

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Abstract

Unprotected heterosexual transactional sex plays a central role in the spread of HIV in India. Given alcohol's association with risky sex in other populations and alcohol's role in HIV disease progression, we investigated patterns of alcohol use in HIV-infected female sex workers (FSWs) and HIV-infected male clients of FSWs in Mumbai. Analyses identified factors associated with heavy alcohol use and evaluated the relationship between alcohol use and risky sex. We surveyed 211 female and 205 male individuals; 80/211 FSWs (38%) and 127/205 male clients (62%) drank alcohol in the last 30 days. Among females, 32 and 11% drank heavily and were alcohol-dependent, respectively; among males the respective proportions were 44 and 29%. Men's heavy alcohol use was significantly associated with inconsistent condom use over the last year (AOR 2.40, 95% CI 1.21–4.77, $P = 0.01$); a comparable association was not seen in women. These findings suggest a need to address alcohol use both to avoid the medical complications of its heavy use in this population and to mitigate inconsistent condom use, the latter issue possibly requiring gender specific approaches. Such efforts to reduce drinking will be an important dimension to secondary HIV prevention in India.

Keywords

Alcohol; Transactional sex; HIV; Female sex workers

Background

In India, unprotected heterosexual transactional sex is a major risk behavior fueling the HIV epidemic [1]. Among Indian female sex workers (FSWs), the prevalence of HIV infection is about 15 times that of the general population [2]. Identifying factors associated with on-going high-risk sexual behavior among HIV-infected persons involved in transactional sex, both FSWs and their clients, is therefore a crucial component of HIV prevention efforts.

Studies from other countries document associations between alcohol use and high-risk heterosexual behaviors among those with and without HIV infection [3–6]. In India, only a minority of the population drinks any alcohol (i.e., 2% of women and 32% of men), although it is becoming more common [7,8]. A national survey, however, suggests that FSWs and their male clients are more likely than other groups in India to drink [2]. Furthermore, men who drink alcohol when visiting Indian FSWs engage in riskier sexual behavior (e.g., unprotected anal sex) and are more likely to have HIV and other sexually transmitted infections (STIs) [9]. Heavy alcohol use among HIV-infected persons has also been associated with increased risk of HIV disease progression as measured by CD4 cell count decline and absence of viral suppression [10–12].

These data suggest that interventions to reduce alcohol use may be an important component of primary HIV prevention efforts in India, but it is not clear whether alcohol use is common among FSWs and clients who are *already* infected with HIV, or whether alcohol plays a role in high-risk behaviors in this group. Independent of any relationship with risky sex, the medical morbidity due to heavy alcohol use among HIV-infected persons is another aspect of potential concern related to this population. Hence in this study, we survey HIV-infected FSWs and HIV-infected male clients of FSWs in Mumbai, with an aim of characterizing alcohol consumption in these groups. Analyses identified factors associated with heavy drinking and evaluated the association between alcohol consumption and risky sexual practices.

Methods

Recruitment and Enrollment

The Transactional sex and Alcohol: Justification for a research initiative (TAJ) research team completed surveys on HIV-infected FSWs and HIV-infected male clients of FSWs in Mumbai, India ($n = 416$) from November 2008 to February 2009. Female participants ($n = 211$) were recruited from the ASHA Center, a community based organization in Mumbai, run by a group of FSWs who provide support and linkage to care for HIV-infected sex workers and HIV-infected clients. The ASHA Center is associated with the HIV Positive People's Network in Maharashtra (NMP+), an NGO committed to the treatment and care of HIV-infected people in India. Male participants ($n = 205$) were recruited from ASHA and two other sites affiliated with NMP+.

HIV-infected outreach workers at the respective agencies reviewed client lists and selected every fifth individual from the list to be contacted (by phone or in person) for study participation. A total of 326 women and 418 men were contacted for study recruitment, of which 246 (75%) women and 372 (89%) men came into their respective recruitment sites. Upon reaching the site, an outreach worker introduced the participant to gender-concordant research staff trained in HIV survey research. Two men and two women were excluded from screening due to intoxication. Of the 244 women and 370 men screened, 216 women and 210 men met eligibility criteria: 18 years or older; HIV-infected; and reporting sex trade involvement in the past year (selling sex for women, purchasing sex for men) and penile–vaginal or anal sex in the past 30 days. HIV infection was confirmed by medical records brought by the participants. Of those eligible for the study, 5 women and 5 men did not complete their interviews and were thus excluded from the analyses, providing the final sample size of 211 female and 205 male participants ($n = 416$).

Human Participants Protections

This study was conducted as a partnership among Boston Medical Center, Boston University, Population Council, and NMP+. Procedures for this study were reviewed and approved by the institutional review boards of Boston University Medical Campus, Network of Maharashtra by People Living with HIV/AIDS (NMP+) and the Indian Council of Medical Research.

Subject Assessment

Participants received a 45 min interviewer-administered survey in Hindi assessing demographics, alcohol use, sexual risk behaviors, and health status. Instruments were developed in English, translated into Hindi and then reviewed by a study investigator fluent in both languages. Discrepancies were resolved with consultation with the US investigators. Participants were also provided with 100 rupees ($2.50) as compensation for their time in this study.

Demographic and Health Information

Demographic data were collected based on items modified or taken from the Demographic and Health Survey [8] and Population Council surveys [13] and included gender, age, level of education, income, religion, marital status, and number of children. The survey included questions on the use of antiretroviral medications, and health status was assessed using the Hindi language Short-Form 12 Health Survey Version 2.0 (SF-12) [14], whose summary measures include the Mental Component Score (MCS) and Physical Component Score (PCS) [15]. The PCS and MCS scores have a range from 0 to 100 and were designed to have a mean score of 50 and a standard deviation of 10 in a representative sample of the US population [16].

Alcohol Outcomes

The survey included questions on alcohol use in various contexts in the past 3 months and past year. Daily consumption in the prior 7 days was collected using a validated calendar method, the Timeline Follow Back (TLFB) [17], and was categorized as heavy, moderate, or abstinent. The "heavy" category was derived from the National Institute on Alcohol Abuse and Alcoholism definition of amounts that risk consequences (>14 drinks per week or >4 drinks on a single occasion for men, and >7 per week or >3 on a single occasion, for women) [18]. Heavy alcohol use (yes vs. no) was the primary outcome for analyses evaluating predictors of heavy drinking. Alcohol dependence over the last 12 months was evaluated using the Composite International Diagnostic Interview (CIDI) [19]. The survey asked about alcohol use prior to sexual encounters (e.g., "In the past 3 months, on how many occasions did you have a drink containing alcohol prior to having sex with a paid sex worker?") [20].

Sexual Behavior Outcomes

The primary sexual behavior outcome was the number of unprotected transactional sex encounters in the past 3 months (e.g., "In the past 3 months, how many times did you have sex with a client(s)?" "Of the times you had sex with a client in the past 3 months, how many times did you use a condom?"). Secondarily, the survey asked about the proportion of transactional sex encounters when the respondent used a condom (e.g. "In the past year, how often did you use a condom with a paid female sex partner?" "In the past year, how often did you use a condom with a client(s)?") with the response options of "always," "usually," "sometimes," "rarely," or "never." The secondary outcome of interest, derived from this question, was thus inconsistent condom use (yes vs. no). For this outcome, all responses other than "always" were categorized as inconsistent use.

Data Management

Data quality and management involved immediate review by field staff of survey data following interviews to ensure accuracy and completion as well as same day review by the field coordinator. Data entry and verification of consistency and accuracy utilized SPSS 11.5 software (SPSS Inc., Champaign, IL). Double data entry of the survey forms was performed in India and all discrepancies were reviewed and reconciled. Data were transmitted via a secure internet data transfer site to the Boston University School of Public Health, where further data cleaning and analysis occurred using SAS version 9.1 (SAS Institute Inc., Cary, NC).

Data Analysis

Identification of Factors Associated with Heavy Drinking—Heavy drinking over the past week, as measured by the Timeline Follow Back survey questions, was defined as the primary outcome. We used an iterative model building procedure based on logistic regression models to identify factors associated with this outcome. The following factors of interest were evaluated: age, income, religion, education, marital status, and MCS and PCS from the SF-12 v2. Age and PCS were modeled using tertiles as the linearity assumption did not hold in the regression models. We first fit unadjusted logistic regression models for each factor of interest. Factors significantly associated with heavy drinking at a significance level of 0.15 were included together in a single multivariable model. Factors that were no longer significant at the 0.15 level in the multivariable model were removed one at a time. Finally, factors not significant in unadjusted analyses were included one at a time in the multivariable model to assess their significance in the presence of other variables. The final model was determined using this iterative approach. Prior to regression modeling, we assessed bivariate correlations between all independent variables and covariates. To avoid potential colinearity, no pair of variables with Spearman correlation coefficient greater than 0.40 was included in the same model. Although a significance level criterion of 0.15 was used for entry and retention in the

model building process, a two-sided alpha level of 0.05 was used to test whether a factor was significantly associated with heavy drinking.

Association between Heavy Drinking and Risky Sexual Behavior—The distribution of number of unsafe sex acts in the past 3 months, a count variable, was skewed, with a considerable proportion of zeros and a long tail. Thus, the use of models assuming normality was not appropriate. Therefore, we used Poisson regression models with overdispersion to evaluate the association between heavy drinking and the number of unsafe sex acts in the past 3 months [21].

The Pearson chi-square correction was used to account for overdispersion in the data. The regression models controlled for the following potential confounders: age, income, religion, education, and marital status. The magnitude of association between heavy drinking and number of unsafe sex acts was quantified using an incidence rate ratio (IRR). The IRR is the ratio of number of unsafe sex acts for heavy drinkers compared to those who were not heavy drinkers, thus the null value of no association for the IRR is equal to 1. The binary outcome inconsistent condom use was analyzed using multiple logistic regression models and resulting odds ratios were reported. These analyses were also controlled for age, income, religion, education and marital status. All analyses were conducted separately by gender. Analyses were performed using SAS software (version 9.1; SAS Institute, Cary, NC).

Results

Participant Characteristics and Alcohol Use

The demographic characteristics of the participants are shown in Table 1. In addition, participants reported frequency and quantity of alcohol consumed over the last 30 days and the last week. In the last 30 days, 38% (80/211; 95% CI 32–45%) of women and 62% (127/205; 55–69%) of men drank on at least one occasion. Among all FSWs, 32% (95% CI 26–38%) met the study threshold for a "heavy" drinking in the past week and 11% (23/211; 95% CI 7–15%) met criteria for alcohol dependence. Among the 80 women who reported any drinking, 84% (67/80) met the study threshold for a "heavy" level of drinking; 29% (23/80) met criteria for alcohol dependence. Among the men, 44% (95% CI 37–51%) met criteria for heavy drinking in the past week and 29% (59/205; 95% CI 23–36%) met criteria for alcohol dependence. Among the 127 drinkers, 71% (90/127) met criteria for heavy drinking and 46% [59/127] met criteria for alcohol dependence. Seventeen percent of the women and 40% of the men said they "always" or "usually" drank before having sex with a client/FSW (Table 1).

Condom Use

The FSWs in this study had many more transactional sex encounters than the male clients, and condoms were used in a lower proportion of the women's encounters. Women reported having had an average of 127 sexual encounters with clients over the last 3 months, while the men had an average of three encounters with paid female partners; in this time period the average number of unprotected sexual encounters was 15 for women and 0.2 for men. When asked about transactional sex practices over the last year, 90% of women and 26% of men reported inconsistent condom use (Table 1).

Demographic and Health Characteristics Associated with Alcohol Use

For the female sex workers, the final multivariable model examining predictors of heavy alcohol use revealed that younger age (AOR 4.69 for youngest tertile [22–28 years] vs. oldest tertile [32–50 years], 95% CI 2.14–10.30; OR 1.62 for middle tertile [29–31 years] versus oldest tertile [32–50 years], 95% CI 0.72–3.64, overall *P* < 0.01) and better self-reported physical health as measured by PCS (AOR 2.43 for highest tertile [42.6–54] versus lowest

tertile [24.2–38.4], 95% CI 1.09–5.45; AOR 2.53 for middle tertile [38.5–42.5] versus lowest tertile [24.2–38.4], 95% CI 1.14–5.60, $P = 0.04$) were significantly associated with heavy alcohol use (Table 2).

For the male clients, none of the demographic or health measures were significantly associated with heavy alcohol use in the final multivariable model, though there was a trend toward a relationship between a lower income (i.e., less than the median for the group) and heavy alcohol use (AOR 1.68, 95% CI 0.95–2.98, $P = 0.07$) (Table 2).

Relationship Between Alcohol Use and Risky Sexual Behavior

Among the FSWs, no significant association was observed between those with heavy alcohol use and the reported number of unsafe transactional sex encounters over the past 3 months. The median (25th, 75th percentiles) number of such encounters was 0 (0, 20) for the heavy drinkers and 0 (0–11) for those with no heavy alcohol use ($P = 0.37$). The percentage who reported inconsistent condom use over the last year was also similar in both groups (90% of heavy drinkers and 91% of those who drank less or not at all). In the multivariable Poisson regression model (Table 3) heavy alcohol use in the past week was not associated with more unprotected transactional sex acts compared to those without heavy drinking ($P = 0.58$). Among other covariates in the model, younger age was significantly associated with the number of unprotected transactional sex encounters (IRR 2.94 for youngest tertile [22–28 years] vs oldest tertile [32–50 years], 95% CI 1.37–6.37; IRR 1.43 for middle tertile [29–31 years] vs oldest tertile [32–50 years], 95% CI 0.61–3.34; $P = 0.01$). We also did not detect an association between heavy alcohol use and the secondary outcome of inconsistent condom use in the past year ($P = 0.59$). Based on the multivariable logistic regression model, being currently unmarried was the only variable associated with inconsistent condom use (AOR 4.59, 95% CI 1.20–17.59, $P = 0.03$) (Table 4).

Heavy alcohol use and age played different roles in the analytic models for the male clients. Among the male clients, those with heavy alcohol use reported more unprotected transactional sex encounters over the last 3 months (IRR 2.75 [0.93–8.19], $P = 0.05$), an association that was borderline statistically significant. In addition, being in the youngest tertile (20–29 years) was associated with fewer unprotected sexual encounters over the last 3 months (IRR 0.14 for youngest tertile [20–29 years] vs. oldest tertile [36–49 years], 95% CI 0.02–0.95; IRR 0.04 for middle tertile [30–35 years] vs. oldest tertile [36–49 years], 95% CI 0.003–0.48, $P < 0.001$) (Table 3). For the secondary outcome inconsistent condom use (Table 4), both heavy drinking (AOR 2.40, 95% CI 1.21–4.77, $P = 0.01$) and older age (for youngest tertile [20–29 years] vs. oldest tertile [36–49 years], AOR 0.46, 95% CI 0.19–1.11; for the middle tertile [30–35 years] versus oldest tertile [36–49 years], AOR 0.24, 95% CI 0.11–0.54; $P < 0.01$) were significantly associated with inconsistent condom use.

Discussion

Based on this survey examining key groups in the Indian AIDS epidemic, alcohol use is widespread among HIV-infected men and women involved in transactional sex in this country, and this use is commonly excessive. These findings sharply contrast with societal norms in which alcohol use is relatively uncommon in India as a whole, particularly among women. According to the 2005–2006 National Family Health Survey, which assesses behavioral risks in a nationally representative sample of adults in India, about 2% of women and 32% of men in India drink any alcohol [8]. The current data, however, are consistent with earlier data on the broader population of Indians involved in transactional sex, who have been found to be more likely to drink than the average Indian. The largest study to report such data, the National Behavioral Surveillance Study 2006, interviewed 7417 FSWs and 6613 male clients of FSWs without regard to HIV status and found that 46% of FSWs surveyed across India, and one-

fourth of FSWs surveyed in the state of Maharashtra (which contains Mumbai) drank alcohol, while three-quarters of male clients of FSWs in India and two-thirds of male clients in Maharashtra drank alcohol [2]. That the prevalence of alcohol consumption in the current study of HIV-infected FSWs and their HIV-infected male clients was similar to this national cohort (in which presumably the majority were not infected with HIV) is consistent with research from other countries that has shown that heavy alcohol use is common among those infected with HIV [22–24].

In addition, a high percentage of participants—11% of the women and almost one-third of the men—were alcohol-dependent. About two-thirds of American adults drink alcohol, up to one-third of them at heavy levels, but only 4% have alcohol dependence [25–27].

It appears that despite presumably being in poorer health, no detectable decrease in percentage of persons drinking alcohol is observed among HIV-infected FSWs or their HIV-infected male partner compared to the findings in the FSWs and clients alcohol consumption survey.

For men and women involved in transactional sex, alcohol may play a variety of roles that could explain its common use. In particular, female sex workers working in brothels in Mumbai often offer alcohol to their male clients [Saggurti N.[Personal communication]. 6 Oct 2009] and indeed in this study most of the men who drink and a significant proportion of the women reported doing so in the setting of transactional sex. The logistic regression analysis was performed to help illuminate other factors that may play a role in heavy alcohol use and to reveal possible avenues to pursue in order to mitigate such consumption. Among the women, those who were younger and those who reported greater physical health (represented by higher PCS scores) had a higher odds of heavy drinking. This latter finding may reflect the "sick quitter" phenomenon in which less alcohol use occurs as one becomes too sick to drink, and thus overall those still drinking appear to reflect better health [28].

Although no associations were statistically significant, a notable magnitude of association was observed between lower income and heavy alcohol use among the men. Other studies have found that depression, family history, and personality traits (e.g., antisocial behavior) are related to heavy drinking among women, factors that we did not assess [29–32].

We did not detect an association between heavy drinking and unprotected sex among the FSWs; this finding may have a number of potential explanations. A recent meta-analysis of 27 studies of people with HIV in North America, Africa, Europe, and Russia found there to be a significant association between alcohol consumption (at all levels) and unprotected sex across the examined data sets [5]. However, it is notable that the association in this meta-analysis was strongest in samples of men only. In the Indian population we studied, one explanation for the difference between the men and the women could be that male clients, rather than the sex workers, may more often control the final decision about condom use in sexual encounters, even if, as has been suggested in another study, the FSW may be more likely to propose condom use [33].

If men do control the final decision, condom use may be less likely in situations when men drink heavily and become disinhibited than in situations in which only the women drink. Alternatively, or in addition, it may be that the study's methodology affected its ability to discern a relationship between heavy drinking and unprotected sex among the female sex workers. In particular, it is important to note that this analysis looked *globally* at the relationship between alcohol intake and inconsistent condom use and, given the high proportion of women who did not consistently have safe sex (90%), detecting an association between the two behaviors would thus be difficult. It is possible that event-level questions asking about individual sexual encounters might have allowed detection of an association between the two behaviors. However, similar questions to those in this study have detected associations between

alcohol and unprotected sex in other settings, so the question format alone is unlikely to account entirely for the lack of association among the women [5]. Also of note, this analysis looked only at a self-reported high-risk sexual behavior (i.e., condom use); it is possible that biologic markers such as sexually transmitted infections, might reveal an association between alcohol and risky sex [34].

Beyond the issue of the association between alcohol consumption and increased risk of HIV transmission among HIV-infected men and women involved in transactional sex in Mumbai, it is important to remain vigilant about the fact that high levels of alcohol use have important health implications for HIV-infected persons. Heavy drinking is known to confer high risk for a spectrum of psychological, social, and health problems [27], including adverse HIV-related health behaviors such as poor antiretroviral medication adherence [35,36], and poor attendance at medical appointments [37,38]. Heavy alcohol use among HIV-infected persons has also been associated with increased risk of medical problems including worse depressive symptoms [39] and poorer HIV immunological function (i.e., CD4 cell count decline) [10,11]. Thus, in addition to alcohol's effects on sexual behavior, the heavy alcohol use found so commonly among the drinkers in this study may negatively affect their HIV-related health outcomes, as well as viral suppression and CD4 cell count. Future research could help define these implications in this population and illuminate the potential benefits of an intervention to reduce alcohol use.

Findings from this study demonstrate a need for programs for those involved in sex work that address alcohol consumption and condom use. The findings also suggest that within care systems for HIV-infected Indians, providers should screen for alcohol problems with subsequent brief interventions for risky drinkers and link those with alcohol dependence to alcohol treatment. Venue based interventions (i.e., interventions in alcohol or sex work settings) may also be useful to address risky alcohol behaviors for both FSWs and male clients, regardless of HIV status, but alone these could be inadequate, as the majority of men are likely drinking prior to entry into the venue. Hence, among men, social norm campaigns are needed to encourage condom use even in social situations in which both alcohol use and transactional sex occurs. FSWs, in contrast, may be using alcohol less for social reasons and more as a means of coping with difficult work situations, as noted in other studies [40–42]. Thus, interventions to reduce FSWs' use of alcohol would require approaches that alter the working conditions for this population. Nonetheless, it is unclear if such an approach would additionally impact HIV risk, as current findings revealed no association between alcohol and condom use among FSWs.

There are several limitations to this study. First, as indicated above, it relied on self-reporting of both alcohol and sexual risk behaviors. Under-reporting of stigmatized behaviors, resulting in an underestimate of the prevalence of alcohol use and condom use, could lead to an under-appreciation of an association between heavy drinking and unprotected sex. By using trained interviewers rather than clinical staff, we sought to minimize this phenomenon. Another limitation is that although when possible we used standard research tools and instruments previously used in India, the survey did not exclusively include instruments validated in Hindi. A third limitation is that the study surveyed a group of HIV-infected men and women who were members of an HIV service network. They therefore may have been more organized or felt more responsible for their health than other HIV-infected individuals involved in transactional sex. In addition, these study participants had already received some HIV prevention education and health care services, which may have reduced their risky sexual behavior and potentially the extent of their alcohol use. If these possibilities were at play during the conduct of this study, the result again would be an underestimate, rather than an overestimate, of the alcohol use and risky sexual behavior among this population. It is noteworthy that even if this is a "best case scenario," much remains to be done to address excessive alcohol use and unsafe sex in these individuals who are at high risk for transmitting

HIV infection. A fourth limitation is that the major outcomes for alcohol consumption and condom use had different time-frames. The study used "alcohol consumption over the last week" to define heavy drinking, whereas the two questions about condom use asked about behavior over the last 3 months and last year, respectively. Thus, the analysis of the relationship between heavy drinking and risky sexual practices relies on the assumption that participants' drinking over the last week also reflects the alcohol consumption patterns over the last 3 months and past year. A final limitation, as noted above, is the use of global-level questions about alcohol and sexual practices in the survey; it is possible that more detailed examination of situation-level or event-level behaviors (e.g., of concurrent drinking and unprotected sex) might have revealed a stronger association between alcohol and high-risk sexual behavior.

In summary, the current study makes a novel contribution by providing a detailed characterization of participants' alcohol use, revealing a strikingly high prevalence of heavy drinking among HIV-infected female sex workers and their HIV-infected male clients in Mumbai, India, despite low levels of drinking nationwide. Heavy drinking by these men appears to be associated with lower rates of condom use. These findings raise the possibility that efforts to reduce alcohol use among HIV-infected men who purchase heterosexual sex in India may be an important component of secondary HIV prevention initiatives. In addition, given the known effects of heavy alcohol consumption on HIV-related health outcomes, interventions to reduce drinking among HIV-infected men and women involved in transactional sex may improve the health of this vulnerable group in India.

Acknowledgments

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Table 1

Characteristics of HIV-infected FSWs and HIV-infected male clients in India

	N (%)[a]	
	Female sex workers (n = 211)	**Male clients (n = 205)**
Demographic characteristics		
Age		
Mean (SD)	31 (5)	33 (6)
Religion		
Hindu	164 (78)	157 (77)
Muslim	25 (12)	19 (9)
Other	22 (10)	29 (14)
Currently married	20 (9)	76 (37)
Ever had children	83 (39)	100 (49)
Any formal schooling	46 (22)	182 (89)
Caste		
Scheduled caste	29 (14)	57 (28)
Scheduled tribe	24 (11)	24 (12)
Other backward caste	103 (49)	53 (26)
None	55 (26)	71 (34)
Monthly income (rupees/month)		
Median (range)	3000 (300–10000)	4500 (1500– 20000)
Last CD4 count[b]		
Mean (SD)	384 (273)	294 (161)
Currently on antiretroviral medications	15 (7)	97 (47)
Mental health score[c]		
Mean (SD)	35 (6.8)	47 (5.9)
Physical health score[c]		
Mean (SD)	40 (5)	37 (3.4)
Alcohol use		
Any alcohol use in last 30 days[d]	80 (38)	127 (62)
Heavy alcohol use[e]	67 (32)	90 (44)
Alcohol dependence[f]	23 (11)	59 (29)
Drank before transactional sex encounters in last year		
Always/Usually	36 (17)	81 (40)
Sometimes/Rarely	52 (25)	56 (27)
Never	122 (58)	67 (33)
Sexual behavior		
No sexual encounters, past 3 months	3 (1.4%)	6 (2.9%)
Did not always use condoms in transactional sex encounters in last year	189 (90)	53 (26)
Number of unprotected transactional sex encounters in last 3 months		

	N (%)[a]	
	Female sex workers **(n = 211)**	**Male clients** **(n = 205)**
Median (range)	0 (0–258)	0 (0–8)
Mean	14.9	0.14

[a] Except where means and medians are given, as noted

[b] Of 171 female and 190 male participants who knew their CD4 count

[c] Represent the MCS and PCS, respectively, from the SF-12 v2. Score range is 0–100; 50 is the mean score for both, with 0–49 below average and 51–100 above average

[d] The number who said they had had any alcohol in the last 30 days

[e] Participants were asked how much they drank in each of the last 7 days. Hazardous drinking is defined as >3 drinks in a day or >7 drinks/week for women and >4 drinks in a day or >14 drinks/week for men

[f] Based on the CIDI-SF, which asks about drinking and behaviors over the last year

Table 2

Characteristics associated with heavy alcohol use among HIV-infected FSWs and HIV-infected male clients in multivariable analyses

Characteristic	Female sex workers		Male clients	
	Adjusted odds ratio (95% CI)	*P* value	Adjusted odds ratio (95% CI)	*P* value
Age				
Youngest tertile[a]	4.69 (2.14–10.30)	<0.01	0.56 (0.27–1.17)	0.29
Middle tertile	1.62 (0.72–3.64)		0.82 (0.42–1.60)	
Oldest tertile	Referent		Referent	
Income				
<median number of rupees/month	N/A[b]	N/A	1.68 (0.95–2.98)	0.07
>/=median rupee/month	N/A		Referent	
Education				
No formal education	1.91 (0.85–4.26)	0.12	N/A	N/A
Formal education	Referent		N/A	
Physical health score				
Highest tertile[c]	2.43 (1.09–5.45)	0.04	N/A	N/A
Middle tertile	2.53 (1.14–5.60)		N/A	
Lowest tertile	Referent		N/A	

[a] Age tertiles (in years) for women: 22–28, 29–31, and 32–50; for men: 20–29, 30–35, and 36–49

[b] Items marked "N/A" did not meet criteria for inclusion into the multivariate model (see "Methods")

[c] Physical health score tertiles for women: 24.2–38.4, 38.5–42.5, and 42.6–54.0

Table 3

Characteristics associated with the number of unprotected transactional sex acts in the last 90 days among HIV-infected

Characteristic	Female sex workers		Male clients	
	Adjusted IRR[a] (95% CI)	P value	Adjusted IRR[a] (95% CI)	P value
Heavy alcohol use in last 7 days	0.83 (0.44–1.59)	0.58	2.75 (0.93–8.19)	0.05
Age				
Youngest tertile[b]	2.94 (1.37–6.37)	0.01	0.14 (0.02–0.95)	<.001
Middle tertile	1.43 (0.61–3.34)		0.04 (.003–0.48)	
Oldest tertile	Referent		Referent	
Income				
<median rupee/month	1.28 (0.67–2.42)	0.33	1.72 (0.63–4.68)	0.28
>/= median rupee/month	Referent		Referent	
Education				
No formal education	0.93 (0.47–1.83)	0.83	1.15 (0.24–5.56)	0.87
Formal education	Referent		Referent	
Marital status				
Currently unmarried	0.92 (0.34–2.50)	0.87	0.40 (0.13–1.20)	0.08
Currently married	Referent		Referent	
Religion				
Muslim and other	1.71 (0.89–3.26)	0.12	0.89 (0.22–3.60)	0.86
Hindu	Referent		Referent	

[a] IRR indicates incident rate ratio for number of unsafe paid sexual acts over last 90 days from multivariable Poisson regression model

[b] Age tertiles for women: 22–28, 29–31, and 32–50 years; tertiles for men: 20–29, 30–35, and 36–49

Table 4

Characteristics associated with the outcome of inconsistent condom use over the last year among HIV-infected

Characteristic	Female sex workers		Male clients	
	Adjusted odds ratio (95% CI)	***P* value**	**Adjusted odds ratio (95% CI)**	***P* value**
Heavy alcohol use in last 7 days	0.75 (0.26–2.19)	0.59	2.40 (1.21–4.77)	0.01
Age				
Youngest tertile[a]	2.27 (0.69–7.51)	0.17	0.46 (0.19–1.11)	0.003
Middle tertile	2.97 (0.85–10.41)		0.24 (0.11–0.54)	
Oldest tertile	Referent		Referent	
Income				
<median rupee/month	0.35 (0.10–1.17)	0.09	0.76 (0.38–1.51)	0.43
>/= median rupee/month	Referent		Referent	
Education				
No formal education	1.82 (0.57–5.82)	0.31	2.17 (0.81–5.79)	0.12
Formal education	Referent		Referent	
Marital status				
Currently unmarried	4.59 (1.20–17.59)	0.03	0.77 (0.36–1.65)	0.50
Currently married	Referent		Referent	
Religion				
Muslim and others	0.96 (0.31–2.99)	0.94	0.55 (0.22–1.34)	0.19
Hindu	Referent		Referent	

[a] Age tertiles for women: 22–28, 29–31, and 32–50 years; tertiles for men: 20–29, 30–35, and 36–49