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# Prevalence and Correlates of Hazardous Drinking among Female Sex Workers in 13 Mexican Cities

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## Abstract

**Aims:** To describe the prevalence and correlates of hazardous drinking among female sex workers (FSWs) at 13 sites throughout Mexico.

**Methods:** FSWs ( $N = 1089$ ) who were enrolled in a brief sexual risk reduction intervention (*Mujer Segura*) were queried about their sexual risk and substance use practices and their work contexts. Participants were classified as hazardous or non-hazardous drinkers based on the Alcohol Use Disorders test (AUDIT-C). Logistic regression models were used to examine individual, contextual, and community-level factors as correlates of hazardous drinking.

**Results:** Ninety-two percent of participants reported alcohol consumption in the past month. Among drinkers ( $N = 1001$ ), 83% met AUDIT-C criteria for hazardous drinking. Factors that were independently associated with hazardous drinking included: drug use in the past month (adjusted odds ratio (AOR) = 3.31; 95% CI 1.29–8.45), being a cigarette smoker (AOR = 1.71; 95% CI 1.13–2.58), being a barmaid or dance hostess (AOR = 3.40; 95% CI 1.95–5.91), alcohol use before or during sex with clients (AOR = 7.78; 95% CI 4.84–12.52), and working in a city with a higher marginalization index (AOR = 1.07; 95% CI 1.04–1.11).

**Conclusions:** Findings support the high prioritization by public health authorities of alcohol prevention and treatment programs for FSWs.

## INTRODUCTION

Compared to the general population, female sex workers (FSWs) in Mexico have an elevated HIV prevalence, which has been estimated at 6% in cities along the USA–Mexico border (Patterson *et al.*, 2008b). Studies with vulnerable populations in both developed and lower- to middle-income countries (LMIC) like Mexico have documented a link between alcohol consumption and HIV risk behaviors (Hendershot and George, 2007; Kalichman *et al.*, 2007, 2008; Stein *et al.*, 2009; Lambert *et al.*, 2011; Hess *et al.*, 2015), including among women who engage in transactional sex (Pitpitan *et al.*, 2014).

High rates of alcohol use among FSWs have been reported in LMIC around the globe (e.g. Surratt, 2007; Verma *et al.*, 2010;

Witte *et al.*, 2010; Chen *et al.*, 2013; Odukoya *et al.*, 2013; Alexander *et al.*, 2014; Chersich *et al.*, 2014; Fernandes *et al.*, 2014). Worldwide, alcohol use among FSWs is significantly higher than in the general population (Samet *et al.*, 2010; Odukoya *et al.*, 2013). In several studies, 85% or more of FSWs reported using alcohol (Fernandes *et al.*, 2014) or met criteria for harmful or hazardous drinking (Witte *et al.*, 2010). A range of adverse health and social outcomes associated with drinking have also been documented in this population.

Studies in several countries have linked alcohol use by FSWs to higher levels of unprotected sex, including China (Chen *et al.*, 2013), Kenya (Chersich *et al.*, 2014) and India (Verma *et al.*, 2010). However, the association of general alcohol consumption with

condom use has been inconsistent (Li *et al.*, 2010). The association of condom non-use with alcohol use appears to be more consistent in sexual contexts, most likely because in such contexts the alcohol use is closer in time to the FSW's deliberations about whether to use a condom (Kalichman *et al.*, 2007). FSWs often use alcohol before and during sex with clients (Heravian *et al.*, 2012; Saggurti *et al.*, 2012; Urada *et al.*, 2012; Chen *et al.*, 2013). In one study, more than half of FSWs and their clients used alcohol in the context of their sexual encounters (Verma *et al.*, 2010).

Besides potentially less condom use, other adverse outcomes associated with alcohol use among FSWs include higher incidence of HIV and STIs (Yadav *et al.*, 2005; Chiao *et al.*, 2006; Chersich *et al.*, 2007), greater likelihood of exposure to sexual and physical violence (Chersich *et al.*, 2007, 2014; Li *et al.*, 2010; Go *et al.*, 2011; Heravian *et al.*, 2012), illicit drug use (Chiao *et al.*, 2006; Surratt, 2007; Medhi *et al.*, 2012), heavy tobacco use (Odukoya *et al.*, 2013), and mental health problems (Hong *et al.*, 2007).

Recent research on factors associated with alcohol use among FSWs has focused primarily on individual-level characteristics (e.g. age, education), with less attention paid to the work context and to conditions and practices in the broader community. However, in studies with non-FSW populations, both work context and community-level factors have yielded associations with heavy drinking and hazardous alcohol use (Scribner *et al.*, 2008; Inder *et al.*, 2012; Kuipers *et al.*, 2012, 2013; Kissinger *et al.*, 2013). Moreover, our work with male clients of Mexican FSWs (Pitpitan *et al.*, 2013b) revealed that the context in which sex occurs is key to understanding the relationship between client intoxication and HIV risk behaviors.

Like their counterparts in other LMIC, FSWs in Mexico solicit clients in a variety of settings, including bars, entertainment venues and massage parlors (Larios *et al.*, 2009; Pitpitan *et al.*, 2013a). The relationships that FSWs have with their clients also vary in kind, with some FSWs devoting most of their time to regular clients and friends, while others focus on one-time clients or other client types (Robertson *et al.*, 2014). Also highly variable is FSWs' relative freedom to determine their working conditions, with some working independently and others answering to a pimp or manager (Bucardo *et al.*, 2004).

On the community level, policing practices (e.g. arresting FSWs for having 'track marks') have been linked to HIV infection among injection drug users (Strathdee *et al.*, 2008). Another community-level factor is 'marginalization,' a term that encompasses an area's overall level of social, structural, and economic development and opportunity. Residents of communities that have fewer resources and a lower index of development may drink more (Ortiz-Hernandez *et al.*, 2007), perhaps as a way to cope with the stress of poverty.

This study aims to describe the prevalence and correlates of hazardous drinking among FSWs in 13 cities located throughout Mexico. We explored individual-level factors (i.e. demographics, sexual risk behaviors and non-consensual sex, general health behaviors), work-related contextual factors (e.g. FSW has a pimp), and community-level variables that are relevant to commercial sex work (e.g. policing practices).

## METHODS

### Participants and setting

Participants were 1089 female sex workers recruited from 13 cities in diverse locations throughout Mexico for a randomized controlled trial of a brief, single-session intervention designed to reduce sexual risk behaviors (Patterson *et al.*, 2012). To be eligible for the study, a woman had to be biologically female, at least 18 years of age,

self-identify as a female sex worker, report having traded sex for drugs, money, shelter, or other material benefit in the previous 2 months, have had unprotected vaginal or anal sex with a client at least once during the previous 2 months, have no previous HIV-positive test result, and agree to be tested for HIV and STIs at baseline and 6-month follow-up. Our primary analysis compared hazardous and non-hazardous drinkers using baseline data from a subsample of 1001 FSWs who reported drinking alcohol in the past month; data from the 88 participants who reported no alcohol consumption in the past month were excluded. The baseline data were collected between June 2011 and December 2013.

### Recruitment

Time-location sampling was used to recruit an average of 84 participants at each study site (range = 71–87). This sampling technique has demonstrated effectiveness in recruiting difficult-to-reach populations (Pawa *et al.*, 2013; Yadav *et al.*, 2014; Pitpitan *et al.*, 2015), including FSWs and FSW-IDUs in Tijuana and Ciudad Juarez (Patterson *et al.*, 2008a; Strathdee *et al.*, 2013). Outreach workers at each site compiled a map of bars, brothels, hotels and motels, shooting galleries, alleys, and street corners, and they subsequently canvassed those venues to locate prospective participants. Interested women were referred to a local clinic operated by the Mexican Foundation for Family Planning (Mexfam) where they completed a screening interview. Women who were eligible were scheduled for a 2-h baseline visit, which included the consent procedure, a face-to-face interview, and a 30-min counseling session on reducing sexual transmission risk of HIV and STIs (either the theory-based *Mujer Segura* protocol or a time-equivalent, standard comparison condition) (Patterson *et al.*, 2012). All procedures and measures were approved by ethical review boards at the University of California, San Diego and Mexfam. FSWs were reimbursed the equivalent of \$30 USD for their baseline interview.

### Procedure

The baseline interview, which was used with over 1000 Mexican FSWs in our previous studies, was conducted in Spanish and took 30 min to complete. Interviews were conducted by trained outreach workers using computer-assisted personal interviewing (CAPI, NOVA software, MD, USA).

### Measures

#### AUDIT-C

This 3-item screening instrument, which is an abbreviation of the full (10-item) AUDIT but performs equally well (Kaarne *et al.*, 2010), reliably identifies patients who are hazardous drinkers or at risk of becoming one (Bush *et al.*, 1998; Bradley *et al.*, 2003). The items query frequency of drinking, typical number of drinks per session, and frequency of excessive drinking (defined as six or more drinks on one occasion). Summary scores range from 0 to 12. Validation studies suggest that, for women, a score of 3 or more identifies risky or hazardous drinking (Bush *et al.*, 1998; Bradley *et al.*, 2003, 2007). AUDIT-C scores were used to create a dichotomized variable (hazardous vs. non-hazardous drinking), which was treated as the dependent variable in these analyses.

### Individual-level factors

#### Demographics

Age, number of years of education, number of years employed as a sex worker, and number of financial dependents were entered into the

analyses as continuous variables. Marital status (married or common law vs. other status) and whether FSWs had children were treated as dichotomous variables.

#### Sexual risk behaviors and non-consensual sex

(a) With reference to their commercial sex transactions, FSWs were asked to report how many times during the past month they had engaged in vaginal and anal sex and how many times they had used a condom for each type of act. The number of condom uses was subtracted from the number of acts to create a summary variable for unprotected sex. (b) Participants were asked to report how many male clients (regular and non-regular) they had during the past month. (c) Participants were distinguished into groups based on whether they reported both regular and non-regular clients (reference group) or only one of the two types of client (either regular or non-regular). (d) Participants were asked whether they had been forced or coerced into having sex with a client in the past year.

#### General health behaviors

(a) Participants were asked to report how often, on a six-point scale (never to every day), they had used each of 13 different drugs in the past month (e.g. marijuana, cocaine, crack, ecstasy, methamphetamine, heroin). The response for each drug was dichotomized (used vs. did not use). (b) FSWs were asked how often they smoked cigarettes in the past month. A dichotomous variable was created to identify cigarette smokers. (c) Participants were asked whether they had ever been tested for HIV/AIDS.

#### Contextual-level factors

##### Type of sex worker

Participants were asked which term from a list of nine types of sex worker (street worker, dance hostess, etc.) best described their work situation. For the analyses, type of sex worker was dichotomized based on whether the FSW worked in an alcohol-serving establishment.

##### Use of alcohol or drugs before or during sex

Participants were asked how often in the past month they had used alcohol or drugs before or during sex with a client. Response categories were recoded to create a dichotomous variable for each (did use vs. did not use).

##### Presence of a pimp

Participants were asked how much money they earned for each of a number of different sex acts and how much of that money went to someone else. In each case, the relationship of that person to the FSW was queried. The categories included 'pimp.' A dichotomous variable was created (FSW has vs. does not have a pimp).

#### Community-level factors

##### Marginalization index

This figure is calculated by Mexico's National Council of Population (CONAPO, 2010) for each municipality. It consolidates nine socioeconomic indicators: percentage of population over age 15 that is illiterate; percentage over age 15 that lacks an elementary school education; percentage living without a toilet, electricity, or access to water; overcrowding; and household income lower than that of two minimum wage earners. CONAPO uses the index to determine where basic public services are lacking and conditions of poverty prevail. The higher the marginalization index, the greater an area's degree

of disadvantage. Based on CONAPO's most recent assessment (CONAPO, 2010), we assigned a marginalization score to each of the 13 different cities from which FSWs were recruited for this study.

#### Policing practices

Participants were asked how many times they had been arrested for prostitution in the community where they had been recruited for the study. The number of prostitution arrests was recoded as a dichotomous variable (ever arrested = 1, never arrested = 0).

#### Data analyses

FSWs who reported any alcohol consumption in the past month and who had a score on the AUDIT-C greater than or equal to 3 were classified as hazardous drinkers. We first examined variance in hazardous drinking to determine the extent to which the nested design of the study affected independence of the data. After determining that the assumption of independence was not violated, we examined individual-level traits and behaviors (i.e. demographics, sexual risk behaviors and non-consensual sex, general health behaviors) as well as contextual (work-related) and community-level factors among hazardous and non-hazardous drinkers using univariate regression analyses. We then conducted a multivariate logistic regression to identify factors that were uniquely associated with hazardous drinking. Variables that were independently associated with hazardous drinking in bivariate analyses ( $P < 0.05$ ) were included in the multivariate logistic regression model. Two variables with skewed distributions (total unprotected vaginal and anal sex acts, total number of clients) were log 10 transformed. Data were analyzed using SPSS Statistics Version 22.0.

## RESULTS

### Sample characteristics

Ninety-two percent of FSWs reported alcohol consumption in the past month. The prevalence of hazardous drinking in the full sample of FSWs ( $N = 1089$ ) was 76.7%. Among the subsample of FSWs who consumed alcohol in the past month ( $N = 1001$ ), 83.4% ( $N = 835$ ) met AUDIT-C criteria for hazardous drinking. The average AUDIT score was 8.8 (SD = 3.2) for hazardous and 1.1 (SD = 0.85) for non-hazardous drinkers. We computed the intraclass correlation (ICC) in hazardous drinking across the 13 cities. We found an ICC of 0.20, suggesting that a relatively low amount of variance is attributable to city and that, therefore, the assumption of independence was not violated.

The first two data columns of Table 1 show the characteristics of the study sample in terms of demographics, sexual risk behaviors and non-consensual sex, general health behaviors, contextual (work-related) factors, and community factors. A comparison of the FSWs who were included in the regression analyses with the non-drinking FSWs who were excluded ( $N = 88$ ) revealed only one significant demographic difference: the FSWs who were excluded reported fewer financial dependents compared to their alcohol-consuming counterparts (2.2 vs. 2.7,  $t = 2.5$ ,  $P = .012$ ).

### Univariate logistic regressions

A further column of Table 1 shows the results of univariate logistic regressions that examined associations between the dependent variable (hazardous drinking) and independent variables.

### Individual-level factors

Compared to FSWs in the non-hazardous drinking group, FSWs who met AUDIT-C criteria for hazardous drinking had a lower odds of

**Table 1.** Individual, contextual and community factors by hazardous vs. non-hazardous drinking among FSWs in 13 Mexican cities (N = 1001)

	No hazardous drinking <sup>a</sup> (N = 166)	Hazardous drinking <sup>a</sup> (N = 835)	OR (95% CI)	P
<b>Demographics</b>				
Age (mean, SD)	35.7 (10.4)	32.3 (9.1)	0.96 (0.95, 0.98)	<0.001
Years of education (mean, SD)	6.6 (3.9)	7.1 (3.2)	1.05 (1.01, 1.11)	<0.05
Married or common-law (N, %)	55 (33.1%)	214 (25.6%)	0.70 (0.49–0.99)	<0.05
Have children (N, %)	156 (94.0%)	729 (87.3%)	0.44 (0.23, 0.86)	<0.05
Number of financial dependents (mean, SD)	2.7 (1.6)	2.7 (1.8)	1.02 (0.93, 1.13)	
Number of years employed as a FSW (mean, SD)	6.9 (7.8)	6.1(6.3)	0.98 (0.96, 1.01)	
<b>Sexual risk behaviors and non-consensual sex</b>				
Regular clients only <sup>a</sup> (N, %)	7 (4.3%)	45 (5.6%)	1.34 (0.59, 3.03)	
Non-regular clients only <sup>a</sup> (N, %)	2 (1.3%)	37 (4.7%)	3.86 (0.92, 16.2)	
Total number of clients <sup>a</sup> (N, %)	57.7 (65.2)	39.7 (51.5)	0.52 (0.37, 0.74)	<0.001
Total number of unprotected vaginal and anal sex acts with clients <sup>a</sup> (N, %)	16.9 (27.4)	15.7 (20.0)	1.04 (0.73, 1.49)	
Forced to have sex with client in past year (N, %)	27 (16.3%)	118 (14.1%)	0.85 (0.54, 1.34)	
<b>General health behaviors</b>				
Used drugs <sup>b</sup> in the past month (N, %)	7 (4.2%)	99 (11.9%)	3.06 (1.39, 6.70)	<0.01
Cigarette smoker (N, %)	78 (47.0%)	522 (62.5%)	1.88 (1.34, 2.63)	<0.001
Ever been tested for HIV/AIDS (N, %)	113 (68.1%)	568 (68.0%)	0.99 (0.70, 1.43)	
<b>Contextual factors</b>				
Bar worker or dance hostess (N, %)	21 (12.7%)	482 (57.7%)	9.43 (5.85, 15.20)	<0.001
Has a pimp or manager	28 (16.9%)	111 (13.3%)	0.76 (0.48, 1.19)	
Used alcohol before or during sex with client(s) <sup>a</sup> (N, %)	29 (17.5%)	632 (75.7%)	14.71 (9.56–22.63)	<0.001
Used drugs <sup>b</sup> before or during sex with client(s) <sup>a</sup> (N, %)	5 (3.0%)	68 (8.2%)	2.86 (1.14, 7.21)	<0.05
<b>Community factors</b>				
Marginalization index for study site (mean, SD) <sup>c</sup>	10.5 (6.7)	16.5 (8.0)	1.13 (1.10, 1.17)	<0.001
Ever arrested by police (N, %)	39 (23.5%)	176 (21.1%)	0.87 (0.59, 1.29)	

OR, odds ratio; CI, confidence interval.

<sup>a</sup>Refers to the last month.

<sup>b</sup>Mexico's drug policy reform does not consider drug use illegal unless the amount possessed is above a certain threshold.

<sup>c</sup>This association was tested to account for clustering using generalized estimating equations, and the results did not differ.

being older, of being married or in a common-law relationship, and of having children, along with a greater odds of having more years of education. Hazardous drinking was associated with a lower odds of having a large number of clients in the past month. FSWs who met AUDIT-C criteria for hazardous drinking also had a greater odds of having used drugs in the past month and of being a cigarette smoker.

#### Contextual-level factors

Hazardous drinkers had a greater odds of self-identifying as a bar maid or dance hostess (vs. working in a different type of venue), of having used alcohol before or during sex with clients in the past month, and of having used drugs with clients during this time frame.

#### Community-level factors

FSWs in the hazardous drinking group had a greater odds of conducting sex work in a location with a higher marginalization index compared to FSWs in the non-hazardous drinking group. No other variables at this level were significantly associated with hazardous drinking.

#### Factors independently associated with hazardous drinking

In a multivariate model, five factors were independently associated with hazardous drinking among the women in our sample. As shown in Table 2, participants who used drugs in the past month

had over three times the odds of engaging in hazardous drinking, and cigarette smokers had almost twice the odds of hazardous drinking. FSWs who worked as barmaids or dance hostesses had almost three-and-one-half times the odds of meeting criteria for hazardous drinking compared to FSWs who self-identified as another type of sex worker. FSWs who used alcohol before or during sex with clients had almost eight times the odds of being in the hazardous drinking group compared to those who did not drink alcohol before or during sex with their clients. Hazardous drinking among FSWs was also associated with higher scores on Mexico's index of marginalization. For every unit increase in the marginalization index of the FSW's municipality of residence, the odds of engaging in hazardous drinking increased by 7%.

## DISCUSSION

FSWs in this study, like their counterparts in other LMIC (e.g. Surratt, 2007; Verma *et al.*, 2010; Odukoya *et al.*, 2013; Alexander *et al.*, 2014; Chersich *et al.*, 2014; Fernandes *et al.*, 2014), had a high prevalence of alcohol use. Ninety-two percent of the FSWs in our sample reported alcohol consumption in the past month, and an alarming 83% of the drinkers met AUDIT-C criteria for hazardous drinking. These findings suggest that interventions targeting alcohol use among FSWs in Mexico are urgently needed. Although hazardous drinking in general showed no association with rates of FSWs'

**Table 2.** Multivariate logistic regression model examining correlates of hazardous drinking<sup>a</sup> among FSWs in 13 Mexican cities (N= 1001)

Model	AOR (95% CI)	P
Age (years)	0.99 (0.97, 1.02)	
Education (years)	1.04 (0.98, 1.11)	
Marital status (married/cohabiting vs. other)	0.93 (0.60, 1.43)	
Have at least one child	0.55 (0.25, 1.21)	
Used drugs <sup>b</sup>	3.31 (1.29, 8.45)	<0.01
Smoke cigarettes	1.71 (1.13, 2.58)	<0.01
Number of clients <sup>b</sup>	1.03 (0.66, 1.59)	
Type of sex worker (bar worker vs. other)	3.40 (1.95, 5.91)	<0.001
Used alcohol before or during sex with clients <sup>b</sup>	7.78 (4.84, 12.52)	<0.001
Used drugs before or during sex with clients <sup>b</sup>	0.69 (0.23, 2.10)	
Marginalization index	1.07 (1.04, 1.11)	<0.001

Hazardous drinking: 1 = yes, no = 0. AOR, adjusted odds ratio; CI, confidence interval.

<sup>a</sup>Audit-C score greater than or equal to 3.

<sup>b</sup>In the past month.

condom use with clients, alcohol use in sexual contexts was so associated. This finding is consistent with results from our study of male clients of FSWs in Tijuana (Pitpitan *et al.*, 2013b; Goodman-Meza *et al.*, 2014), in that it highlights the importance of examining context-specific alcohol consumption in relation to high-risk unprotected sex. Overall, our findings support an increased emphasis upon programs for alcohol prevention and treatment among FSWs.

Our findings also indicate that it is important that harm-reduction interventions for alcohol be multi-level (Chersich *et al.*, 2014). We found that hazardous drinking among FSWs in Mexico is influenced by a combination of individual-, contextual- and community-level factors, all of which should be taken into account when developing interventions for FSWs. At the individual level, we found an association between hazardous drinking and general negative health behaviors, including the use of drugs and cigarette smoking. This suggests that health consciousness among Mexican FSWs may be low and that holistic intervention approaches are needed to address multiple risky health habits simultaneously (Allamani *et al.*, 2011). Prevention programs for high-risk drinking should take into account these other health habits, which are known contributors to lifestyle diseases (Gracey and King, 2009).

At the contextual level, we found hazardous alcohol consumption to be associated with type of sex worker and with use of alcohol before or during sex with clients. The strong association between hazardous drinking and type of sex worker (employment in venues where alcohol is served) suggests that interventions directed at alcohol-serving establishments could be useful. Kalichman *et al.* (2007) advocated the implementation of HIV prevention interventions in alcohol-serving establishments as a form of structural intervention. Interventions that integrate brief alcohol prevention counseling with HIV prevention messages could reach large numbers of FSWs who work in these venues. Such interventions may also be more acceptable to alcohol-serving businesses than alcohol prevention counseling alone. Educating owners about the benefits of such programs and obtaining their support and approval remains a challenge for researchers.

Another potentially fruitful point of intervention on the contextual level is FSWs' alcohol use during sexual encounters with their clients. The *Mujer Segura* intervention did not specifically target alcohol use;

however, counselors addressed alcohol use if the participant identified it as a barrier to her use of condoms with clients. Counselors applied motivational interviewing (Miller and Rollnick, 1991) to elicit the participant's reasons for drinking with her clients and to increase her insight into how alcohol use affected her personal values and behavior, with the goal of increasing her motivation and willingness to reduce or stop using alcohol with clients. Social cognitive strategies (Bandura, 1986) were also used to increase the FSW's knowledge, self-efficacy, and positive outcome expectancies in relation to changing alcohol use behaviors with clients and negotiating condom use in the context of alcohol use. Cognitive behavioral therapy strategies (e.g. leaving high risk situations, delaying the decision to drink) were also offered for avoiding alcohol consumption or overconsumption with clients (Beck *et al.*, 1979). Other studies have suggested that workplace-based policies of promoting 'ladies' drinks' (which are lower in alcohol) may be effective in reducing alcohol consumption and related risk behaviors among FSWs (Urada *et al.*, 2012, 2013). Another approach that has been found effective in other risk groups and may be useful for FSWs is the promotion of strategies for self-management of alcohol cravings (e.g. Bowen *et al.*, 2014).

FSWs who resided in Mexican cities with higher marginalization index scores had a greater odds of engaging in hazardous drinking. This finding is consistent with the situation described by the World Health Organization's framework of social determinants of health (World Health Organization, 2012). Research on the social determinants of substance abuse have linked a number of factors (low socioeconomic status, low income, low educational attainment, prevailing poverty, and social exclusion or discrimination) to increased vulnerability to substance abuse (Galea and Vlahov, 2002; Galea *et al.*, 2004). Although Mexico has experienced overall economic growth over the past 20 years (Trading Economics, 2014), the benefits are unequally distributed. Underprivileged and stigmatized groups such as FSWs are often at the highest risk for hazardous drinking, particularly in developing countries where alcohol consumption levels are increasing (World Health Organization (WHO), 2004). High rates of hazardous drinking are of major concern to governments because of the associated social, financial, and health burdens (Poznyak *et al.*, 2005). Addressing the social determinants of hazardous drinking among FSWs in Mexico will require multiple strategies, which may include some or all of the following: providing effective alcohol prevention and treatment programs, examining the role of alcohol availability, assessing extant alcohol policies, reducing stigma, and increasing opportunities for education and employment (Poznyak *et al.*, 2005).

This study has a number of limitations. (a) The FSWs in our sample were volunteers in a sexual risk reduction intervention and thus may not be representative of the overall population of FSWs in Mexico. (b) Our findings are based on cross-sectional data, which provide no basis for inferring causal relationships. (c) The findings are limited by the retrospective and self-report nature of the behavioral data. In particular, both alcohol use and behaviors that occur in the context of alcohol use are subject to inaccurate recall and reporting biases. (d) We did not use event-level analysis, which is desirable in studies of alcohol use and behavior. (e) Our baseline survey was brief, and as a consequence, a limited number of contextual and community-level factors were examined. Future studies should examine a wide range of individual, contextual, and community-level factors as correlates of hazardous drinking among FSWs in Mexico and other LMIC. In addition, the potential risks associated with hazardous drinking (e.g. STIs, HIV infection) should be examined prospectively.

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## CONFLICT OF INTEREST STATEMENT

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