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Venue-level correlates of female sex worker registration status: A multilevel analysis of bars in Tijuana, Mexico

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Abstract

In Tijuana, Mexico, sex work is regulated by the municipal government, through registration cards issued to female sex workers (FSWs) for an annual fee. Registration has been associated with decreased drug use and increase condom use and HIV testing. Previously, it was demonstrated that FSWs operating in bars were more likely than street-based FSWs to be registered. This implies that certain venues may be more accessible to local authorities for the enforcement of this type of programme. Taking a novel multilevel approach, we examined whether venue characteristics of bars reflecting greater organised management and visibility affect registration status of FSWs. In an analysis of venue-level characteristics, predictors of being registered were availability of free condoms at work and distance to the main sex strip; however, these were not independently associated after inclusion of FSWs' income, illicit drug use and history of HIV testing. Our findings suggest that sex work regulations may inadvertently exclude venues in which the more vulnerable and less visible FSWs, such as injection drug users and those with limited financial resources, are situated. Efforts to revise or reconsider sex work regulations to ensure that they best promote FSWs' health, human and labour rights are recommended.

Keywords

sex work; venue; multilevel analysis; sex work regulation; registration

Introduction

The risk of female sex workers (FSWs) acquiring and transmitting HIV and sexually transmitted infections (STIs) is of particular concern along the Mexico–US border. In 2006,

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the most common STIs among FSWs in the northern Mexico border cities of Tijuana and Ciudad Juarez were gonorrhoea (6.2%), chlamydia (13%) and syphilis (14.2% with titers 1:8) (Patterson *et al.* 2008b). Both cities are located along major drug trafficking routes into the USA and over the past 10 years illicit drug use, especially injection drug use, has increased within these areas (Bucardo *et al.* 2005). Among FSWs who injected drugs, STI prevalence tends to be much higher, with 15.2% having gonorrhoea, 21.2% chlamydia and 22.7% syphilis titers 1:8 (Strathdee *et al.* 2008b). Furthermore, HIV prevalence in northern border cities has risen over the last decade from <1% to 6% where HIV-positive FSWs were more likely than HIV-negative FSWs to have injected drugs, have had male clients that injected drugs and have used drugs before or during sex (Patterson *et al.* 2008b, Strathdee *et al.* 2011).

In Mexican border cities, sex work is quasi-legal in zones of tolerance collectively described as the *Zona Roja*. An estimated 9000 FSWs work in Tijuana, where sex work is regulated by the Municipal Health Department (MHD) through work permits. The annual cost of registration, which includes mandated periodic testing for HIV and STIs, is US\$360 (Bucardo *et al.* 2004, Sirotnin *et al.* 2010a). Women with positive STI tests are treated with antibiotics according to federal STI guidelines. FSWs who test positive for HIV have their permits revoked and are referred to specialty care (Sirotnin *et al.* 2010b). Although no formal law exists on permit enforcement (Congreso de la Union 2012), unregistered FSWs often face harassment and extortion by local authorities (Beletsky *et al.* 2012). Despite controversy surrounding the potential negative impacts of regulatory policies (Goodyear and Cusick 2007, Jeffreys *et al.* 2010, Richter *et al.* 2010, Gertler and Shaw 2011), previous studies by our group found that registration is associated with behaviours that can be protective against HIV/STIs. In Tijuana, registered FSWs are less likely to engage in illicit drug use, more likely to have a previous HIV test, and more likely to use condoms (Sirotnin *et al.* 2010a, 2010b). However, these relationships may reflect a bias in both self-selection and venue-affiliated selection of FSW into the registration system.

Regulating sex work has been the focus of several public health efforts to minimise HIV/STI transmission among FSWs (Steen and Dallabetta 2003). These approaches have emphasised alteration of working conditions through community-based campaigns such as 100% condom use, STI screening and AIDS awareness educational policies (Rojanapithayakom and Hanenberg 1996, Morisky *et al.* 2002, Kerrigan *et al.* 2003, 2006). However, in Tijuana, sex work regulation is problematic for two reasons: first, through a fee-based permit system, registration may become biased towards venues on the upper-end of the sex market, leaving hard-to-reach populations, such as FSWs in less visible venues and those who are unable to afford the costs of permits, without access to services; second, despite the potential health benefits, sex work regulations in Mexico have been critiqued as punitive and undermining sex workers' rights since these regulations effectively position FSWs as public health risks (Cuadra *et al.* 2002, Dreser *et al.* 2002, Bucardo *et al.* 2004, Rosete *et al.* 2004) rather than promoting their labour and safety rights (Overs and Hawkins 2011).

The workplace environment has also been an important contributor towards FSWs' health. Characteristics of sex work establishments, including venue size and type, have been associated with supportive workplace policies for HIV prevention (Withers *et al.* 2007). We previously found that venues located in the spatial core of the *Zona Roja* had a greater density of STIs but also a greater concentration of FSWs compared to venues in the outer edge (Rusch *et al.* 2010). In addition, sex work venue was a correlate of registration status, with more than twice as many registered FSWs working in bars or cantinas compared to those working on the street (Sirotnin *et al.* 2010b). This suggests that registration may not be uniformly monitored in the *Zona Roja* and highlights the need for multifaceted prevention

efforts targeting the more vulnerable and less visible FSWs, such as illicit drug users and economically disadvantaged women.

Accordingly, the purpose of this study is to provide greater insight on the context of FSWs' working environments by examining venue-level factors that are associated with registration status. We hypothesised that venue-level characteristics reflecting greater organised management, higher income clients and visibility (e.g., condom accessibility, US clientele and geographic proximity to main sex strip) would increase FSWs' likelihood to be registered, independent of individual-level characteristics, as these venues would be more likely to participate in the registration programme. Findings will further our understanding of how this type of permit system may be missing a more vulnerable population of FSW, thus giving insight on how to improve HIV prevention efforts in Tijuana.

Methods

Study population

Between January 2004 and January 2006, FSWs in Tijuana and Ciudad Juarez were enrolled into the *Mujer Segura* project, a behavioural intervention to increase condom use (Patterson *et al.* 2008a). We excluded data from Ciudad Juarez because registration is not required of FSWs. Furthermore, we only included participants that reported their sex work location was a bar ($n = 243$), since this was the most common venue type reported by FSWs and these venues could be retrospectively mapped.

FSWs were recruited by outreach workers and municipal and community health clinics. Eligibility requirements included being 18-years-old; giving informed consent; having traded sex for drugs, money or goods within the past 2 months; having unprotected vaginal sex with at least one client in the past 2 months; and having no history of a positive HIV test, since the intention of the intervention study was to reduce HIV incidence. The study was approved by the cognisant institutional review boards in San Diego and Tijuana.

Data collection and outcome

Trained Spanish-speaking female counsellors administered face-to-face baseline interviews as previously described (Patterson *et al.* 2008a). Interviews covered a range of topics including demographics, type of sex work, working conditions, sexual risk behaviours, HIV/STI testing and illicit drug use. In addition, participants were asked, 'Are you currently registered with the Tijuana municipal health department as a sex worker?' The outcome for the present study was formed by the dichotomous response (Yes/No) to this question.

Venue-level measures

To evaluate venue-level effects on FSWs' registration status, self-reported sex work locations were digitised using ArcGIS 9.2 (ESRI, 2007). A total of 52 venues were mapped in Tijuana's *Zona Roja* and locations were verified through visual inspection (Rusch *et al.* 2010). Venue characteristics under consideration included: geographic proximity to the main sex work strip in the *Zona Roja*, availability of free condoms at work; and bars with clientele from the USA, which was associated with high-risk behaviours in a previous study (Strathdee *et al.* 2008a). We assumed that geographic location, condom accessibility and type of clientele are environmental factors influenced by management that could affect individual behaviour (Gupta *et al.* 2008).

Individual-level measures

To account for the potential confounding effect of individual behaviours and income, we adjusted for measures previously reported as significant contributors to the likelihood of

FSWs' being registered (Sirotin *et al.* 2010b). These variables included cocaine injection in the past month, methamphetamine use in the past month and history of HIV testing. We included a proxy measure for income that was constructed as a binary variable from participants' characterisation of their current financial situation as bad or extremely bad versus good or extremely good.

Roadway distance

Proximity to the geographic centre in Tijuana's *Zona Roja* was manually calculated using the ArcGIS 9.2 measuring tool (ESRI, 2007), which derived the road distance, in metres, from each bar to the main sex work strip. Previous work in this area, as well as field staff reports, cited the same one-block street where sex work is most concentrated (Goldenberg *et al.* 2011). We defined road distance as the path distance that a pedestrian would actually travel in the *Zona Roja*. Pedestrian path distances were assumed to follow the centre road line as determined from maps provided by the Tijuana Municipal Planning Institute. Since bars are not located on the centre road line, an additional segment was added to the total distance travelled. This segment was assumed to be the shortest linear distance from the bar to the centre road line. This gave a total distance travelled as the sum of the distance from each bar to the centre road line plus the road distance to the main sex work strip.

Statistical analysis

Our statistical analysis assumes that registration status is partly dependent on FSWs' attributes and the characteristics of the venues where they work. The hierarchical structure of our data was modelled by separating the sources of variation at the venue-level and FSW-level. Therefore, we utilised multilevel models to account for variability within groups (e.g., FSWs nested within venues) and between groups (e.g., difference between venues) through a single analysis approach. Three different multilevel models were run for comparison. The first (or empty) model included only an intercept term and allowed us to estimate the variability in registration status that is due to the venue-level. This first model was important for verifying whether between-venue variability was greater than zero, since this justifies a multilevel approach (Snijders and Bosker 1999). Venue-level predictors were then added to the empty model to assess the effects of venue attributes on registration status. The third model adjusted for the potential confounding effects of FSWs' risk behaviours to determine whether venue-level attributes were independently associated with FSW registration. Across all three models, we compared the intraclass correlation coefficient, which is the fraction of variability in FSWs' registration status that is attributed to the venue-level (Snijders and Bosker 1999). The multilevel analyses were performed in STATA 11 (StataCorp 2009). The model assumption of linearity on the logit scale for continuous measures was verified using the fractional polynomial command in STATA.

Although we performed a multilevel analysis to accommodate the hierarchical data structure, we noted that approximately 12% ($n = 30$) of the participants reported working in more than one of the reported bar venues ($n_{\text{bars}} = 49$). Therefore, we excluded women reporting more than one venue to enforce a strict hierarchical data structure. This resulted in a sample of 213 FSWs nested within 43 bar venues for analysis. Compared to FSWs reporting one bar venue, excluded participants were more likely to rate themselves in a bad financial situation (43% vs. 37%), have injected cocaine in the past month (7% vs. 4%), have used methamphetamines in the past month (50% vs. 34%) and have received a HIV test during their lifetime (70% vs. 68%), although none these differences were statistically significant.

Results

In this sample of 213 participants, registration status was missing for 15% of the women ($n = 32$); these women were excluded from subsequent analysis. Among the remaining 181 FSWs, 52% reported registration with the MHD.

Venue-level characteristics

As shown in Table 1, at the venue-level ($n_{\text{bars}} = 43$), nearly one-quarter of bars had US clients (25%) and over one-third had access to free condoms at their work (35.4%). The average roadway distance to the geographical centre of the *Zona Roja* was 158 metres (SD = 91; Interquartile Range = 112–214m). In the unadjusted analysis, bars with US clientele (OR = 1.41; 95% CI = 0.50–3.99) and condoms freely available (OR = 2.28, 95% CI = 0.80–6.53) were more likely to have registered sex workers, whereas there was a decreased likelihood of being registered among bars further from the main sex strip (OR = 0.72, 95% CI = 0.47–1.12); although these associations were not statistically significant.

Individual-level characteristics

As shown in Table 2, at the individual-level ($n_{\text{FSWs}} = 181$), a greater percentage of unregistered FSWs rated themselves as being in a bad financial situation (73% vs. 26%), injected cocaine in the past month (6% vs. 1%) and used methamphetamines in the past month (51% vs. 19%); whereas a greater percentage of registered FSWs reported a previous HIV test (88% vs. 55%). Of FSWs' individual attributes, only methamphetamine use (OR = 0.23, 95% CI = 0.11–0.48) and report of a previous HIV test (OR = 6.12; 95% CI = 2.64–14.17) were significant in the unadjusted analysis.

Multilevel analysis

Table 3 presents the results of a multilevel logistic regression analysis comparing parameter estimates from a model adjusting for venue-level characteristics and a full model adjusting for venue- and FSW-level variables. Of the bars considered for analysis, 41% had a sample of 1 FSW, 39% had 2–7 FSWs, and 20% had 8 or more FSWs. Although a substantial number of bars had only one FSW, multilevel modelling is applicable, but these particular venues will be less influential to the results.

Approximately 23% of the variance in FSWs' registration status was due to variability at the venue-level. Inclusion of the venue-level predictors reduced the fraction of variability to 0.12, while inclusion of individual-level predictors reduced this by half, to 0.06.

In the venue-level adjusted analysis, factors significantly associated with registration status included access to free condoms at work (OR = 3.08; 95% CI = 1.15–8.25) and roadway distance from the geographical centre of the *Zona Roja* (OR = 0.66, 95% CI = 0.44–0.99) as shown in Table 3. More specifically, there was a three-fold increase in the likelihood of registration among sex workers operating from a venue that freely provided condoms compared to venues that did not, and a 34% decrease in the likelihood of registration for every 89 m (or 1 standard deviation) that a bar was away from the main sex strip of the *Zona Roja*. However, these effects were insignificant after adjusting for individual risk behaviours. All of the odds ratios for the individual-level predictors in Model 3 were significant, excluding self-rated financial situation. Furthermore, participants reporting cocaine and/or methamphetamine use and those without a history of HIV testing were more likely to work in venues further from the main sex strip of the *Zona Roja* (data not shown).

Discussion

Through our initial examination, we found that registration is dependent on the context of FSWs' working environment, since venues providing free condoms and those closer to the main sex strip of the *Zona Roja* were significantly more likely to have registered FSWs. However, these effects were not independent of individual-level characteristics, as initially hypothesised, since all of the venue-level characteristics were insignificant in a model simultaneously adjusting for both individual- and venue-level variables. The lack of significance in the full model was likely the result of individual-level covariates, such as illicit drug use and history of HIV testing, being a function of geographic proximity to the main sex strip. Nevertheless, these findings demonstrate that Tijuana's current registration system is not adequately reaching FSWs in greatest need of HIV prevention services, such as injection drug users and those with limited financial resources. In addition, it highlights that at a venue-level, visibility of sex work may be directly tied to availability of HIV prevention materials such as free condoms and reflects the unanticipated impact of regulatory systems.

Our results also indicate the importance of considering the hierarchical structure of FSWs nested in bars during parameter estimation. We found that 23% of the variation in registration status was attributable to venue-level differences, and that inclusion of venue-level characteristics (e.g., condom accessibility, geographic proximity and US clientele) reduced this variation to 12%. Through multilevel models, we partitioned sources of variation in the outcome (registered vs. unregistered), reducing the fraction of variability at the venue-level even further to 6% with the inclusion of both venue- and individual-level covariates.

More important, this study is the first to demonstrate empirically an association between venue-level attributes and FSWs' registration status in Tijuana. Of particular interest was the significant association between geographic proximity and registration status in the adjusted analysis with the venue-level covariates. We found that increased distance from the main sex strip of the *Zona Roja* decreased the likelihood of being registered. The visibility of sex work may affect whether officials enforce Tijuana's registration policy, since male clients in this setting perceive that police frequently check permits of FSWs operating on the main sex strip (Goldenberg *et al.* 2011). Furthermore, unpublished qualitative data from our research team suggest that registration is not consistently enforced in Tijuana, and that FSWs register to avoid harassment and/or extortion by the authorities. Similarly, harassment by police in lieu of arrest has been described by FSWs in the *Zona Roja* (Strathdee *et al.* 2011), which can create structural barriers to accessing health services and safe places to work (Overs and Hawkins 2011).

Furthermore, our results demonstrated an association between condom accessibility and FSWs' registration. More than one-third of bars provided free condoms to FSWs, which may imply that management at these venues support HIV prevention efforts and would be receptive to additional programmes. Alternatively, this may imply that bars with FSWs that are able to buy into the permit system are better able to explicitly promote HIV prevention efforts. In any case, access to free condoms did not universally lead to consistent use with clients since these women were recruited for an intervention to promote safer sex. The discrepancy between condom accessibility and use has been studied in other countries where structural changes such as venue-level policies that mandate condom use, availability of condoms to sex workers and/or clients, and classes on how to use condoms were most effective when there was a collaborative process with FSWs through peer-led programmes (Morisky *et al.* 1998, 2002, 2006, Morisky and Tiglaio 2010, Urada *et al.* 2012).

The socio-economic status of FSWs also relates to condom access, use and registration. For example, our team previously hypothesised that FSWs have a financial motivation to modify their behaviours in venue-based establishments, where failure to obtain registration could result in loss of employment (Sirotin *et al.* 2010a). This is consistent with our conclusion that bars closer to the main sex strip may attract more attention and that management within these bars may promote behaviours, such as condom use and registration that will not jeopardise their business or have them targeted by local authorities. However, this also suggests that more marginalised FSWs, including injection drug users and HIV-positive women, may be displaced to isolated locations, which can decrease their ability to negotiate safer sex while exposing them to increased exploitations and abuses (Shannon *et al.* 2009, Shannon and Csete 2010). This is concerning as it suggests that enforcement efforts to regulate sex work may have the unintended consequence of deterring sex workers from accessing harm reduction and HIV prevention/treatment services.

Last, our results indicate that women who are in greatest need of services that are tailored to sex workers are not being reached through the current registration policy. Instead, this permit-based policy appears primarily to affect FSWs operating at higher-end venues, as evidenced by the fact that women from more highly visible establishments (e.g., those closer to the main sex strip) had an increased likelihood of registration, probably because FSWs within these higher-end venues can better afford the permits. This suggests that additional, non-regulatory approaches may be needed that are based on the empowerment and organisation of sex workers to respond to the vulnerabilities they face (Kerrigan *et al.* 2003, Swendeman *et al.* 2009). These interventions have successfully changed the HIV/STI risk contexts through a combination of approaches including condom-use campaigns, government policy concerning safe-sex practices, holistic sexual health care and HIV counselling (Kerrigan *et al.* 2006, Shahmanesh *et al.* 2008, Lippman *et al.* 2010). Common to all these prevention strategies is a human rights emphasis that addresses violence, discrimination and social exclusion of sex workers (Sukthankar 2011, Shannon and Montaner 2012) and that does not stop or reduce their involvement in sex work but promotes their ability to access HIV/STI prevention, treatment and care (UNAIDS 2012).

Although demonstrated successful in other settings, such multifaceted approaches could be difficult to adopt in Tijuana due to its limited history of community-based organisation of sex workers (Manson 1999). In places such as the Dominican Republic, non-governmental organisations have been successful in mobilising communities around the sexual health and rights of sex workers, facilitating the implementation of multi-component prevention strategies (Kerrigan *et al.* 2003, 2006). However, within the contexts of drug use and extreme marginalisation, it has been difficult for FSWs in Mexico to mobilise in this way.

To date, Mexico has taken a punitive approach to regulating sex work, by fining and revoking permits, without written guidelines or laws for enforcement (Congreso de la Union 2012). Tijuana's mandatory and periodic HIV/STI testing of FSWs must be considered in light of its potential unintended consequences such as deterring sex workers from accessing services, increasing stigma and discrimination and loss of livelihood related to testing HIV positive. This regulatory environment can be counterproductive to HIV prevention efforts (Harcourt *et al.* 2010). A more effective public health response would engage FSWs to determine how to reframe regulations in ways that better meet their health needs and promote safer working conditions while maintaining their human and labour rights.

There are several limitations that should be noted when interpreting these results. First, generalisability to other venues may be limited, since FSWs were not directly recruited from bars and our analysis excluded street-based FSWs. Instead, we used a convenience sample of FSWs recruited by outreach workers in the *Zona Roja*, which may not represent the

diversity of sex work venues in Tijuana. Despite this sampling strategy, FSWs distributed across a large portion of the *Zona Roja* were identified, and there was no tendency for participants to more frequently report sex work within bars closer to the main sex strip of the *Zona Roja* (data not shown). Second, FSWs reporting two or more venues ($n = 30$) were excluded from analysis, since primary place of work was not asked of participants. However, there was no indication of bias by excluding bar locations reported by these 30 participants, since the distances of these bars were within one standard deviation from the geographical centre of the *Zona Roja*. Third, bias in reporting is of concern, since there are legal penalties for failing to register; however, there is little evidence of this given that FSWs reported high levels of other risk behaviours.

As a public health response, our findings highlight that current sex work policies may inadequately protect FSWs operating in venues that are less visible and organised, especially in terms of condom accessibility. These venues are likely to represent those in greatest need of prevention services, which is why it is important for Tijuana to adopt a human rights-based approach for addressing HIV and STIs risks. This has been effective in other countries that have promoted FSWs sexual health and HIV prevention through community-based efforts (Morisky *et al.* 1998, Kerrigan *et al.* 2006, Shahmanesh *et al.* 2008, Zhongdan *et al.* 2008, Lippman *et al.* 2010, Urada *et al.* 2012).

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Table 1

Venue-level descriptive statistics and unadjusted odds ratios (95% CI) for registered vs. unregistered FSWs in Tijuana, Mexico ($n = 43$).

Venue-level variables	Percentage	Unadjusted OR (95% CI)
Clientele from the USA	18.2	1.41 (0.50–3.99)
Free condoms available at work	37.8	2.28 (0.80–6.53)
Roadway distance to main sex strip in metres (median)	145.3	0.72 (0.47–1.12) ^a

^aOdds ratio interpreted as the odds of being registered for a one standard deviation (91 m) increase in roadway distance.

Table 2

Individual-level characteristics of registered vs. unregistered FSWs in Tijuana, Mexico and unadjusted odds ratio (95% CI).

Individual-level variables	Registered FSWs (<i>n</i> = 94) (%)	Unregistered FSWs (<i>n</i> = 87) (%)	Unadjusted OR (95% CI)
In a bad financial situation	26.6	73.4	0.55 (0.27–1.13)
Injected cocaine in past month	1.1	5.8	0.10 (0.01–1.16)
Non-injection use of methamphetamines in past month	19.2	50.6	0.23 (0.11–0.48)
Ever tested for HIV/AIDS	88.3	55.2	6.12 (2.64–14.17)

Table 3

Adjusted odds ratios of registered vs. not registered FSWs and variability of registration in Tijuana bars after controlling for venue-level and FSW-level effects.

Macro- and micro-level variables	Odds ratio (95% CI)		
	Model 1: intercept only	Model 2: addition of venue-level variables	Model 3: addition of individual-level variables
Venue-level			
Clientele from the USA		2.01 (0.76–5.24)	2.06 (0.80–5.33)
Free condoms available at work		3.08 (1.15–8.25)	2.39 (0.94–6.08)
Roadway distance to main sex strip (1 SD increase)		0.66 (0.44–0.99)	0.81 (0.54–1.22)
Individual-level			
In a bad financial situation			0.75 (0.34–1.64)
Injected cocaine in past month			0.08 (0.01–0.88)
Non-injection use of meth in past month			0.28 (0.13–0.60)
Ever tested for HIV/AIDS			5.4 (2.33–12.53)
Fraction of variability due to venue-level	0.23	0.12	0.06