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Effects of government registration on unprotected sex among female sex workers in Tijuana, Mexico

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Abstract

Background—Sex work is partially regulated in Tijuana, but little is known of its health effects. A recent behavioral intervention among female sex workers (FSWs) decreased incidence of HIV/STIs by 40%. We evaluated effects of sex worker regulation on condom use among FSWs randomized to this intervention.

Methods—FSWs aged ≥ 18 years who reported unprotected sex with ≥ 1 client in the last 2 months and whether they were registered with Tijuana's Municipal Health Department underwent a brief, theory-based behavioral intervention to increase condom use. At baseline and 6 months, women underwent interviews and testing for HIV, syphilis, *C. trachomatis* and *N. gonorrhoeae*. Negative binomial regression was used to determine the effect of registration on numbers of unprotected sex acts and cumulative HIV/STI incidence.

Results—Of 187 women, 83 (44%) were registered. Lack of registration was associated with higher rates of unprotected sex (rate ratio: 1.7, 95% CI: 1.2–2.3), compared to FSWs who were registered, after controlling for potential confounders.

Conclusions—Registration predicted increased condom use among FSWs enrolled in a behavioral intervention. Public health programs designed to improve condom use among FSWs may benefit from understanding the impact of existing regulation systems on HIV risk behaviors.

Keywords

commercial sex work; registration; Mexico; injection drug use; sexually transmitted infection; behavioral intervention

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Background

Sex work is quasi legal in specified zones of tolerance (*zonas rojas*) in Mexican–U.S. border cities such as Tijuana (bordering San Diego, CA) and Ciudad Juarez (bordering El Paso, TX). In these cities, HIV prevalence has risen from <1% among female sex workers (FSWs) to 6% between 1991 and 2006 (Guerena-Burgueno, Benenson, & Sepulveda-Amor, 1991; Patterson, Semple, et al., 2008) and 12% among FSWs who inject drugs (Strathdee et al., 2008). In Tijuana, HIV prevalence was 4% among 400 male clients of FSWs (Patterson et al., 2009).

An estimated 5000–9000 FSWs work in Tijuana (Patterson et al., 2006). To mitigate risk, a government regulation system was created over ten years ago, through the municipal health department (MHD), with about half of all FSWs in Tijuana having registered (Patterson et al., 2006). The MHD charges \$360 per year for registration cards authorizing sex workers who receive monthly testing for HIV and quarterly STI screening to legally work. If they test positive for an STI, they are treated with antibiotics according to federal STI guidelines (Secretaría de Salud, 2002), and their registration card is temporarily held until they are cleared by the MHD. If they are found to be HIV-positive, their registration cards are revoked, and they are referred to specialty care. (Personal communication, Clark-Alfaro V, director of the Binational Center for Human Rights, Tijuana, Mexico, May 2009). We recently reported that registered FSWs in Tijuana were more likely to be tested for HIV and earn more money for sex compared to unregistered FSWs, who were more likely to work on the street and use stimulants (Sirotin et al., 2010). These results are consistent with those of other government systems for regulating sex work, which typically do a poorer job of reaching marginalized, street-based, drug-using FSWs (Shahmanesh, Patel, Mabey, & Cowan, 2008). Government efforts to regulate sex workers have also been criticized for human rights violations through forced, mandatory STI testing and ineffectual support for other important healthcare needs of FSWs, such as violence prevention (Wolffers & van Beelen, 2003). However, some successful models exist for government involvement in sex worker regulation. Thailand's 100% condom campaign revoked brothel licenses if owners did not enforce condom use; it was successful in increasing condom use to 94% within five years of initiation, but it was less successful in protecting FSWs working outside of brothels (Hanenberg, Rojanapithayakorn, Kunasol, & Sokal, 1994; Rojanapithayakorn & Hanenberg, 1996). In the Dominican Republic, FSWs randomized to receive a community solidarity intervention offered alone or with government regulation found that both groups increased condom use, but only the government-regulated group showed a significant reduction in STI incidence (Kerrigan et al., 2006). In both cases, brothel owners, not FSWs themselves, were held responsible for non-compliance with the regulations, which were enforced with notifications, fines and closures. This is in contrast to regulations in Tijuana where individual FSWs are fined if they lack registration cards (Personal communication, Clark-Alfaro V, director of the Binational Center for Human Rights, Tijuana, Mexico, May 2009).

Our group previously reported upon the *Mujer Segura* (Healthy Woman) behavioral intervention, which employed motivational interviewing and social cognitive theory to promote condom negotiation skills among FSWs in Tijuana and Ciudad Juarez (Patterson, Mausbach, et al., 2008). The intervention was associated with significant reductions in the number of unprotected sex acts and with a 40% reduction in combined HIV and STI incidence (Patterson, Mausbach, et al., 2008), and it has been shown to be cost-effective (Burgos et al., 2010). In this paper, we evaluate the association of government registration and rates of unprotected sex and incidence of HIV and STIs in FSWs enrolled in the *Mujer Segura* behavioral intervention. We hypothesized that after completing the behavioral intervention, FSWs who were registered with the MHD would show greater improvements in condom use and have fewer HIV and STIs at follow-up, since registered FSWs already

would have received separate HIV and STI counseling and testing by the MHD. As public health officials continue to develop novel HIV and STI prevention programs that involve regulation of sex work, it is important to understand the impact that existing regulatory schemes might have on any new strategies.

Methods

Population and settings

Between January 2004 and January 2006, the *Mujer Segura* intervention study enrolled 924 FSWs in Tijuana and Ciudad Juarez in a prospective, randomized trial (described in detail elsewhere (Patterson, Mausbach, et al., 2008)) to evaluate a behavioral intervention to promote condom use. Because this sub-analysis was designed to determine whether registration with the MHD predicted response to the intervention, this analysis was restricted to the 187 women enrolled in the intervention arm in Tijuana, since at the time of this study, Ciudad Juarez did not have a formal system of sex worker registration. Briefly, FSWs were randomized to either the *Mujer Segura* intervention—a brief session using motivational interviewing and role-playing to promote condom use—or to the didactic control. Eligibility requirements included age >18 years; ability to give consent; having traded sex for money, goods, or drugs within the previous 2 months; and having had unprotected sex with ≥ 1 client in the last 2 months. Women known to have HIV or who tested positive for HIV or an STI at baseline were excluded, since this intervention aimed to reduce HIV and STI incidence. Participants were compensated \$30 per visit for their time. Institutional Review Boards at the University of California–San Diego and the Universidad Autónoma de Baja California, Tijuana reviewed and approved the study protocol. As previously reported, the study adhered to CONSORT guidelines (Patterson, Mausbach, et al., 2008).

Outcomes

Trained female, Spanish-speaking counselors conducted baseline interviews with participants. The interview comprised questions on demographics, socioeconomic factors, type of sex work, working conditions and work history, self-efficacy for condom use (i.e., confidence in one's ability to use condoms), outcome expectancies (i.e., belief that using condoms reduces the risk of acquiring HIV and STIs), and HIV/AIDS knowledge. Behavioral measurements included sexual and drug-use behaviors; self-reported history of sexually transmitted infections; and frequency of unprotected sex ("In the past month, what was the total number of times you had vaginal sex with non-regular male clients?" and, "In the past month, what was the total number of times you used a condom for vaginal sex with non-regular male clients?"). In addition, we determined the proportion of sex acts that were unprotected (total number of unprotected sex acts divided by the total number of sex acts). The interview was repeated 6 months post-randomization.

Laboratory evaluation

Trained nurses performed the Determine[®] rapid test (Abbott Pharmaceuticals, Boston, MA) for initial detection of HIV antibodies. All positive tests were confirmed by enzyme immunoassay (EIA) and Western Blot. The rapid plasma reagin (RPR) test was used to detect antibody to *Treponema pallidum* (Macro-Vue; Becton Dickinson, Cockeysville, MD). All positive RPR samples were confirmed by *Treponema pallidum* hemagglutinin assay (Fujirebio, Wilmington, DE), with titers >1:8 considered consistent with active infection (Golden, Marra, & Holmes, 2003). Cervical swab samples were tested for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* using the APTIMA[®] Combo-2 collection device (Gen-Probe, San Diego, CA). Specimen testing was conducted at the San Diego County Health Department. All test results were provided to participants, and those with positive results were referred to the MHD for free treatment and follow-up.

Statistical analysis

Demographic and baseline characteristics of FSWs who were registered with the MHD were compared to those of FSWs who were not registered. Depending on whether distributional assumptions were met, continuous outcomes were examined using either t tests or Wilcoxon rank sum tests. Similarly, binary outcomes were examined using either Pearson Chi-square or Fisher's exact test.

To examine the effect of registration on reducing the ratio of unprotected sex acts to total of sex acts, we conducted negative binomial regression with robust variance estimation. As the outcome, we took the number of unprotected sex acts reported at follow-up; the logarithm of the total number of sex acts reported at follow-up was an offset variable; registration status was the primary predictor; and the following were covariates: baseline ratio of unprotected to total number of sex acts, duration of sex work, and IDU status. Only those covariates that retained significance at the 5% level were retained in the final model. Lack of multicollinearity among the independent variables in our model was confirmed by the appropriate values of the largest condition index and of the variance inflation factors.

Low power precluded an assessment of the effect of registration on HIV incidence; there were no incident HIV cases in the intervention arm, compared to an HIV incidence of 2 per 100 person-years (PY) in the control arm (Patterson, Mausbach, et al., 2008). For each STI, as well as for any STI, we obtained cumulative incidence and incidence density. Incidence density was calculated per 100 PY at risk; seroconversions were assumed to have occurred at the mid-point of the follow-up interval. Exact 95% Poisson confidence intervals (CI) were calculated for estimated rates. For each STI outcome, Poisson regression was used to determine if group differences were statistically significant.

Results

Of the 188 FSWs randomized to the intervention in Tijuana, 187 answered the registration questions and completed their 6-month follow-up assessments and were therefore included in this analysis. Almost half (N=83; 44%) were registered with the MHD. In analyses of STI incidence, we excluded women who had tested positive at baseline (numbers excluded per STI: HIV = 18, syphilis = 36, *N. gonorrhoeae* = 18, *C. trachomatis* = 33).

Baseline results

Of the 187 women, median age was 32 (interquartile range (IQR) 26.0–40.0); most women had <7 years of formal education (median 6.5, IQR 5.0–9.0); less than one-fifth were married (15%); and almost all had children (90%) (Table 1). Although most were migrants to Tijuana, unregistered FSWs were significantly more likely than registered FSWs to have lived in Tijuana for longer (11.5 vs. 6, years, $p=.002$), engaged in sex work for more years (5 vs. 3, $p=.04$), and to describe themselves as street workers (56% vs. 29%, $p<.001$). Compared to registered FSWs, unregistered FSWs made less money per sex act (20 vs. 40 USD, $p<.001$); were less likely to live in their own homes (12% vs. 30%, $p=.003$); described significantly more unprotected sex acts with clients in the last month (median number of acts: 12 vs. 8, $p=.028$); were more likely to test positive for any STI (55% vs. 34%, $p=.005$); and, as expected, were significantly less likely to have been tested previously for HIV (52% vs. 87%, $p<.001$). There were no significant differences between unregistered and registered FSWs in the use of injection drugs or in HIV seropositivity.

Behavior change at follow-up

After controlling for the baseline proportion of unprotected sex, we found that at the 6-month follow-up visit, lack of registration with the MHD was associated with a higher rate

of unprotected sex (rate ratio [RR]: 1.6, 95% CI: 1.2–2.2), being born in Tijuana (RR: 1.6, 95% CI: 1.2–2.1) and injection drug use (RR: 1.4, 95% CI: 1.1–1.9) (Table 2). Number of years in sex work was inversely associated with rate of unprotected sex after participation in the intervention (RR: 0.95 per year, 95% CI: 0.93–0.98).

In the final multivariate model, lack of registration was independently associated with higher rates of unprotected sex (RR: 1.67, 95% CI: 1.2–2.3), after we controlled for IDU status, being born in Tijuana, number of years in sex work, and baseline proportion of unprotected sex acts (Table 2). Sex worker venue was not statistically significant.

Cumulative incidence of STIs (Table 3) did not differ between registered and unregistered FSWs, likely due to low power. Similarly, there were no significant differences in incidence density of STIs, although the registered group had lower incidence for both syphilis (5.44 vs. 14.29 per 100 py, $p=.41$) and *N. gonorrhoeae* (4.52 vs. 15.56 per 100 py, $p=.18$).

Conclusions

This study found that women who had registered with Tijuana's MHD as sex workers and who received the *Mujer Segura* behavioral intervention demonstrated greater reductions in risk behavior (i.e., fewer unprotected sex acts) compared to women who were not registered with MHD. The intervention's brevity (35 minutes) and ability to be administered by lay counselors suggests that it is an appropriate model for such resource-constrained environments as Tijuana's *Zona Roja*. This study is the first to describe the effect of an existing government registration program for sex workers on the effectiveness of an intervention designed to lower the workers' HIV and STI risks. As we translate research into practice, this study can inform the role of existing government prevention programs in new HIV prevention efforts.

Furthermore, our study supports a growing body of literature which shows that current government registration programs are not reaching the most marginalized FSWs, who are also the FSWs most at risk for HIV and STIs (Hanenberg et al., 1994; Kerrigan et al., 2006). This may be evidence that existing government registration do not embrace harm reduction models of prevention in high-risk populations. A number of factors may impede women from registering, including cost, which can be prohibitive. In the four years since the *Mujer Segura* intervention study was conducted, the cost of registration to Tijuana's sex workers has increased from \$360 per FSW per year to \$450 per FSW per year (Alfaro, V.C., Director of the Binational Center for Human Rights, Tijuana, Mexico, personal communication, May 7, 2009). Unregistered FSWs earn, on average, US\$20 less per sex act than registered FSWs. Higher costs of registration may result in fewer registered FSWs, with the unintended consequences of increasing both risks and treatment costs for STIs and HIV and of driving the poorest, highest-risk FSWs away from current prevention services. This suggests that if registration systems exist, they need to be low-cost with concomitant free STI testing. Additional qualitative and mixed methods studies are needed to further characterize the roles of poverty and of cost in FSWs' and establishment operators' decisions on registration. Another barrier to registration could be the fear of revocation of a sex-work permit, whether it be a temporary revocation until a diagnosed STI is treated, or a permanent revocation for those who test HIV-positive. This fear could deter women from seeking employment at establishments that require registration or from becoming independently registered and therefore decrease access to basic services for those FSWs. This risk of deterrence has increased in light of recent police raids on such establishments (which occurred after this study was completed), resulting in arrests and fines of individual FSWs ("Retiró reglamentos a 250 sexoservidoras [Permits revoked for 250 sex workers]," 2010). FSWs who suspect they may be infected with HIV could become increasingly marginalized.

Finally, the location of the clinic which performs the testing may deter some women from becoming registered and receiving government services. In Tijuana, the MHD clinic sits directly opposite a police station, and it is relatively distant from the *Zona Roja*, where the majority of sex work is performed. Fear of police harassment, especially by drug-using sex workers, and lack of money for transportation may serve as additional barriers for FSWs to become registered and to access services. Expansion of mobile services and onsite clinics that operate where the FSWs work could mitigate this barrier.

Our results show that registration with the MHD was associated with improved condom use for FSWs enrolled in the *Mujer Segura* behavioral intervention in Tijuana. One potential pathway for this finding includes increased exposure to prevention efforts (both through HIV testing at the MHD and the intervention). Additionally, previous analyses showed that registered FSWs were more likely to work in venue-based establishments and earn more money per transaction, while unregistered sex workers were more likely to work on the street, and inject drugs (Sirotin et al., 2010). This could imply that registered FSWs are more engaged in screening and prevention programs because they risk losing their employment if found to have an STI, whereas unregistered, street-based FSWs may not have the same incentive since they are already working illegally. Registered FSWs may be more receptive to a behavioral intervention focused on improving their condom use, although further studies are needed to confirm this. Alternatively, Gu and colleagues have suggested that street based FSWs who are more likely to use drugs are perceived as less desirable in bar settings (Gu et al., 2008) and their behavior may attract the authorities, jeopardizing the establishment's bar license. This suggests interventions aimed at reducing high risk drug use may encourage FSWs to work in safer environments which encourage safer sex practices. Previous studies in the Dominican Republic and Thailand, as well as our findings here, suggest that peer-focused prevention programs may be most successful at improving condom use when they include enforcement of the program in the form of registration or condom-use policies, although both in the Dominican Republic and Thailand, the enforcement occurred at the brothels, not through the sex workers themselves. The *Mujer Segura* intervention is a unique, low-cost, brief intervention that can be administered by workers with low education and literacy levels. Our findings suggest that a peer-administered, theory-driven behavioral intervention, in combination with additional external prevention measures, may prove helpful for new HIV and STI prevention efforts in resource-limited settings.

Although we found significant benefits to registration, low power precluded our ability to examine if concomitant reductions in HIV and STIs in the registered group were statistically significant. The study follow-up period was relatively short, and the durability of intervention benefits is unknown. However, another behavioral intervention based on the same principles showed sustained efficacy of up to 18 months in men who had sex with men in San Diego, CA (Mausbach, Semple, Strathdee, Zians, & Patterson, 2007). In addition, several aspects of Tijuana's registration system may have affected our results. First, women who voluntarily register with the MHD, as opposed to those who are required to register by their places of work, may be a self-selecting group whose awareness of prevention may be different from that of unregistered sex workers. In addition, being registered may change the FSWs' perception of risk, as she would be potentially exposed to further prevention education. Second, point-of-care data are not available from the MHD, and therefore we cannot evaluate whether the services were implemented. Although all of the women who were registered with the MHD should have had an HIV test as part of the requirements for their registration, only 87% of registered FSWs stated they had had an HIV test. This suggests that some registered FSWs did not know they had been tested or did not return to the MHD for their results. Finally, since the penalty for not being registered is arrest, the non-registered women may have underreported their risk behaviors. However, this reporting

bias would work against our hypothesis, and reported high rates of other sensitive behaviors such as illegal drug use suggest this is unlikely.

Our findings suggest that the current system of government regulation of sex work in Tijuana may exclude up to half of all working FSWs, many of whom are poor and socially marginalized. Since the Mujer Segura study was conducted, a mobile HIV-prevention campaign has been initiated in Tijuana, utilizing a partnership between governmental and non-governmental organizations, targeting those FSWs not currently benefiting from the MHD prevention efforts (Strathdee & Magis-Rodriguez, 2008). A combined model of peer-driven, empowerment-focused behavioral interventions with free HIV and STI testing for all FSWs and mobile outreach to the most marginalized FSWs may help promote HIV prevention in resource-limited settings.

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Table 1

Baseline characteristics of registered and non-registered FSW enrolled in a behavioral intervention in Tijuana, Mexico (N=187*)

Characteristic	Registered N=84	Non-registered N=103	Total N=187	p-value
Age, median (IQR), years	31 (26.0–38.0)	34 (27.0–40.0)	32 (26.0–40.0)	.12
Born in Baja California	13 (15.7%)	30 (29.4%)	43 (23.2%)	.04
Number of years living in Tijuana, median (IQR)	6.0 (2.4–15.0)	11.5 (5.0–20.0)	9.0 (4.0–19.0)	.002
Married/common law	12 (14.5%)	16 (15.7%)	28 (15.1%)	.84
Has children	75 (90.4%)	92 (90.2%)	167 (90.3%)	1.0
Years of completed education, median (IQR)	7.0 (6.0–9.0)	6.0 (4.0–9.0)	6.5 (5.0–9.0)	.05
Lives/sleeps most of the time in one's own house	25 (29.8%)	12 (11.7%)	37 (19.8%)	.003
Years in sex work, median (IQR)	3.0 (1.0–7.0)	5.0 (2.0–10.0)	4.8 (2.0–9.0)	.036
Describes oneself as streetworker	24 (28.6%)	58 (56.3%)	82 (43.9%)	<.001
Describes oneself as dance hostess	36 (42.9%)	18 (17.5%)	54 (28.9%)	<.001
Median income per sex act with condom (IQR), USD	40.0 (20.0–70.0)	20.0 (15.0–40.0)	30.0 (15.0–50.0)	<.001
Median # of sex acts (protected + unprotected) in the past month with clients (IQR)	18 (9, 47)	24.5 (11, 51)	22 (10, 48)	.37
Median # of unprotected sex acts in the past month with clients (IQR)	8.0 (2.0–17.0)	11.5 (4.0–31.0)	10.0 (3.0–27.0)	.028
Median ratio of unprotected to total # of sex acts in the past month with clients	0.5 (0.2, 0.7)	0.6 (0.3, 0.8)	0.5 (0.2, 0.8)	.12
Ever injected drugs	11 (13.1%)	22 (21.4%)	33 (17.6%)	.18
Any STI	28 (33.7%)	56 (55.4%)	84 (45.7%)	.005
Ever been tested for HIV	73 (86.9%)	53 (51.5%)	126 (67.4%)	<.001
HIV positive	4 (4.8%)	9 (8.7%)	13 (7.0%)	.39
Median Outcome expectancy score, (IQR)	2.8 (2.4–3.0)	2.6 (2.4–3.0)	2.6 (2.4–3.0)	.08
Median HIV/AIDS knowledge score, median (IQR)	12.5 (10.0–14.0)	12.0 (9.0–13.0)	12.0 (10.0–14.0)	.045
Median self-efficacy for condoms score, median (IQR)	3.0 (2.8–3.3)	3.0 (2.8–3.0)	3.0 (2.8–3.3)	.07

* NOTE: Unless otherwise specified, data are no. (%) of women. Certain percentages may reflect denominators smaller than the n value given in the column head. These discrepancies are due to missing data. IDU = injection drug user; IQR = interquartile range; STI = sexually transmitted infection.

Table 2

Factors independently associated with unprotected sex in FSWs in Tijuana, Mexico

Variable	Unadjusted Rate Ratio (95% CI)	Adjusted Rate Ratio (95% CI)
Lack of registration	1.56 (1.18–2.17)	1.67 (1.23–2.30)
# of years in sex work	0.96 (0.93–0.98)	0.95 (0.93–0.97)
> 9 years of education	1.08 (0.73–1.59)	
Born in Tijuana	1.60 (1.23–2.09)	1.52 (1.11–2.08)
Has children	1.14 (0.64–2.01)	
Ever injected drugs	1.43 (1.05–1.93)	
Positive change in HIV-knowledge	0.10 (0.75–1.32)	
Positive change in outcome-expectancy	0.90 (0.66–1.23)	
Positive change in self-efficacy	0.10 (0.73–1.36)	
Baseline ratio of unprotected to total # sex acts	1.55 (0.94, 2.57)	2.06 (1.21–3.50)

Cumulative incidence and incidence density of sexually transmitted infections at 6 month follow-up for registered and unregistered FSWs

Table 3

STI	Proportion of incident cases among FSWs at risk*			Incidence Density per 100 person years (95%CI)		
	Registered	Not Registered	Overall	Registered	Not registered	Overall
HIV	0/78 = 0%	0/91 = 0%	0/169 = 0%	0 (0, 0)	0 (0, 0)	0 (0, 0)
Syphilis	2/64 = 3%	4/57 = 7%	6/121 = 5%	5.44 (0,12.99)	14.29 (0.29,28.30)	9.27 (1.85,16.69)
RPR (titer ≥ 1:8)	0/71 = 0%	2/80 = 3%	2/151 = 1%	0 (0, 0)	4.83 (0,11.53)	2.44 (0, 5.82)
Gonorrhea	2/80 = 3%	7/89 = 8%	9/169 = 5%	4.52 (0,10.79)	15.56 (4.03,27.08)	10.09 (3.50,16.68)
Any STI	9/83 = 11%	13/103 = 13%	22/186 = 12%	19.70 (6.83,32.56)	25.38 (11.58,39.17)	22.70 (13.21,32.18)

* numerator represents women who acquired the STI during the 6 month follow up period, denominator represents women who tested negative at baseline

** based on Poisson Regression for comparing two groups with respect to Incidence Rate. IDU status was used as a covariate