A Study Comparing Sexually Transmitted Infections and HIV Among Ex-Red-Light District and Non–Red-Light District Sex Workers After the Demolition of Baina Red-Light District

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Objective: In June 2004, the red-light area of Goa was demolished. We compare HIV and sexually transmitted infections (STIs) between sex workers who had been based in Baina red-light district (ex-RLD-SWs) with sex workers who had never worked in Baina (non-RLD-SWs).

Methods: Three hundred twenty-six sex workers recruited using respondent-driven sampling, completed interviewer-administered questionnaires, and were tested for Trichomonas vaginalis, Neisseria gonorrhoeae, Chlamydia trachomatis, and antibodies to HIV. The association between ever working in Baina red-light area and HIV and STIs was examined using multivariate analysis.

Results: Non-RLD-SWs made up 55.3% (n = 201) of the sample, 48% of whom had entered sex work since the demolition. Non-RLD-SWs more likely to be less than 20 years old, Goan, have experienced sexual and intimate partner violence, to work part time, from home or the streets, and to have fewer clients. Ex-RLD-SWs were less likely to have curable STIs adjusted odds ratio of 0.27 (95% confidence interval: 0.10 to 0.73) and were more likely to have been exposed to HIV prevention and report consistent condom use with clients.

Conclusions: Non-RLD-SWs were more likely to be engaged in high-risk sexual activity. Although partly explained by lack of exposure to HIV prevention and inconsistent condom use, social and professional isolation and greater experience of intimate partner and sexual violence may play a role.

INTRODUCTION

The HIV epidemic in India, the world’s second most populous country, is of global importance.1 Interventions targeting sex workers are pivotal to HIV prevention in India.2,3 Community mobilization is considered by the National AIDS Control Program to be an integral component of this strategy.2,3 Yet, with the exception of exemplary programs in South India’s high-prevalence states, HIV prevention in sex workers is suboptimal.1

Despite mounting evidence for targeting female sex workers (FSWs) as part of a comprehensive HIV prevention strategy,2,3 only 10 countries provide HIV prevention services to the majority of their FSWs.4 This failure reflects the tension between 2 opposing philosophies: harm reduction versus prohibition. Policy makers and the public often prefer the “quick fix” allure of the latter.

Baina beach, a well-demarcated slum of 0.09 km², situated in Goa’s largest port, was a renowned red-light area. Having emerged in response to docking ships, it expanded and adapted to the needs of tourism, and its army of migrant workers. HIV prevention interventions, consisting of behavioral change, condom promotion, and syndromic treatment of sexually transmitted infections (STIs), had been provided for the 2000–3000 FSWs living and working in Baina red-light area since the early 1990s. Routine surveillance recorded a predemolition HIV prevalence of 30%–50% in Baina FSWs and high levels of HIV awareness and condom use.5

The Immoral Trafficking Prevention Act regulates sex work in India. Although the act does not prohibit prostitution per se, prostitution carried out in a brothel or within 200 m of certain public places is a criminal offense. On June 14, 2004, the Government of Goa implemented in part of a Mumbai High Court ruling and demolished Baina red-light area.6 No rehabilitation or relief was provided and a decade of HIV prevention was brought to an abrupt close.7 Since the demolition of Baina, several high-profile closures of red-light areas and dance bars have taken place in India.8 There is an
urgent need to systematically document the public health consequences of prohibitive approaches to sex work. We hypothesized that after the demolition, area-based sex work would be replaced by more dispersed and clandestine types of sex work, less amenable to HIV prevention. In this cross-sectional study of FSWs, conducted in the year after the demolition, we compare the sex work concentrated in Baina with the dispersed sex work that materialized.

### METHODS

#### Study Setting

The study was set in Goa, a small coastal state with a population of 1.37 million.10 After the demolition, the relatively homogeneous population of red-light district sex work rapidly evolved into a more heterogeneous dispersed and clandestine types.11 This study was conducted throughout Goa in collaboration with Positive People, the largest and most experienced HIV organization in Goa. Recruitment took place from December 2004 to 2005.

#### Study Population

FSWs were defined as women who were currently providing sexual services in exchange for goods or money.

#### Sampling Method

The FSWs in the survey were recruited using respondent-driven sampling (RDS).12 This variant of chain sampling delves deeper into the hidden networks by rationing the number of recruits per respondent, increasing the number of waves of recruitment, and providing financial incentives to the “recruiter.” The initial recruiters (seeds) were defined as FSWs or community members close to sex work. Based on detailed ethnographic mapping of Goa, seeds were purposively selected from various ethnicities, ages, areas of Goa, and sex work typologies.13

#### Data Collection and Management

This has previously been described in detail.13 Data were collected through face-to-face interviews with a female interviewer in 1 of 4 Indian languages. The questionnaire was a composite of questions derived from several sources on demographics, psychosocial factors, sex work and sexual risk, knowledge and exposure to HIV prevention interventions, reproductive health, and health-seeking behavior. An informal confidential voting interview collected responses to sensitive questions from each respondent. Two independent reviewers checked all questionnaires and inconsistencies were referred back to the field. Data were double entered into a Microsoft access database (Microsoft, Redmond, WA) and underwent range and consistency checks.

#### Laboratory Methods

Biological samples were collected using self-administered vaginal swabs, previously validated in Goa, and dried blood spots. For women who refused to take a vaginal swab, first void urine samples were collected to test for Neisseria gonorrhoeae (NG) and Chlamydia trachomatis (CT). One vaginal swab was inserted into a sterile universal container and the other was inserted into an InPouch TV culture kit (Biomed Diagnostics, San Jose, CA). Five blood spots were taken according to protocol. All samples reached the laboratory within 24 hours of collection. The InPouch TV culture was incubated at 37°C for up to 5 days and underwent daily microscopy for Trichomonas vaginalis (TV). The other samples were stored in a −70°C freezer until processing. Polymerase chain reaction using the Roche Amplicor system (Roche Molecular Systems, Alameda, CA) was used to diagnose chlamydial and gonococcal infection. Dried blood spots were tested for antibody to HIV using 2 enzyme-linked immunosorbent assay (ELISA) tests, Vironostika Uni-Form II plus O (Organon Teknika, Boxtel, The Netherlands), HIV enzyme immunoassay (Ani Labsystems, Ltd, Oy, Vantaa, Finland). Discordant tests were confirmed by Murex HIV 12O (Abbott Laboratories, Abbott Park, IL). The laboratory participated in quality control for molecular (United Kingdom) diagnostics annual QC and National AIDS Research Institute external quality control of the dried blood spots.

#### Statistical Analysis

To adjust for potential biases in recruitment, data were weighted by the inverse of the approximate probabilities of recruitment.12 The weights were calculated, based on network size, age, ethnicity and area, according to how these factors were related to recruitment, using RDS Analysis Tool 5.4.0 (Cornell University, Ithaca, NY). All analyses were performed using Stata8 (Stata Corporation, College Station, TX), incorporating the weights through the standard survey analysis functions. The exposure was defined as ever having worked in Baina red-light area. Characteristics of FSWs who had ever worked in Baina (ex-RLD-SWs) were compared with FSWs who had never worked in Baina (non-RLD-SWs). The association between the exposure, that is, being a ex-RLD-SW and the following outcomes, curable STI, HIV, self-reported condom use, and ever having attended HIV prevention sessions, were measured using multivariate analysis and adjusting for potential confounding factors. Confounders were defined for each outcome as factors associated with both exposure and outcome (P < 0.2) and not on the explanatory pathway. Age, religion, ethnicity, marital status, socioeconomic status, number of regular and nonregular paying customers, and duration of sex work were included as a priori confounders based on published literature. Finally, factors potentially on the explanatory pathway were added into the model to explore their effect on the relationship between STIs and having worked in Baina.

The main reason for missing values was that samples were not received or inhibition of the sample occurred during polymerase chain reaction. Seventeen (5%) of the STI samples were missing (4 CT, NG, TV not received, 6 CT, NG inhibitory, and 7 TV only not received). Only 1 (0.3%) HIV sample was not received. Missing cases were excluded from the analysis.

#### Ethical Considerations

Ethical approval was obtained from the Independent Ethics Commission, Mumbai, and University College London’s ethics committee. A community advisory board mediated community engagement. We campaigned against the demolition.
and provided material support in the immediate aftermath. All participants and their partners were offered presumptive treatment for curable STIs and treatment based on laboratory tests. HIV results were anonymous; however, voluntary counseling and testing for HIV, treatment for STIs, and HIV risk reduction counseling were made available to participants and nonparticipants alike.

RESULTS

Three hundred twenty-six sex workers were recruited from 35 of the 59 seeds approached. Following up to 6 recruitment waves, each seed gave rise to between 2 and 30 participants. Based on our extensive mapping, we became aware of networks that we were unable to recruit; these comprised mainly of women who did not self-identify as FSWs. All areas of Goa and types of sex work identified through mapping were represented in the sample.

Of the 326 FSWs recruited, 125 [44.8% (95% confidence interval, CI: 39.1 to 50.5)] had ever worked in Baina red-light district (ex-RLD-SWs) and 201 [55.3% (95% CI: 49.5 to 60.9)] had never worked in Baina red-light district (non-RLD-SWs). Ninety-six [47.9% (95% CI: 40.9 to 55.0)] of the non-RLD-SWs had started sex work since the demolition.

Table 1 summarizes the differences between ex-RLD-SWs and non-RLD-SWs. Although, the median age of non-RLD-SWs and ex-RLD-SWs was similar, 27 (interquartile ratio: 23–35) and 28 (interquartile ratio: 24–35) respectively; the proportion aged younger than 20 years was higher in the non-RLD-SWs. The non-RLD-SWs were more likely to be Goan, part time, street, and home based. They were more likely to work in more than 1 place and entertained fewer customers, more of whom were regular clients. They were more likely to experience sex-based violence and report suicide attempts, but less likely to be economically disadvantaged than their Baina counterparts.

After adjustment for confounding (Table 2), ex-RLD-SWs had 3 times lower odds of having a curable STIs, 20 times greater odds of exposure to HIV prevention, and a 100 times greater odds of reporting consistent condoms use with clients compared with the heterogeneous dispersed sex workers and non-RLD-SWs. The greater odds of HIV in univariate analysis did not remain statistically significant after adjustment.

After further adjustment for behavioral factors potentially on the explanatory pathway, that is, condom use with paying and nonpaying male partners, HIV knowledge, and exposure to HIV prevention interventions, ex-RLD-SWs were still less likely to have curable STIs, adjusted odds ratio 0.30 (95% CI: 0.19 to 0.94).

DISCUSSION

We believe that this is the first published description of sex work in the aftermath of dismantling a red-light district. Our study suggests that the homogeneous ex-RLD-SWs had lower risk sexual behavior and better access to HIV prevention services compared with the heterogeneous dispersed sex workers who dominated after the demolition.

Part time, dispersed, home, and street-based FSWs filled the void left by the demolition. The non-RLD-SWs were more likely to have an STI, a biological marker of recent sexual risk and/or poor access to STI treatment. This finding was in keeping with their lower likelihood of reporting consistent condom use with clients14 and supports the hypothesis that the non-RLD-SWs were more likely to engage in high-risk behavior. Although this may partly be explained by lack of exposure to HIV prevention interventions, the persistence of higher odds of STIs even after adjusting for behavioral and knowledge indicators suggests that nonpaying sexual networks and more proximal determinants, such as their greater experience of sexual and intimate partner violence, the more socially isolated types of sex work, and lack of collective identity, may also play a part.13,15

Ex-RLD-SWs were more likely to have HIV, although this difference was not statistically significant after adjustment for confounding. Ex-RLD-SWs reported a longer duration in sex work, more clients, and were more likely to have migrated from the higher prevalence areas of northern Karnataka, which was an independent risk factor for HIV.13,15

We have compared ex-RLD-SWs with non-RLD-SWs. The speed with which events unfolded meant that quantitative predemolition data were unavailable for comparison. As recruitment started soon after the demolition, it was likely that the ex-RLD-SWs would approximate to the sex workers working in Baina before the demolition, whereas the non-RLD-SWs would represent the types of dispersed sex work that dominate the sex trade after the demolition. However, the possibility that ex-RDL-SWs who continued to practice in Goa are different to those who left is an important source of selection bias. Moreover, recruitment took place over a period of a year, and the prevalence of curable STIs can rapidly change over a shorter period, potentially diluting the difference between ex-RLD-SWs and non-RLD-SWs.

A dedicated team, familiar with sex work, conducted this study. We actively engaged in advocacy and provided material support post demolition. This lack of “distance” may have resulted in interviewer bias. Similarly, our association with HIV prevention may have resulted in social desirability bias. Behavioral data collected through the survey was, however, consistent with data collected through qualitative methods, informal confidential voting interview, and biological markers.13

To reduce selection bias, we used chain sampling where the probability of recruitment can be calculated; however, this is not a probability sample survey. Although we are able to incorporate variability in the probability of recruitment through weighting to provide unbiased analysis, bias may arise in our analysis if the selection of network members for recruitment is based on factors related to our outcome measures. Furthermore, the full complexity of the RDS sample is not reflected in the standard errors, and so the CIs should be viewed as approximate.

Ex-RLD-SWs had better access to HIV prevention and were more likely to consistently use condoms with their clients. Although the methodological limitations make the difference in STIs difficult to interpret, it is notable that the increased likelihood of having an STI among dispersed
non-RLD-SWs is of a similar magnitude to the reductions recorded in successful sex worker interventions.\textsuperscript{5,16–19}

In conclusion, sociopolitical events that destabilize the context and force sex workers into unorganized, fragmented, and clandestine working conditions create barriers to effective HIV prevention and community mobilization.\textsuperscript{20–22}

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\begin{table}
\centering
\caption{Characteristics Associated With FSWs Who have Ever Worked in Goa’s Red-Light Area, Baina Compared With FSWs Who Never Worked in the Baina Red-Light Area}
\begin{tabular}{l|l|l|l|l}
\hline
Variable & \multicolumn{2}{|l|}{Non-RLD-SW (N = 201), N [Weighted % (95\% CI)]} & \multicolumn{2}{|l|}{Ex-RLD-SW (N = 125), N [Weighted % (95\% CI)]} \\
\hline & & & & \\
\hline Age younger than 20 yrs & 29 [21.1 (8.3 to 17.3)] & 6 [4.5 (2.0 to 9.9)] & & 0.02 \\
Age older than 25 yrs & 117 [60.5 (53.3 to 67.2)] & 74 [64.6 (55.9 to 72.5)] & & 0.5 \\
Ethnicity non-Goan & 150 [81.1 (75.6 to 85.6)] & 122 [98.3 (94.9 to 99.5)] & & <0.001 \\
Religion & & & & 0.005 \\
Hindu & 122 [63.2 (56.1 to 69.7)] & 101 [84.5 (77.5 to 89.5)] & & \\
Christian & 30 [12.6 (8.8 to 17.7)] & 11 [7.0 (3.8 to 12.3)] & & \\
Muslim & 47 [24.2 (18.6 to 31.0)] & 13 [8.6 (5.0 to 14.5)] & & \\
Not fully literate & 150 [78.8 (72.7 to 83.8)] & 105 [85.8 (78.7 to 90.8)] & & 0.1 \\
Marital status & & & & <0.001 \\
Married & 108 [58.5 (51.4–62.5)] & 26 [17.6 (12.1–25.0)] & & \\
Widowed/separated & 56 [27.4 (21.5–34.1)] & 45 [36.6 (28.4–45.7)] & & \\
Never married & 37 [14.1 (10.2–19.3)] & 54 [45.8 (36.9–54.8)] & & \\
Migrated to Goa & 131 [69.8 (63.2 to 75.6)] & 103 [82.0 (73.9 to 88.0)] & & 0.02 \\
Support dependents & 167 [84.8 (79.2 to 89.1)] & 116 [93.6 (87.9 to 96.7)] & & 0.02 \\
Any current debt & 90 [46.4 (39.4 to 53.6)] & 80 [65.0 (56.1 to 73.0)] & & 0.002 \\
Entrapment (not free to leave sex work) & 18 [8.7 (5.5 to 13.6)] & 11 [9.9 (5.5 to 17.1)] & & 0.7 \\
Financial autonomy (having money to spend as she chooses) & 150 [74.9 (68.2 to 80.6)] & 70 [53.1 (44.1 to 62)] & & <0.001 \\
Political empowerment (having voted in any election) & 91 [45.6 (38.7 to 52.8)] & 79 [66.8 (58.1 to 74.5)] & & <0.001 \\
Ever having experienced physical or verbal abuse from current intimate nonpaying male partner & 97 [45.6 (40.5 to 54.7)] & 27 [19.5 (13.5 to 27.4)] & & <0.001 \\
Lifetime experience of sexual violence & 31 [13.3 (9.4 to 18.7)] & 5 [3.4 (1.4 to 8.2)] & & 0.004 \\
Police raid in past year & 32 [14.4 (10.2 to 19.9)] & 18 [13.5 (8.5 to 20.8)] & & 0.8 \\
No emotional support past week & 138 [69.6 (62.7 to 75.7)] & 59 [47.4 (38.5 to 56.4)] & & <0.001 \\
Suicidal attempt (past 3 mo) & 59 [25.5 (20.0 to 32.0)] & 14 [10.3 (6.1 to 16.9)] & & <0.001 \\
Duration SW & & & & <0.001 \\
Less than 1 yr & 96 [47.9 (40.9 to 55.0)] & 9 [6.8 (3.5 to 12.8)] & & \\
1–10 yrs & 86 [42.2 (35.4 to 49.4)] & 59 [42.9 (34.4 to 51.9)] & & \\
More than 10 yrs & 19 [9.9 (6.3 to 15.1)] & 57 [50.2 (41.3 to 59.2)] & & \\
Other source of income & 107 [57.0 (49.8 to 63.8)] & 33 [27.9 (20.5 to 36.7)] & & <0.001 \\
Street workers & 72 [28.5 (21.7 to 35.7)] & 5 [3.2 (1.3 to 7.7)] & & <0.001 \\
Work from home & 69 [36.4 (29.7 to 43.5)] & 20 [17.7 (11.7 to 25.9)] & & <0.001 \\
Work in bar brothel or lodge & 88 [38.7 (32.1 to 45.6)] & 104 [81.3 (73.0 to 87.5)] & & <0.001 \\
Start sex work younger than the age of 16 yrs & 23 [9.8 (6.4 to 14.8)] & 41 [34.0 (26.0 to 43.1)] & & <0.001 \\
At least 1 client per day & 114 [55.1 (47.9 to 62.1)] & 94 [71.9 (62.9 to 79.5)] & & 0.004 \\
At least 1 regular customer & 102 [50.1 (43.0 to 57.2)] & 38 [28.1 (20.8 to 36.7)] & & <0.001 \\
Work in more than 1 place & 10 [70.3 (61.3 to 78.0)] & 34 [29.7 (22.0 to 38.8)] & & <0.001 \\
\hline
\end{tabular}
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and analysis of the qualitative data, and critical appraisal of all the drafts of the articles and final approval of the published article. A. Copas declares that he supported the statistical analysis of the quantitative data and was involved in the critical appraisal of all the drafts of the articles and final approval of the published article. V. Patel, D. Mabey, and F. Cowan declare that they participated in the design of the study, interpretation of the data, and critical appraisal of all the drafts of the articles and final approval of the published article.

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