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Suicidal Behavior Among Female Sex Workers in Goa, India: The Silent Epidemic

Maryam Shahmanesh, MSc, MRCP, Sonali Wayal, MSc, Frances Cowan, MD, FRCP, David Mabey, DM, FRCP, Andrew Copas, PhD, and Vikram Patel, PhD, MRCPsych

Suicide is a public health priority in India. Rates of suicide in India are 5 times higher than in the developed world, with particularly high rates of suicide among young women. Verbal autopsy surveillance from southern India suggests that suicide accounts for 50% to 75% of all deaths among young women, with average suicide rates of 158 per 100,000.

Common mental disorders such as depressive and anxiety disorders, and social disadvantage such as gender-based violence and poverty, are major risk factors for suicide among women. Although research from high-income countries shows that common mental disorders are a major contributor to the risk of suicidal behavior, their role is less clear in low- and middle-income countries in which social disadvantage has been found to be at least as important. Gender disadvantage is increasingly seen as an important contributing factor to the high rates of suicide seen among women in Asia. Gender-based violence is a common manifestation of gender disadvantage and has been linked with common mental disorders and suicide in population-based studies of women and young adults in Goa, India. Lack of autonomy, early sexual debut, limited sexual choices, poor reproductive health, and social isolation are other manifestations of gender disadvantage.

Sex work in India is common. An estimated 0.6% to 0.7% of the female adult urban population are engaged in commercial sexual transactions. Studies from developed nations have found a high prevalence of self-harming behaviors in people engaged in transactional sexual activity. There is also growing evidence suggesting that HIV-positive individuals from traditionally stigmatized groups report higher rates of violence exposure and suicidal ideation. Female sex workers in India are a traditionally stigmatized group, with high prevalence of HIV and levels of stigma and violence that relate to the context of their work. Yet, despite substantial investigation of their reproductive and sexual health needs, there is virtually no information on suicide and its determinants among female sex workers from low- and middle-income countries.

As demonstrated in the hierarchical conceptual framework outlined in Figure 1, we hypothesized that gender disadvantage, sex work, and health factors together with factors indicative of social disadvantage are distal determinants of female sex workers’ vulnerability to suicidal behaviors, the effects of which would be mediated through poor mental health. We studied the burden of suicidal behaviors among sex workers from low- and middle-income countries.

We physically mapped the urban centers, migrant slums, and coastal belt with a team of trained field researchers. We completed site inventories for each area and used participatory observation, focus group discussions, and semistructured key informant interviews to identify the type and number of female sex workers, and where, when, and how they worked. This formed the basis of the sampling framework for a cross-sectional study of female sex workers.

Study Setting
Our study was set in Goa, a small coastal state with a population of 1.37 million. The main industries are tourism, fishing, and...
Goa has more than 1.5 million domestic and international tourists annually and a corresponding number of seasonal migrants. Consequent to this thoroughfare of seasonal visitors, Goa has a large population of predominantly migrant female sex workers. The rapid ethnographic mapping of sex work, which followed the demolition of the Baina red-light area in June 2004, showed that homogeneous brothel-based sex work evolved into a heterogeneous dispersed and clandestine trade. This consisted of street-based female sex workers soliciting in railway stations, bus stops, and municipal parks; sex workers working 10- to 14-day contracts in lodges throughout Goa; sex workers working from home and through mobile phones; women on short-term contracts to pimps and confined to flats; female construction workers and women residing in urban slums subsidizing their meager income with transactional sexual relations; and the survivors of the Baina demolition continuing to operate from the neighboring slums.

The HIV-prevention interventions that the women were exposed to were a composite of sexual risk reduction counseling delivered through outreach workers and peer educators, the provision of condoms, and the referral of symptomatic women for treatment of sexually transmitted infections (STIs; Shahmanesh et al., unpublished data, 2009). We conducted this study throughout Goa in collaboration with Positive People, the largest HIV nongovernmental organization in Goa, with more than a decade of experience of working with female sex workers. Recruitment took place from December 2004 to December 2005. Women who had provided sexual services in exchange for goods or money over the past 3 months were eligible to participate in the study.

Sampling Method

We used respondent-driven sampling to recruit the female sex workers in the survey. 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.” We defined the initial recruiters, also known as “seeds,” as female sex workers or community members proximate to the sex workers. We purposively selected seeds from various ethnicities, ages, areas of Goa, and sex-work categories that were identified during the qualitative phase of the study. The seeds received vouchers with unique numbers to recruit 3 other members of their network into the study. Each respondent received a sum of 100 rupees (US$2.50) for participating and a further sum of 50 rupees ($1.25) for each successfully recruited referral. In keeping with other studies that have utilized respondent-driven sampling, we aimed for 6 waves of recruitment.

A community advisory board mediated community engagement. Participants who were found to be psychologically distressed or who were suicidal were referred to services at Positive People and Sangath, a community-based mental health nongovernmental organization or to public-sector psychiatric services. All participants and their partners were offered presumptive treatment of bacterial STIs as well as treatment on the basis of laboratory tests. HIV test results were anonymous; however, voluntary counseling and testing for HIV, treatment of STIs, and HIV risk reduction counseling were made available throughout the study.

Measures

We trained female interviewers to administer a questionnaire that had been translated and extensively pilot-tested in 4 Indian languages. The trained interviewers interviewed female sex workers in private settings including hired rooms, lodgings, drop-in-centers, the project vehicle, and clinics. The questionnaire, which took 60 minutes to complete, was a composite of questions derived from several sources covering 5 domains: sociodemographic factors, sex-work and sexual risk factors, gender disadvantage, mental health, substance abuse, and suicidal behaviors.

The following domains were measured through the questionnaire: sociodemographic factors, sex work–related factors, gender disadvantage, social support, sexual health, mental health, substance abuse, and suicidal behaviors. These covered age, ethnicity, religion, literacy, schooling, marital status, debt, homeownership, the responsibility to support dependents, number of children, and migration status.
Sex work–related factors. These included duration in sex work, age at starting sex work, type of sex work (brothel based, street based, or home based), part-time sex work (defined as a woman whose sole source of income was not sex work) versus full time sex work, the number of customers (regular and nonregular), income per customer, condom use with customers, having a nonpaying intimate partner, and change in nonpaying intimate partner in the past 3 months.

Gender disadvantage. We assessed gender disadvantage in 2 ways. First, we elicited the participant’s experience of violence through questions about lifetime experience of verbal and physical violence from intimate nonpaying sexual partners and others in the community. We collected experience of sexual violence from family and society with the confidential voting interview. Second, we measured the participants’ autonomy to make decisions as entrapment (i.e., unable to leave sex work by choice), financial autonomy (i.e., having money to utilize as they choose), political autonomy (i.e., having exercised the right to vote during elections), and finally, the autonomy to make decisions regarding their own sexual safety with clients.

Social support. We measured the extent of participant’s social support as whether they had someone to turn to for support in the past week.

Sexual health. We used questions adapted from the Indian national survey to assess changes in behavior and prevalence of HIV and other STIs in populations at risk for HIV known as the Integrated Behavioral and Biological Assessment to elicit knowledge regarding HIV transmission and prevention. We ascertained recent and lifelong exposure to HIV prevention interventions. We defined infertility as a failed attempt to have a child over the past year. We used the confidential voting interview to elicit information about ever having had an abortion.

Women were asked to provide self-taken vaginal swabs and dried-blood spots. The vaginal specimens were tested with the Roche Amplicor PCR assay (Roche Molecular Systems, Alameda, CA) for chlamydial and gonococcal infection, and the InPouch TV culture kit (Biomed Diagnostic, San Jose, CA) for Trichomonas vaginalis. The dried-blood spots were tested with a World Health Organization testing algorithm for HIV and enzyme-linked immunosorbent assays for herpes simplex virus

### TABLE 1—Association Between Sociodemographic Factors and Suicide Attempt Among Female Sex Workers: Goa, India, December 2004–December 2005

<table>
<thead>
<tr>
<th>Univariate Analysis</th>
<th>Prevalence of Suicide Attempts in Past 3 Mo, No. (Weighted %)</th>
<th></th>
<th>Univariate Analysis</th>
<th>Prevalence of Suicide Attempts in Past 3 Mo, No. (Weighted %)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All 325 (100) 73 (18.7)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Age, y</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 20 (Ref)</td>
<td>35 (8.6) 17 (41.5)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21–25</td>
<td>100 (29.0) 22 (18.5)</td>
<td>0.32 (0.13, 0.76)</td>
<td>0.44 (0.17, 1.15)</td>
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</tr>
<tr>
<td>26–30</td>
<td>78 (25.5) 11 (10.8)</td>
<td>0.17 (0.07, 0.45)</td>
<td>0.29 (0.10, 0.86)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31–35</td>
<td>43 (13.8) 10 (21.1)</td>
<td>0.38 (0.14, 1.04)</td>
<td>0.75 (0.23, 2.51)</td>
<td></td>
<td></td>
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<tr>
<td>≥ 36</td>
<td>69 (22.9) 13 (17.7)</td>
<td>0.30 (0.12, 0.77)</td>
<td>0.63 (0.20, 2.05)</td>
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<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>&lt;.001</td>
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<td></td>
<td></td>
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<tr>
<td>Goan (Ref)</td>
<td>54 (11.2) 23 (39.7)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karnataka</td>
<td>200 (72.0) 28 (13.3)</td>
<td>0.23 (0.12, 0.46)</td>
<td>0.26 (0.11, 0.62)</td>
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<tr>
<td>Other</td>
<td>71 (16.8) 22 (28.2)</td>
<td>0.60 (0.28, 1.27)</td>
<td>0.62 (0.25, 1.57)</td>
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<td></td>
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<tr>
<td>Religion</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Non-Hindu (Ref)</td>
<td>102 (27.5) 41 (27.4)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
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<tr>
<td>Hindu</td>
<td>223 (72.6) 32 (15.5)</td>
<td>0.48 (0.28, 0.85)</td>
<td>0.66 (0.34, 1.26)</td>
<td></td>
<td></td>
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<tr>
<td>Literacy</td>
<td>.12</td>
<td></td>
<td></td>
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<tr>
<td>Literate (Ref)</td>
<td>71 (18.1) 21 (25.4)</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Not fully literate</td>
<td>254 (81.9) 52 (17.3)</td>
<td>0.61 (0.33, 1.14)</td>
<td>1.00</td>
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<tr>
<td>Schooling</td>
<td>.01</td>
<td></td>
<td></td>
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<tr>
<td>None (Ref)</td>
<td>252 (67.3) 33 (15.1)</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Any</td>
<td>73 (32.7) 40 (26.3)</td>
<td>2.01 (1.16, 3.48)</td>
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<tr>
<td>Marital status</td>
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<tr>
<td>Never married (Ref)</td>
<td>91 (28.4) 24 (20.2)</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Married</td>
<td>134 (40.3) 30 (20.5)</td>
<td>1.02 (0.53, 1.95)</td>
<td>1.00</td>
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<tr>
<td>Separated or widowed</td>
<td>101 (31.3) 19 (15.2)</td>
<td>0.70 (0.35, 2.00)</td>
<td>1.00</td>
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<tr>
<td>In debt</td>
<td>.5</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>No (Ref)</td>
<td>156 (45.4) 39 (20.3)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>169 (54.6) 34 (17.4)</td>
<td>0.83 (0.48, 1.43)</td>
<td>1.00</td>
<td></td>
<td></td>
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<tr>
<td>Homeownership</td>
<td>.16</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Yes (Ref)</td>
<td>124 (36.8) 35 (22.7)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>201 (63.2) 38 (16.5)</td>
<td>0.67 (0.39, 1.17)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support dependents</td>
<td>.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (Ref)</td>
<td>43 (11.3) 29 (28.9)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>282 (88.7) 14 (17.5)</td>
<td>0.52 (0.25, 1.09)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td>&lt;.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None (Ref)</td>
<td>72 (19.3) 30 (37.6)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 or more</td>
<td>254 (80.7) 43 (14.2)</td>
<td>0.28 (0.15, 0.50)</td>
<td>0.36 (0.17, 0.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration in Goa</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 y or less (Ref)</td>
<td>42 (11.6) 16 (31.1)</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-10 y</td>
<td>99 (30.1) 14 (13.5)</td>
<td>0.35 (0.15, 0.83)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 10 y</td>
<td>92 (33.5) 13 (12.9)</td>
<td>0.33 (0.14, 0.80)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From birth</td>
<td>92 (24.8) 30 (27.2)</td>
<td>0.83 (0.37, 1.83)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: AOR = adjusted odds ratio; CI = confidence interval.
TABLE 2—Association Between Sex Work Factors and Suicide Attempt Among Female Sex Workers: Goa, India, December 2004–December 2005

<table>
<thead>
<tr>
<th>Prevalence of Suicide Attempts in Past 3 Mo.</th>
<th>No. (Weighted %)</th>
<th>No. (Weighted %)</th>
<th>AOR* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time in sex work, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤1 (Ref)</td>
<td>105 (29.6)</td>
<td>28 (22.8)</td>
<td>1.00</td>
</tr>
<tr>
<td>2–10</td>
<td>144 (42.4)</td>
<td>37 (21.9)</td>
<td>1.02 (0.50, 2.08)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>76 (28.0)</td>
<td>8 (9.6)</td>
<td>0.43 (0.16, 1.11)</td>
</tr>
<tr>
<td>Having ever worked in the Baina red-light area</td>
<td>124 (44.6)</td>
<td>14 (10.3)</td>
<td>0.37 (0.16, 0.84)</td>
</tr>
<tr>
<td>Income from source other than sex work</td>
<td>140 (44.1)</td>
<td>30 (18.7)</td>
<td>1.29 (0.67, 2.48)</td>
</tr>
<tr>
<td>Location of sex work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Street</td>
<td>77 (22.8)</td>
<td>15 (17.9)</td>
<td>1.13 (0.53, 2.39)</td>
</tr>
<tr>
<td>Establishment (lodge, bar, or brothel)</td>
<td>191 (57.6)</td>
<td>46 (19.8)</td>
<td>0.86 (0.41, 1.81)</td>
</tr>
<tr>
<td>Home</td>
<td>89 (28.1)</td>
<td>21 (19.9)</td>
<td>1.38 (0.67, 2.84)</td>
</tr>
<tr>
<td>Number of customers per wk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 (Ref)</td>
<td>123 (38.4)</td>
<td>20 (13.1)</td>
<td>1.00</td>
</tr>
<tr>
<td>1–7</td>
<td>179 (56.4)</td>
<td>43 (20.5)</td>
<td>1.84 (0.96, 3.51)</td>
</tr>
<tr>
<td>&gt;7</td>
<td>23 (5.2)</td>
<td>19 (41.5)</td>
<td>4.27 (1.30, 14.07)</td>
</tr>
<tr>
<td>1 or more regular customers</td>
<td>139 (40.1)</td>
<td>47 (29.5)</td>
<td>2.93 (1.57, 5.48)</td>
</tr>
<tr>
<td>Consistent condom use with customers</td>
<td>236 (74.2)</td>
<td>47 (16.5)</td>
<td>0.56 (0.28, 1.13)</td>
</tr>
<tr>
<td>Income from customer (per $2.5 increase in payment)</td>
<td>236 (74.2)</td>
<td>47 (16.5)</td>
<td>0.56 (0.28, 1.13)</td>
</tr>
<tr>
<td>Started sex work at age 16 y or younger</td>
<td>64 (20.8)</td>
<td>17 (21.4)</td>
<td>1.09 (0.49, 2.43)</td>
</tr>
<tr>
<td>No regular nonpaying male partner</td>
<td>78 (24)</td>
<td>16 (19.3)</td>
<td>0.86 (0.42, 1.78)</td>
</tr>
<tr>
<td>Change in nonpaying regular partner over the past 3 mo</td>
<td>19 (5.4)</td>
<td>5 (22.2)</td>
<td>1.02 (0.27, 3.90)</td>
</tr>
</tbody>
</table>

Note. AOR = adjusted odds ratio; CI = confidence interval.
*Adjusted for baseline factors (age, ethnicity, religion, and number of children).

We performed analyses with Stata version 8 (Stata Corp, College Station, TX), incorporating the weights through the survey analysis functions. All percentages and odds ratios (ORs) quoted were weighted with 95% confidence intervals (CIs). We carried out logistic regression with suicide attempt in the past 3 months as the outcome. We built multiple logistic regression models for the outcome based on a hierarchical conceptual framework shown in Figure 1. First we included the sociodemographic (underlying) factors that were found to be associated with the outcome in univariate analysis (at P≤.2) in a stepwise forward model selection procedure (also at P≤.2). This led to our base model. Next we individually tested the association between each of the gender-disadvantage, sex-work, and health factors and suicide while simultaneously adjusting for the factors in the base model. We present the resulting adjusted ORs in our tables. We included those factors found to be associated (at P≤.2) after adjustment together in the final model selection. Therefore, the final model was a composite model that included the previously mentioned factors selected in a stepwise forward model selection procedure (P≤.2) and the factors from the base model. We then fitted the final model with and without mental health scores to examine the effect of the distal factors independently and with the potentially mediating effect of poor mental health. Adjusted odds ratios of the final model with and without the mental health score are presented in the tables.

One woman refused to answer the questions on suicide attempt and was excluded from the analysis. We converted continuous variables to categories based on published studies and a priori definitions. We tested for interaction between all pairs of factors in the final model.

RESULTS

We recruited 326 sex workers from 35 different respondent-driven sampling networks throughout Goa. Of the 59 seeds that were approached, 35 recruited women into the study. Through our extensive mapping we became aware of sex-worker networks that we were unable to recruit; these mainly comprised women who did not self-identify as sex workers. We recruited up to 6 waves, with recruitment networks comprising 2 to 30...
participants. Each type of sex work identified during mapping was represented in the sample. The socioeconomic characteristics of the study population are presented in Table 1. Most participants were younger than 30 years, Hindu, and from the neighboring state of Karnataka. Two thirds had not attended school, and 82% could not read or write. The majority were married, supported dependents, and did not own their own house. A little more than half were in debt.

Prevalence of Suicidal and Self-Harm Behaviors

In the previous 3 months, the prevalence of suicidal ideation was 34.9% (95% CI = 29.8%, 40.3%; n = 126), the prevalence of suicide planning was 25.6% (95% CI = 21.1%, 30.6%; n = 95), and the prevalence of suicide attempt was 18.7% (95% CI = 14.9%, 23.3%; n = 73). The prevalence of suicide attempts in the past 3 months among women younger than 20 years was 41.5% (n = 17).

Table 3 describes the relationship between autonomy, social support, violence, and suicide attempt among female sex workers: Goa, India, December 2004–December 2005.

<table>
<thead>
<tr>
<th>Autonomy</th>
<th>Prevalence of Suicide Attempts in Past 3 Months</th>
<th>AOR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. (Weighted %)</td>
<td>Mo. No. (Weighted %)</td>
</tr>
<tr>
<td>Political empowermentb</td>
<td>169 (55.0)</td>
<td>33 (33.6)</td>
</tr>
<tr>
<td>Entrapmentc</td>
<td>296 (90.7)</td>
<td>63 (28.1)</td>
</tr>
<tr>
<td>No financial autonomy</td>
<td>106 (35.0)</td>
<td>25 (19.0)</td>
</tr>
<tr>
<td>Coerced into unsafe sexual relations with customer</td>
<td>95 (26.9)</td>
<td>33 (30.3)</td>
</tr>
<tr>
<td>Social support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recent lack of emotional support</td>
<td>196 (60.0)</td>
<td>50 (21.5)</td>
</tr>
<tr>
<td>Turn to intimate partner for support</td>
<td>65 (19.5)</td>
<td>12 (14.9)</td>
</tr>
<tr>
<td>Turn to family for support</td>
<td>21 (6.2)</td>
<td>3 (10.2)</td>
</tr>
<tr>
<td>Turn to other female sex workers for support</td>
<td>114 (35.2)</td>
<td>27 (20.2)</td>
</tr>
<tr>
<td>Violence</td>
<td></td>
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<tr>
<td>Involved in police raid, past y</td>
<td>50 (14.0)</td>
<td>18 (30.8)</td>
</tr>
<tr>
<td>Intimate partner verbal abuse, current</td>
<td>108 (29.7)</td>
<td>40 (32.2)</td>
</tr>
<tr>
<td>Intimate partner physical abuse, current</td>
<td>104 (29.8)</td>
<td>38 (31.8)</td>
</tr>
<tr>
<td>Any intimate partner violence, current</td>
<td>124 (35.1)</td>
<td>43 (30.5)</td>
</tr>
<tr>
<td>Violence from others, current</td>
<td>69 (18.9)</td>
<td>29 (35.9)</td>
</tr>
<tr>
<td>Lifetime sexual violence</td>
<td>36 (8.9)</td>
<td>18 (46.9)</td>
</tr>
<tr>
<td>Childhood sexual abuse</td>
<td>18 (4.6)</td>
<td>7 (41.0)</td>
</tr>
</tbody>
</table>

Notes: AOR = adjusted odds ratio; CI = confidence interval.

The determinants of suicide attempts

Several sociodemographic factors, such as age, ethnicity, attendance of school, number of children, and duration in Goa, were associated with suicide attempt in the past 3 months (Table 1). After we adjusted for other socioeconomic factors, being of Kannad ethnicity, and having at least 1 child were independently associated with lower likelihood of reporting a suicide attempt. Kannad ethnicity, having exposure to HIV prevention services in the past 3 months, and having at least 1 child were associated with lower probability of suicide attempts. After inclusion of mental health indicators into the model, we observed that having a higher (i.e., poor) mental health score was independently associated with suicide attempts. Inclusion of mental health indicators did not affect the direction or magnitude of the distal determinants of self-reported suicide attempts. There were no significant interactions between any of the exposure variables in the final model.

Discussion

To the best of our knowledge, this is the first study of suicidal behavior in female sex workers in India. Suicidal behaviors were very common, particularly among younger women. Gender disadvantage (notably violence, entrapment, and childlessness), type of sex work, and poor mental health were associated with suicide attempts. Sex workers who had attended a sexual risk reduction session in the past 3 months were 3 times less likely to have attempted suicide in the same period, which suggests that HIV prevention interventions...
TABLE 4—Association Between Health-Related Factors and Suicidal Behavior Among Female Sex Workers: Goa, India, December 2004–December 2005

<table>
<thead>
<tr>
<th>Sexual health</th>
<th>Prevalence of Suicide Attempts in Past 3 Mo. (Weighted %)</th>
<th>AOR* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV knowledge score</td>
<td>1.00 (0.96, 1.04)</td>
<td></td>
</tr>
<tr>
<td>Exposure to sexual risk reduction interventions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>110 (38.5)</td>
<td>17 (12.4)</td>
</tr>
<tr>
<td>Past 3 mo</td>
<td>55 (19.3)</td>
<td>28 (16.3)</td>
</tr>
<tr>
<td>Lifetime induced abortions</td>
<td>90 (24.9)</td>
<td>28 (16.3)</td>
</tr>
<tr>
<td>Infertility over past y</td>
<td>47 (14.8)</td>
<td>15 (29.8)</td>
</tr>
<tr>
<td>Presence of sexually transmitted infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlamydia, trichomonas, or gonorrhea</td>
<td>75 (22.0)</td>
<td>25 (22.9)</td>
</tr>
<tr>
<td>HIV</td>
<td>77 (25.8)</td>
<td>14 (16.0)</td>
</tr>
<tr>
<td>Herpes simplex 2</td>
<td>180 (57.1)</td>
<td>39 (18.2)</td>
</tr>
<tr>
<td>Substance use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never (Ref)</td>
<td>137 (42.9)</td>
<td>33 (21.2)</td>
</tr>
<tr>
<td>Less than weekly</td>
<td>23 (6.2)</td>
<td>9 (31.0)</td>
</tr>
<tr>
<td>At least weekly</td>
<td>165 (50.9)</td>
<td>31 (15.2)</td>
</tr>
<tr>
<td>Gutka (chew tobacco)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never (Ref)</td>
<td>165 (47.6)</td>
<td>43 (31.2)</td>
</tr>
<tr>
<td>Less than weekly</td>
<td>21 (6.7)</td>
<td>5 (19.1)</td>
</tr>
<tr>
<td>At least weekly</td>
<td>139 (45.7)</td>
<td>25 (16.2)</td>
</tr>
<tr>
<td>Smoke tobacco</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never (Ref)</td>
<td>290 (91.5)</td>
<td>58 (16.9)</td>
</tr>
<tr>
<td>Less than weekly</td>
<td>10 (2.4)</td>
<td>4 (27.3)</td>
</tr>
<tr>
<td>At least weekly</td>
<td>25 (6.1)</td>
<td>11 (43.0)</td>
</tr>
</tbody>
</table>

Note. AOR = adjusted odds ratio; CI = confidence interval.
*Adjusted for baseline factors (age, ethnicity, religion, and number of children).

served as a vehicle to promote their mental health.

The prevalence of suicidal behaviors, particularly in young women in this study, was remarkably high. Suicide is a leading cause of death in young women in India.

A prospective cohort of 2494 women in Goa found a 0.8% annual incidence of attempted suicide.

A cross-sectional study of 3662 young people in Goa found that 6% of women aged 16 to 24 years had contemplated suicide in the past 3 months.

We have reported on a particularly disadvantaged group of women who have traditionally been excluded from mainstream health policies and services. A Chinese study in a comparable population found that 14% of female sex workers had contemplated and 8% had attempted suicide in the preceding 6 months.

During the study, the Goa government demolished the red-light area. The negative publicity surrounding the demolition and the subsequent increased stigma and violence experienced by female sex workers in Goa may explain the extremely high levels of self-reported suicidal behavior.

Intimate partner violence is extremely common in India. The 2005–2006 National Family Health Survey showed that 37% of women had experienced intimate partner physical or sexual violence.

A cohort study of women in Goa found a lifetime experience of verbal, physical, or sexual abuse of 15%.

The prevalence of domestic violence among the sex workers in this study, although close to the national average, is higher than that for rural women in Goa. Moreover, sex workers differ from other women in their experience of violence from the wider community, i.e., from police, clients, pimps, brothel owners, and community members. We found an association between suicide attempts and intimate partner violence similar to that described in other studies. However, we also found an independent association, of a similar magnitude, with violence from others.

Regarding other measures of gender disadvantage, suicide was associated with the inability to leave sex work (entrapment) but was not associated with lack of financial autonomy. This may reflect the observation that 65% of the women in our study had financial autonomy compared with 45% of women in the 2005–2006 National Family Health Survey.

The relationship between being childless and suicide may be because of social censure of childless women in India; however, the life-affirming protective effect of having a child can be an alternative explanation.

In contrast to other studies, we found that migrant women were less likely to report suicide attempts. Non-Goan female sex workers from Karnataka follow the Devadassi tradition, i.e., being dedicated to the temples as young girls. Studies from Karnataka and our qualitative data suggest that Devadasis have a more cohesive identity and are less likely to experience violence from customers and police. This is attributed to the widely held belief that Devadasis are protected by the goddess Yellamma and should not be harmed. Goan sex workers by contrast are extremely stigmatized and live under the daily threat of disclosure and exclusion from their communities. Other cultural differences are a less likely explanation given that religious difference was not associated with suicide attempt. Similarly, the relationship between suicide attempt and regular paying customers may be explained by the observation that sex workers with regular customers were more likely to be working part time, working from home, and using mobile phones, suggesting a more marginalized group devoid of peer support and collective identity.

The reduced probability of suicide attempt among women who had exposure to HIV prevention interventions could be explained through a number of mechanisms. First, HIV prevention is often done in groups and involves a degree of collectivization that can be protective of women’s mental health. Secondly,
Suicidal behaviors were very common in this marginalized and disadvantaged group of women. Both structural factors, relating to gender and context of sex work, and individual factors, such as poor mental health, were independently associated with suicidal behaviors. Our study findings indicate that interventions to promote the health of female sex workers must prioritize mental health and suicide prevention, along with the existing focus on HIV prevention. To reduce self-harm, our findings point to the need for a multipronged approach that includes community mobilization that organizes, empowers, and provides the means for women to collectively confront violence and improves access to mental health interventions for depression. The huge scale-up of HIV

### TABLE 5—Multivariate Analysis of the Determinants of Self-Reported Suicide Attempt in the Past 3 Months Among Female Sex Workers: Goa, India, December 2004–December 2005

<table>
<thead>
<tr>
<th>Final Model Including Proxy Measures of Mental Health</th>
<th>Final Model Including Proxy Measures of Mental Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR (95% CI)</td>
<td>ADR (95% CI)</td>
</tr>
<tr>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
</tr>
<tr>
<td>&lt;20 (Ref)</td>
<td>1.00 (0.95, 1.06)</td>
</tr>
<tr>
<td>21-25</td>
<td>0.97 (0.87, 1.09)</td>
</tr>
<tr>
<td>26-30</td>
<td>0.85 (0.77, 0.94)</td>
</tr>
<tr>
<td>31-35</td>
<td>0.76 (0.69, 0.84)</td>
</tr>
<tr>
<td>≥36</td>
<td>0.65 (0.58, 0.72)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
</tr>
<tr>
<td>Goan (Ref)</td>
<td>1.00 (0.92, 1.09)</td>
</tr>
<tr>
<td>Karnataka</td>
<td>0.47 (0.40, 0.55)</td>
</tr>
<tr>
<td>Other</td>
<td>0.74 (0.64, 0.86)</td>
</tr>
<tr>
<td>Hindu</td>
<td>0.41 (0.35, 0.48)</td>
</tr>
<tr>
<td>Has at least 1 child</td>
<td>0.41 (0.35, 0.48)</td>
</tr>
<tr>
<td>Gender disadvantage</td>
<td></td>
</tr>
<tr>
<td>Intimate partner physical abuse</td>
<td>2.81 (1.45, 5.45)</td>
</tr>
<tr>
<td>Violence from others</td>
<td>2.29 (1.16, 4.54)</td>
</tr>
<tr>
<td>Entrapment‡</td>
<td>1.13 (0.45, 2.85)</td>
</tr>
<tr>
<td>1 or more regular customers</td>
<td>0.87 (0.36, 1.51)</td>
</tr>
<tr>
<td>At least 1 customer per wk</td>
<td>1.23 (0.21, 0.72)</td>
</tr>
<tr>
<td>Exposure to sexual risk reduction counseling in past 3 mo</td>
<td>0.29 (0.10, 0.88)</td>
</tr>
<tr>
<td>Measure of poor mental health</td>
<td>1.06 (1.01, 1.11)</td>
</tr>
</tbody>
</table>

Note. OR = odds ratio; CI = confidence interval. Only variables that remained in the model after multivariate logistic regression are reported in this table.

*Adjusted for age, ethnicity, religion, number of children, time in sex work, ever worked in Baina red-light area, number of customers per week, number of regular customers, payment per customer, entrapment, lack of emotional support, police raid, intimate partner physical violence, intimate partner verbal violence, violence from others, lifetime sexual violence, coerced unsafe sexual relations, recent exposure to HIV prevention interventions, infertility, and alcohol use.

†Adjusted for all variables in the final model plus Kessler-10 (K10) mental health score.

‡Not free to leave sex work.

female sex workers that access services may be a “different type” of sex worker, i.e., more empowered, more health conscious, and less disadvantaged. Thirdly, the sexual health counselor may inadvertently address psychological and social concerns during the counseling process. The lack of association between HIV and suicide attempt in our study is likely an artifact because not all study participants were aware of their HIV status and HIV testing was anonymous.

Our findings suggest that the key factors associated with suicidal behaviors among female sex workers are gender disadvantage (i.e., violence, entrapment, and childlessness) and a more socially isolated working environment. Although we did find an association between suicide attempt and greater depression and anxiety scores, the introduction of mental health measures into the model did not affect the magnitude of the association of other factors. This, in keeping with other studies from India, suggests an equal weight for underlying structural factors and mental health in determining suicidal behaviors.

### Strengths and Limitations

The strength of this study is that we had a representative sample of female sex workers, including different networks and types, and many of whom had never accessed sexual health services. We used standardized and field-tested tools for the diagnosis of self-harming behaviors and sociodemographic, health, and gender-disadvantage indicators that were culturally appropriate and validated. The remaining questions were informed by the qualitative data, translated, and extensively field tested.

To reduce selection bias we used chain sampling, in which an approximate probability of recruitment can be calculated for each participant and then inverted to form weights, for an approximately unbiased analysis. However, although we are confident that the majority of networks are represented in the final sample, this is not a true probability sample survey. In particular, bias may arise in our analysis if the selection of network members for recruitment is based on factors related to outcome measures. Furthermore, the full complexity of the sample derived from respondent-driven sampling is not reflected in the standard errors, so the CIs and P values should be viewed as approximate.

Finally, this was a cross-sectional study and the direction of effect is unclear: for example, entering into violent relationships may be a manifestation of suicidal behavior and not vice versa. Sex work is taboo within Indian society. Participants may have felt obliged to express suicidal ideation if they were engaged in such socially undesirable work. However, the results of our qualitative study suggested that self-harming behaviors were prevalent.

### Conclusions
prevention interventions among female sex workers and the seemingly protective effect of being in contact with HIV prevention services implies that sexual health services may be the most appropriate vehicle to deliver quality mental health services to female sex workers.

About the Authors
At the time of the study, Maryam Shahmanesh was with the Centre for Sexual Health and HIV Research, University College London, London, UK, and with the Department of Epidemiology and Public Health, London School of Hygiene and Tropical Medicine, London, UK. Frances M. Cowan and Andrew Copas were with the Centre for Sexual Health and HIV Research, University College London, London. David Mabey was with the Department of Infection and Tropical Disease, London School of Hygiene and Tropical Medicine, London. Vibur Patelt was with the Department of Epidemiology and Public Health, London School of Hygiene and Tropical Medicine, London, UK, and Sangath, Porvorm, Goa, and Positive People, Goa.

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Contributors M. Shahmanesh designed and implemented the study and reviewed, analyzed, and interpreted the data. She wrote the first and subsequent drafts of the article. S. Wayal participated in the implementation of the study, collection and analysis of the data, and critical appraisal of all the drafts of the article. F. Cowan, D. Mabey, and V. Patel participated in the design of the study, interpretation of the data, and critical appraisal of all the drafts of the article. A. Copas supported the statistical analysis of the quantitative data and was involved in the critical appraisal of all the drafts of the article.

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Note. The design and implementation of the study was independent from the funding body and the findings do not reflect the Wellcome Trust opinions.

Human Participant Protection This study received ethical approval from the independent ethics committee of Mumbai and the ethics committee of the University College London.

References