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,[1,2] with particularly high rates of suicide among young women.[3–5] 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.[2]

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.[1,3,6–8] 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.[1,3,6–8] Gender disadvantage is increasingly seen as an important contributing factor to the high rates of suicide seen among women in Asia.[1,3,6,7] 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.[4,5,9] 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.[10] Studies from developed nations have found a high prevalence of self-harming behaviors in people engaged in transactional sexual activity.[11] There is also growing evidence suggesting that HIV-positive individuals from traditionally stigmatized groups report higher rates of violence exposure and suicidal ideation.[12,13] Female sex workers in India are a traditionally stigmatized group, with high prevalence of HIV[10] and levels of stigma and violence

Objectives. We sought to study suicidal behavior prevalence and its association with social and gender disadvantage, sex work, and health factors among female sex workers in Goa, India.

Methods. Using respondent-driven sampling, we recruited 326 sex workers in Goa for an interviewer-administered questionnaire regarding self-harming behaviors, sociodemographics, sex work, gender disadvantage, and health. Participants were tested for sexually transmitted infections. We used multivariate analysis to define suicide attempt determinants.

Results. Nineteen percent of sex workers in the sample reported attempted suicide in the past 3 months. Attempts were independently associated with intimate partner violence (adjusted odds ratio [AOR]=2.70; 95% confidence interval [CI]=1.38, 5.28), violence from others (AOR=2.26; 95% CI=1.15, 4.45), entrapment (AOR=2.76; 95% CI=1.11, 6.83), regular customers (AOR=3.20; 95% CI=1.61, 6.35), and worsening mental health (AOR=1.05; 95% CI=1.01, 1.11). Lower suicide attempt likelihood was associated with Kannad ethnicity, HIV prevention services, and having a child.

Conclusions. Suicidal behaviors among sex workers were common and associated with gender disadvantage and poor mental health. India's widespread HIV-prevention programs for sex workers provide an opportunity for community-based interventions against gender-based violence and for mental health services delivery. (*Am J Public Health.* 2009;99:1239–1246. doi:10.2105/AJPH.2008.149930)

that relate to the context of their work.[14] 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.[15]

As demonstrated in the hierarchical conceptual framework outlined in Figure 1,[4,5,9] 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,[4,5,9,15] the effects of which would be mediated though poor mental health.[3] We studied the burden of suicidal behaviors in a cross-sectional sample of female sex workers in Goa, India. We explored the association of sociodemographic factors, type of sex work, sexual health, and gender disadvantage, with and without measures of

poor mental health, on suicide attempts in the past 3 months.

METHODS

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.[16] The main industries are tourism, fishing, and
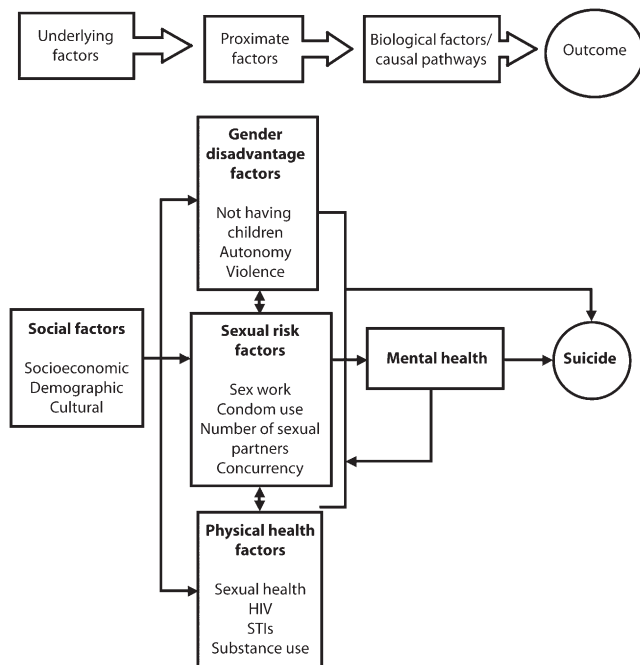
Note. STI = sexually transmitted infection.

FIGURE 1—A conceptual framework for social risk factors for suicide among female sex workers in India.

mining.[17] 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.[18] 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.[19] 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.[19]

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, health, and suicidal behavior.[20–22] 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.

Sociodemographic factors. 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 women 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.[23] 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[24] 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

	No. (Weighted %)	Prevalence of Suicide Attempts in Past 3 Mo, No. (Weighted %)	Univariate Analysis		Base Model, AOR (95% CI)
			OR (95% CI)	P	
All	325 (100)	73 (18.7)			
Age, y				.01	
< 20 (Ref)	35 (8.6)	17 (41.5)	1.00		1.00
21–25	100 (29.0)	22 (18.5)	0.32 (0.13, 0.76)		0.44 (0.17, 1.15)
26–30	78 (25.5)	11 (10.8)	0.17 (0.07, 0.45)		0.29 (0.10, 0.86)
31–35	43 (13.8)	10 (21.1)	0.38 (0.14, 1.04)		0.75 (0.23, 2.51)
≥ 36	69 (22.9)	13 (17.7)	0.30 (0.12, 0.77)		0.63 (0.20, 2.05)
Ethnicity				<.001	
Goan (Ref)	54 (11.2)	23 (39.7)	1.00		1.00
Karnataka	200 (72.0)	28 (13.3)	0.23 (0.12, 0.46)		0.26 (0.11, 0.62)
Other	71 (16.8)	22 (28.2)	0.60 (0.28, 1.27)		0.62 (0.25, 1.57)
Religion				.01	
Non-Hindu (Ref)	102 (27.5)	41 (27.4)	1.00		1.00
Hindu	223 (72.6)	32 (15.5)	0.48 (0.28, 0.85)		0.66 (0.34, 1.26)
Literacy				.12	
Literate (Ref)	71 (18.1)	21 (25.4)	1.00		
Not fully literate	254 (81.9)	52 (17.3)	0.61 (0.33, 1.14)		
Schooling				.01	
None (Ref)	252 (67.3)	33 (15.1)	1.00		
Any	73 (32.7)	40 (26.3)	2.01 (1.16, 3.48)		
Marital status				.5	
Never married (Ref)	91 (28.4)	24 (20.2)	1.00		
Married	134 (40.3)	30 (20.5)	1.02 (0.53, 1.95)		
Separated or widowed	101 (31.3)	19 (15.2)	0.70 (0.35, 2.00)		
In debt				.5	
No (Ref)	156 (45.4)	39 (20.3)	1.00		
Yes	169 (54.6)	34 (17.4)	0.83 (0.48, 1.43)		
Homeownership				.16	
Yes (Ref)	124 (36.8)	35 (22.7)	1.00		
No	201 (63.2)	38 (16.5)	0.67 (0.39, 1.17)		
Support dependents				.09	
No (Ref)	43 (11.3)	29 (28.9)	1.00		
Yes	282 (88.7)	14 (17.5)	0.52 (0.25, 1.09)		
Number of children				<.001	
None (Ref)	72 (19.3)	30 (37.6)	1.00		1.00
1 or more	254 (80.7)	43 (14.2)	0.28 (0.15, 0.50)		0.36 (0.17, 0.75)
Duration in Goa				.01	
1 y or less (Ref)	42 (11.6)	16 (31.1)	1.00		
2–10 y	99 (30.1)	14 (13.5)	0.35 (0.15, 0.83)		
More than 10 y	92 (33.5)	13 (12.9)	0.33 (0.14, 0.80)		
From birth	92 (24.8)	30 (27.2)	0.83 (0.37, 1.83)		

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

	No. (Weighted %)	Prevalence of Suicide Attempts in Past 3 Mo, No. (Weighted %)	AOR[a] (95% CI)
Time in sex work, y			
≤1 (Ref)	105 (29.6)	28 (22.8)	1.00
2–10	144 (42.4)	37 (21.9)	1.02 (0.50, 2.08)
>10	76 (28.0)	8 (9.6)	0.43 (0.16, 1.11)
Having ever worked in the Baina red-light area	124 (44.6)	14 (10.3)	0.37 (0.16, 0.84)
Income from source other than sex work	140 (44.1)	30 (18.7)	1.29 (0.67, 2.48)
Location of sex work			
Street	77 (22.8)	15 (17.9)	1.13 (0.53, 2.39)
Establishment (lodge, bar, or brothel)	191 (57.6)	46 (19.8)	0.86 (0.41, 1.81)
Home	89 (28.1)	21 (19.9)	1.38 (0.67, 2.84)
Number of customers per wk			
<1 (Ref)	123 (38.4)	20 (13.1)	1.00
1–7	179 (56.4)	43 (20.5)	1.84 (0.96, 3.51)
>7	23 (5.2)	10 (41.5)	4.27 (1.30, 14.07)
1 or more regular customers	139 (40.1)	47 (29.5)	2.93 (1.57, 5.48)
Consistent condom use with customers	236 (74.2)	47 (16.5)	0.56 (0.28, 1.13)
Income from customer (per $2.5 increase in payment)	. . .	. . .	1.05 (0.97, 1.14)
Started sex work at age 16 y or younger	64 (20.8)	17 (21.4)	1.09 (0.49, 2.43)
No regular nonpaying male partner	78 (24)	16 (19.3)	0.86 (0.42, 1.78)
Change in nonpaying regular partner over the past 3 mo	19 (5.4)	5 (22.2)	1.02 (0.27, 3.90)

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

2 antibodies (HerpeSelect, Focus Technologies, Cypress, CA)[25]

Mental health. We assessed mental health with the Kessler 10 (K10), a 10-item questionnaire[26–28] that has been widely validated in Indian settings, including Goa.[29] This questionnaire elicits the frequency of various depressive and anxiety symptoms over the past month on a 4-point Likert scale of frequency and generates a continuous score (range: 0–40) measuring the severity of symptoms of common mental disorders.

Substance abuse. We rated use of alcohol, *Gutka* (chewed tobacco), and smoked tobacco on a 6-point Likert scale, which we recategorized to at least once a week, less than once a week, and never.

Suicidal behaviors. We measured suicidal behaviors with separate questions to elicit whether participants had contemplated, planned, or attempted suicide in the past 3 months. To reduce social desirability bias, we used an informal confidential voting interview to collect responses to sensitive questions; participants placed their responses to sensitive questions into a color-coded ballot box, enabling them to conceal their response from the interviewer.[23] We used validity checks to measure internal consistency. Two independent reviewers checked all questionnaires, and any inconsistencies were referred back to the field and corrected. We double-entered the data into a Microsoft Access database (Microsoft, Redmond, WA) and undertook range and consistency checks.

Statistical Analysis

To adjust for potential biases in recruitment, we weighted data by the inverse of the approximate probability of recruitment.[19] We calculated the weights on the basis of network size, age, ethnicity, and area, according to how these factors were related to recruitment, by using Respondent-Driven Sampling Analysis Tool 5.4.0 (Cornell University, Ithaca, NY). 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 $P \leq .2$) in a stepwise forward model selection procedure (also at $P \leq .2$). 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 $P \leq .2$) 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 ($P \leq .2$) 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

TABLE 3—Association Between Autonomy, Social Support, Violence, and Suicide Attempt Among Female Sex Workers: Goa, India, December 2004–December 2005

	No. (Weighted %)	Prevalence of Suicide Attempts in Past 3 Mo, No. (Weighted %)	AOR[a] (95% CI)
Autonomy			
Political empowerment[b]	169 (55.0)	33 (33.6)	1.01 (0.51, 2.05)
Entrapment[c]	296 (90.7)	63 (28.1)	2.54 (1.01, 6.44)
No financial autonomy	106 (35.0)	25 (19.0)	1.45 (0.77, 2.75)
Coerced into unsafe sexual relations with customer	95 (26.9)	33 (30.3)	1.85 (0.96, 3.55)
Social support			
Recent lack of emotional support	196 (60.0)	50 (21.5)	1.67 (0.90, 3.14)
Turn to intimate partner for support	65 (19.5)	12 (14.9)	0.69 (0.33, 1.42)
Turn to family for support	21 (6.2)	3 (10.2)	0.43 (0.12, 1.57)
Turn to other female sex workers for support	114 (35.2)	27 (20.2)	1.21 (0.64, 2.31)
Violence			
Involved in police raid, past y	50 (14.0)	18 (30.8)	1.99 (0.95, 4.18)
Intimate partner verbal abuse, current	108 (29.7)	40 (33.2)	2.99 (1.63, 5.49)
Intimate partner physical abuse, current	104 (29.8)	38 (31.8)	3.00 (1.60, 5.62)
Any intimate partner violence, current	124 (35.1)	43 (30.5)	3.13 (1.59, 6.17)
Violence from others, current	69 (18.9)	29 (35.9)	2.69 (1.41, 5.11)
Lifetime sexual violence	36 (8.9)	18 (46.9)	2.88 (1.17, 7.13)
Childhood sexual abuse	18 (4.6)	7 (41.0)	2.21 (0.58, 8.39)

Note. AOR = adjusted odds ratio; CI = confidence interval.
[a]Adjusted for baseline factors (i.e., age, ethnicity, religion, and number of children).
[b]Defined as ever having voted in an election.
[c]Not free to leave sex work.

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).

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 (i.e., from Karnataka) and having at least 1 child were independently associated with lower likelihood of reporting a suicide attempt.

Table 2 describes the association between sex-work factors and suicide attempts in the past 3 months after we adjusted for socioeconomic factors. Ever having worked in the Baina red-light area was associated with a lower likelihood of suicide attempts. Having more and regular customers were associated with a greater likelihood of suicide attempts.

Table 3 describes the relationship between gender disadvantage and suicide attempts in the past 3 months after we adjusted for socioeconomic factors. We found that, over the past year, 35% of all study participants had

experienced intimate partner violence, 9% had experienced sexual violence, 27% had been coerced into unsafe sexual activity with a client, and 14% had been involved in a police raid. Physical and verbal intimate partner violence, violence from other people, and sexual violence were associated with suicide attempt.

Table 4 describes the relationship between health indicators and suicide attempts in the past 3 months after we adjusted for socioeconomic factors. Bacterial STIs were present in 22%, HIV in 26%, and herpes simplex 2 in 57%. Having exposure to an HIV prevention intervention was associated with lower likelihood of suicide attempt, but there was no association between likelihood of suicide attempt and STIs.

The final model (Table 5) shows that after simultaneous adjustment for the factors from the base model and the factors from other domains (*P* < .2), intimate partner violence, violence from others, entrapment, and having regular customers were independently associated with suicide attempts. 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

	No. (Weighted %)	Prevalence of Suicide Attempts in Past 3 Mo, No. (Weighted %)	AOR[a] (95% CI)
Sexual health			
HIV knowledge score			1.00 (0.96, 1.04)
Exposure to sexual risk reduction interventions			
Lifetime	110 (38.5)	17 (12.4)	0.54 (0.27, 1.05)
Past 3 mo	55 (19.3)	28 (16.3)	0.25 (0.10, 0.68)
Lifetime induced abortions	90 (24.9)	28 (16.3)	0.84 (0.45, 1.59)
Infertility over past y	47 (14.8)	15 (29.8)	2.00 (0.91, 4.41)
Presence of sexually transmitted infections			
Chlamydia, trichomonas, or gonorrhea	75 (22.0)	25 (22.9)	1.17 (0.59, 2.32)
HIV	77 (25.8)	14 (16.0)	0.95 (0.46, 1.93)
Herpes simplex 2	180 (57.1)	39 (18.2)	0.97 (0.53, 1.78)
Substance use			
Alcohol			
Never (Ref)	137 (42.9)	33 (21.2)	1.00
Less than weekly	23 (6.2)	9 (31.0)	1.23 (0.43, 3.50)
At least weekly	165 (50.9)	31 (15.2)	0.57 (0.30, 1.11)
Gutka (chew tobacco)			
Never (Ref)	165 (47.6)	43 (31.2)	1.00
Less than weekly	21 (6.7)	5 (19.1)	1.41 (0.37, 5.33)
At least weekly	139 (45.7)	25 (16.2)	1.07 (0.55, 2.09)
Smoke tobacco			
Never (Ref)	290 (91.5)	58 (16.9)	1.00
Less than weekly	10 (2.4)	4 (27.3)	1.09 (0.26, 4.58)
At least weekly	25 (6.1)	11 (43.0)	1.97 (0.68, 5.67)

Note. AOR = adjusted odds ratio; CI = confidence interval.
[a]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.[1,2] A prospective cohort of 2494 women in Goa found a 0.8% annual incidence of attempted suicide.[4] 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.[5] 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.[15] 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.[30] A cohort study of women in Goa found a lifetime experience of verbal, physical, or sexual abuse of 15%.[4] 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.[4] 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.[30] The relationship between being childless and suicide may be because of social censure of childless women in India[31]; however, the life-affirming protective effect of having a child can be an alternative explanation.

In contrast to other studies,[4] 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[14] and our qualitative data suggest that *Devadassi* women 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 *Devadasi* women 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.[3] 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,

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

	Final Model[a]		Final Model Including Proxy Measures of Mental Health[b]	
	AOR (95% CI)	P	AOR (95% CI)	P
Age, y		.10		.07
< 20 (Ref)	1.00		1.00	
21–25	0.47 (0.16, 1.37)		0.36 (0.12, 1.09)	
26–30	0.28 (0.08, 0.97)		0.25 (0.07, 0.87)	
31–35	0.95 (0.23, 3.93)		0.81 (0.19, 3.47)	
≥ 36	0.65 (0.18, 2.31)		0.67 (0.20, 2.29)	
Ethnicity		.02		.01
Goan (Ref)	1.00		1.00	
Karnataka	0.41 (0.18, 0.93)		0.47 (0.20, 1.07)	
Other	1.13 (0.45, 2.85)		1.04 (0.37, 2.93)	
Hindu	0.74 (0.36, 1.51)	.4	0.81 (0.39, 1.69)	.6
Has at least 1 child	0.41 (0.17, 0.96)	.04	0.39 (0.17, 0.91)	.03
Gender disadvantage				
Intimate partner physical abuse	2.81 (1.45, 5.45)	.002	2.53 (1.29, 4.98)	.007
Violence from others	2.29 (1.16, 4.54)	.02	2.08 (1.05, 4.12)	.04
Entrapment[c]	2.48 (1.01, 6.08)	.047	2.41 (0.97, 6.01)	.06
1 or more regular customers	2.70 (1.40, 5.23)	.003	3.08 (1.52, 6.26)	.002
At least 1 customer per wk	1.85 (0.93, 3.69)	.08	1.62 (0.79, 3.43)	.2
Exposure to sexual risk reduction counseling in past 3 mo	0.29 (0.10, 0.88)	.03	0.30 (0.10, 0.87)	.03
Measure of poor mental health			1.06 (1.01, 1.11)	.02

Note. OR = odds ratio; CI = confidence interval. Only variables that remained in the model after multivariate logistic regression are reported in this table.
[a]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.
[b]Adjusted for all variables in the final model plus Kessler-10 (K10) mental health score.
[c]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,[3,4] 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

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[32] and improves access to mental health interventions for depression.[8] The huge scale-up of HIV

prevention interventions among female sex workers[10] 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, England, and Positive People, Goa, India. Sonali Wayal was with Positive People, Goa. 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. Vikram Patel was with the Department of Epidemiology and Public Health, London School of Hygiene and Tropical Medicine, London, and Sangath, Porvorim, Goa, and Positive People, Goa.

Requests for reprints should be sent to Dr Maryam Shahmanesh, Centre for Sexual Health and HIV Research, University College London, 3rd floor Mortimer Market Centre, off Caper St, London WC1E 6AU UK (e-mail: bamaryjoon@yahoo.co.uk).

This article was accepted November 11, 2008.

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

1. Aaron R, Joseph A, Abraham S, et al. Suicides in young people in rural southern India. *Lancet.* 2004;363: 1117–1118.

2. Eddleston M, Konradsen F. Commentary: time for a re-assessment of the incidence of intentional and unintentional injury in India and South East Asia. *Int J Epidemiol.* 2007;36:208–211.

3. Vijayakumar L, John S, Pirkis J, Whiteford H. Suicide in developing countries (2): risk factors. *Crisis.* 2005;26: 112–119.

4. Maselko J, Patel V. Why women attempt suicide: the role of mental illness and social disadvantage in a community cohort study in India. *J Epidemiol Community Health.* 2008;62:817–822.

5. Pillai A, Andrews T, Patel V. Violence, psychological distress and the risk of suicidal behaviour in young people in India. *Int J Epidemiol.* 2009;38(2):459–469.

6. Phillips MR, Yang G, Zhang Y, Wang L, Ji H, Zhou M. Risk factors for suicide in China: a national case-control psychological autopsy study. *Lancet.* 2002;360:1728–1736.

7. Phillips MR, Li X, Zhang Y. Suicide rates in China, 1995-99. *Lancet.* 2002;359:835–840.

8. Patel V. Commentary: preventing suicide: need for a life course approach. *Int J Epidemiol.* 2007;36:1242–1243.

9. Patel V, Kirkwood BR, Pednekar S, et al. Gender disadvantage and reproductive health risk factors for common mental disorders in women: a community survey in India. *Arch Gen Psychiatry.* 2006;63:404–413.

10. Chandrasekaran P, Dallabetta G, Loo V, Rao S, Gayle H, Alexander A. Containing HIV/AIDS in India: the unfinished agenda. *Lancet Infect Dis.* 2006;6:508–521.

11. Greene JM, Ennett ST, Ringwalt CL. Prevalence and correlates of survival sex among runaway and homeless youth. *Am J Public Health.* 1999;89:1406–1409.

12. Carrico AW, Johnson MO, Morin SF, et al. Correlates of suicidal ideation among HIV-positive persons. *AIDS.* 2007;21:1199–1203.

13. Huebner DM, Rebchook GM, Kegeles SM. Experiences of harassment, discrimination, and physical violence among young gay and bisexual men. *Am J Public Health.* 2004;94:1200–1203.

14. Blanchard JF, O'Neil J, Ramesh BM, Bhattacharjee P, Orchard T, Moses S. Understanding the social and cultural contexts of female sex workers in Karnataka, India: implications for prevention of HIV infection. *J Infect Dis.* 2005;191(suppl 1):S139–S146.

15. Hong Y, Li X, Fang X, Zhao R. Correlates of suicidal ideation and attempt among female sex workers in China. *Health Care Women Int.* 2007;28:490–505.

16. *Census of India 2001.* New Delhi: Government of India; 2001.

17. *Economic Survey 2005–2006: Directorate of Planning, Statistics and Evaluation.* Goa, India: Government of Goa; 2007.

18. Shahmanesh M, Wayal S. Targeting commercial sexworkers in Goa, India: Time for a strategic rethink? *Lancet.* 2004;364:1297–1299.

19. Magnani R, Sabin K, Saidel T, Heckathorn D. Review of sampling hard-to-reach and hidden populations for HIV surveillance. *AIDS.* 2005;19(suppl 2):S67–S72.

20. Buve A, Carael M, Hayes RJ, et al. Multicentre study on factors determining differences in rate of spread of HIV in sub-Saharan Africa: methods and prevalence of HIV infection. *AIDS.* 2001;15(suppl 4):S5–S14.

21. Cowan FM, Hargrove JW, Langhaug LF, et al. The appropriateness of core group interventions using presumptive periodic treatment among rural Zimbabwean women who exchange sex for gifts or money. *J Acquir Immune Defic Syndr.* 2005;38:202–207.

22. Patel V, Pednekar S, Weiss H, et al. Why do women complain of vaginal discharge? A population survey of infectious and psychosocial risk factors in a South Asian community. *Int J Epidemiol.* 2005;34:853–862.

23. Gregson S, Zhuwau T, Ndlovu J, Nyamukapa CA. Methods to reduce social desirability bias in sex surveys in low-development settings: experience in Zimbabwe. *Sex Transm Dis.* 2002;29:568–575.

24. Indian Council of Medical Research and Family Health International. *National Interim Summery Report-India, Integrated Behavioural and Biological Assessment (IBBA), Round 1 (2005–2007).* New Delhi, India: National AIDS Research Institute and Family Health International; 2007.

25. Shahmanesh M, Cowan FM, Wayal SS, Copas A, Patel V, Mabey D. The burden and determinants of HIV and sexually transmitted infections in a population based sample of female sex workers in Goa, India. *Sex Transm Infect.* 2009;85(1):50–59.

26. Furukawa TA, Kessler RC, Slade T, Andrews G. The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychol Med.* 2003; 33:357–362.

27. Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry.* 2003;60:184–189.

28. Kessler RC, Andrews G, Colpe LJ, et al. Short screening scales to monitor population prevalence and trends in non-specific psychological distress. *Psychol Med.* 2002;32:959–976.

29. Patel V, Araya R, Chowdhary N, et al. Detecting common mental disorders in primary care in India: a comparison of five screening questionnaires. *Psychol Med.* 2008;38:221–228.

30. International Institute for Population Science and Macro International. National Family Health Survey 2005-2006 (NFHS-3). Pune, India: International Institute for Population Science; 2007.

31. Davar B, Wayal S. *Mental Health, Pregnancy and Childbirth: Evidence.* New Delhi: John D and Catherine T MacArthur Fund for Leadership Development, India; 2001.

32. Pronyk PM, Hargreaves JR, Kim JC, et al. Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *Lancet.* 2006;368:1973–1983.