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What is This?
Evaluation of a Community-Based HIV Preventive Intervention for Female Sex Workers in Rural Areas of Karnataka State, South India

Reynold G. Washington, MD, DNB1,2, Anita Nath, MD1, Shajy Isac, PhD2, Prakash Javalkar, MA2, Banadakoppa M. Ramesh, PhD2, Parinita Bhattacharjee, MSW2, and Stephen Moses, MD3

Abstract
Objective. To examine changes in behavioral outcomes among rural female sex workers (FSWs) involved in a community-based comprehensive HIV preventive intervention program in south India. Methods. A total of 14,284 rural FSWs were reached by means of a community-based model for delivering outreach, medical, and referral services. Changes in behavior were assessed using 2 rounds of polling booth surveys conducted in 2008 and 2011. Results. In all, 95% of the mapped FSWs were reached at least once, 80.3% received condoms as per need, and 71% received health services for sexually transmitted infections. There was a significant increase in condom use (from 60.4% to 72.4%, P = .001) and utilization of HIV counseling and testing services (from 63.9% to 92.4%; P = .000) between the 2 time periods. Conclusions. This model for a community-based rural outreach and HIV care was effective and could also be applied to many other health problems.

Keywords
HIV/AIDS, female sex workers, behavior, condom, rural India

Introduction
India, with an estimated 2.08 million people living with HIV (PLHIV), currently ranks third globally in the burden of HIV infection after South Africa and Nigeria.1 The HIV epidemic in India is concentrated among high-risk groups, including intravenous drug users, men who have...
sex with men, female sex workers (FSWs), and sexually transmitted infection (STI) clinic attendees.1 Almost 70% of India’s population resides in rural areas,2 and 57% of PLHIV in India also come from rural areas.3 The state of Karnataka in south India accounts for 11% of the PLHIV in the country.3 Studies in northern Karnataka report a higher HIV prevalence in the general population in rural than in urban areas.4 This has been attributed to the large concentration of rural sexual networks, between rural FSWs and the within- and outside-district clients who visit them. There is a high degree of variability in HIV prevalence among FSWs in Karnataka, with prevalence ranging from 9% to 33% in different districts.3-5 A rapid mapping exercise in 2007 in Karnataka demonstrated that more than 50% of sex workers resided and practiced in rural areas.6

In 2006, the University of Manitoba, Karnataka Health Promotion Trust, Karnataka State AIDS Prevention Society, and their partners developed the framework for a project called Samastha to address the growing rural HIV epidemic, and gaps in the implementation of HIV prevention programs. The project initiated targeted interventions with rural FSWs in 2008 and the intervention ended in the year 2011. In this article, we examine the impact of targeted interventions in terms of consequent changes in behavioral outcomes among the rural FSWs.

Methods

The rural HIV prevention component was implemented in 8 high-HIV prevalence districts of Karnataka.7 Outreach under this project was strategically planned at both macro and micro levels.5,8 At the macro level, the project used rural mapping data to ensure that a maximum number of villages with more than 10 rural FSWs per village were covered. At the micro level, community-based health workers known as link workers used social maps, focused maps, and line listings to intensify coverage and quality.9 Social mapping by village leaders and focused mapping by key informants such as frontline health and social workers in the villages, provided visual representations of the caste distribution and resources and location of high risk individuals in the villages. Line lists of sex workers contained unique identifiers, including name, age, typology, residence, and place of work and helped link workers to identify who needed what services (condoms, referrals for STI services, and HIV testing).

The link workers were residents of the villages, who were identified by supervisors during a situation needs assessment and selected through an interview process. Each link worker underwent 1-week long induction training followed by 5 days training program in care and support interventions for HIV. A pair of link workers (1 male and 1 female) was assigned to provide outreach services in a village cluster consisting of 3 to 5 villages. In village clusters with more than 30 FSWs, peer educators, who were sex workers themselves, were identified using a consultative process with the local sex worker community. These workers distributed condoms directly to FSWs and provided prevention education on how to use condoms correctly using a model. They also assessed the need for STI services and to be counseled and tested for HIV, and made appropriate referrals. The link workers ensured condom availability through placing and regularly stocking condom boxes at public places such as toilets, tobacco/paan shops, wine stores, and other petty shops.

Primary health center doctors catering to these villages were trained to provide syndromic case management for symptomatic STIs, including asymptomatic treatment at first visit, as per the national protocol.10 HIV testing was also achieved through referrals to integrated HIV counseling and testing centers at the subdistrict or taluka level. The project set up an individualized computerized management information system (CMIS) to track FSWs registered in the program.

Two rounds of polling booth surveys (PBS) were conducted approximately 6 months after project initiation in 2008 and 3 years later at the end of 2011, by an independent team of researchers. PBS represents a method of collecting sensitive behavioral information in an anonymous
fashion, reducing social desirability bias in responses. For the PBS surveys, 2 districts were purposively chosen, representing the sociocultural diversity and size of rural FSW populations. The sample sizes were designed to detect a 10% to 15% increase in condom use with 80% power and an α error of 5%, assuming a baseline value for condom use by an FSW at last sex at 50%. Assuming a design effect of 1.5, the required sample size is 261 for each round of PBS.

Twenty PBS sessions were planned in 2 districts, with an average of 15 participants per session. The village was used as a stratification variable. Subjects were recruited from among the FSWs who had been contacted at least once during the previous 6 months. However, no identifiers were recorded following recruitment thus limiting our ability to assess how many FSWs were recruited in both rounds. All questions were asked in Kannada, the local language, by trained interviewers. Each participant was given 3 colored boxes (red, green, and white), and a pack of cards that were numbered corresponding to the number of the questions that were asked. A moderator would explain the method, and a practice session provided. The participant would drop a “yes” response card into the green box, a “no” response into the red box, and a “not applicable” response into the white box. If the participant did not want to respond to a certain question, the card was kept outside the box. Secondary data generated from the individualized CMIS on an annual basis was used to measure coverage- and service-related outputs. FSWs were registered once during the project and assigned a unique identity number. Details of STI services provided at outreach or fixed clinics were entered in a clinic form using the same unique identity. Indirect condom distribution was monitored by registering condom outlets and subsequently tracking their refill.

**Ethical Consideration**

The PBS and CMIS were conceived as routine program monitoring to improve the program implementation and its outcomes. Therefore, the study was not formally reviewed or approved by any institutional review board. However, the project conforms to the ethical standards set under the Helsinki Declaration for both processes. Registration into the CMIS was completed only after initial rapport building and with written consent. Verbal informed consent was obtained from the groups participating in PBS. While analyzing the CMIS, the data were sanitized of all individual identifiers, including name and address. We did not record any identifiers for the PBS. For both processes, all participants in PBS were informed and their doubts clarified in relation to possible harms and benefits associated with their participation before the start of the session. They were provided with the option of not responding to any questions that made them uncomfortable. To maintain privacy, PBS sessions were conducted inside closed rooms ensuring both visual and auditory privacy. Participants did not receive any monetary compensation for participation.

Statistical analyses were undertaken using IBM SPSS version 20 and the χ² test was used to compare results from the 2 surveys. Because responses in the PBS could not be linked, only univariate analyses were possible.

**Results**

**Sociodemographic and Work-Related Profile of Female Sex Workers**

A total of 14,284 FSWs from 1253 villages were registered in the program according to data generated from the CMIS (Table 1). About 91% of the FSWs were 25 years of age or more, and the mean age was 31 ± 5.8 years. The majority of the FSWs (63.5%) were illiterate. As many as 40.4% were currently married/cohabiting, while single women as devadasis (20.9%), widowed (18.7%), divorced, separated or deserted (16.9%), or never married (3.1%) made up the...
Table 1. Sociodemographic Characteristics and Work-Related Profile of Female Sex Workers.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentage (N = 14,284)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age-group (years)</td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>9.5</td>
</tr>
<tr>
<td>25-29</td>
<td>25.9</td>
</tr>
<tr>
<td>30-34</td>
<td>29.1</td>
</tr>
<tr>
<td>≥35</td>
<td>35.5</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Currently married and cohabiting</td>
<td>40.4</td>
</tr>
<tr>
<td>Single</td>
<td>38.7</td>
</tr>
<tr>
<td>Devadasi</td>
<td>20.9</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>63.5</td>
</tr>
<tr>
<td>Literate</td>
<td>36.5</td>
</tr>
<tr>
<td>Place of solicitation</td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>61.3</td>
</tr>
<tr>
<td>Street/public place</td>
<td>36</td>
</tr>
<tr>
<td>Lodge/hotel/brothel</td>
<td>2.7</td>
</tr>
<tr>
<td>Duration of sex work (years)</td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>14.7</td>
</tr>
<tr>
<td>2-4</td>
<td>44.5</td>
</tr>
<tr>
<td>≥5</td>
<td>40.8</td>
</tr>
<tr>
<td>Client volume per week (n)</td>
<td></td>
</tr>
<tr>
<td>&lt;5</td>
<td>55.9</td>
</tr>
<tr>
<td>5-9</td>
<td>27.6</td>
</tr>
<tr>
<td>≥10</td>
<td>16.5</td>
</tr>
<tr>
<td>Mean client volume per month (n)</td>
<td>24</td>
</tr>
</tbody>
</table>

*Source of data: Project’s computerized management information system.

The remainder. Home was the place of solicitation for more than half of the FSWs (61.3%), while street/public places was the next most common (36%). In all, 85.3% of FSWs reported involvement in sex work for 2 or more years, and 55.9% and 27.6% reported client volumes of less than 5 and 5 to 9 clients per week, respectively. The mean client volume per month was 24.

**Project Coverage**

Data were extracted from the CMIS on an annual basis every year to assess project coverage.

**Female Sex Worker Contact With Link Workers/Peer Educators.** A total of 13,570 (95%) FSWs in the selected villages of the districts were reached at least once by link workers or peer educators. Over the period of study, there was a significant increase in FSW contact per month, from 7.6% in 2008 to 86% in 2011 (Table 2).

**Condom Distribution.** A total of 2392 active condom depots were established, with the mean number of depots being 1.9 per village. An average of 8.9 million condoms was distributed each year, of which 62% were through outlets and 38% directly to FSWs. The average number of condoms provided per FSW per month was 29, against an average monthly requirement (estimated based on reported client volume) of 24 per FSW. Overall, 11,427 (80.3%) of FSWs had received condoms as per need. The proportion of FSWs receiving condoms as per need increased from 2.1% in 2008 to 71% in 2011 (P < .001; Table 2).
Sexually Transmitted Infection Services. Overall, 10,142 (71%) of the registered FSWs received STI services at least once in the previous 6 months and 1,417 (62%) of high-volume FSWs (more than 10 clients per month) received STI services once in quarter. The proportion of FSWs visiting the clinic increased significantly over time ($P < .001$) from 8.9% in 2008 to 83.4% in 2011 (Table 2). The proportion of FSWs who reported symptoms suggestive of STI declined from 79.4% in 2008 to 47.5% in 2011.

Human Immunodeficiency Virus Testing. In total, 6,428 (45%) of FSWs reported having been tested for HIV at least once in the preceding 6 months, of whom 4,306 (67%) reporting receiving their results. There was a highly significant increase ($P < .001$) in the proportion of FSWs who were ever tested for HIV increasing from 29.6% in 2009 to 94.7% in 2011 (HIV testing was tracked only from 2009 onward) as seen from Table 2. The proportion of FSWs reporting HIV positive test results declined from 2.3% in 2009 to 0.17% in 2011.

Behavioral Change

The total number of participants in the 2 rounds of PBS was 374 and 275, respectively.

The proportion of FSWs reporting condom use during last sex with any partner increased significantly between the 2 rounds of PBS, from 60.4% to 72.4% ($P < .01$). This increase was largely because of increased condom use with occasional clients. There was no significant change in condom use at last sex with a husband/lover. The main reasons for not using condoms, including partner refusal, alcohol consumption, and condom non-availability also declined during the same period. The percentage of FSWs reporting condom breakage declined significantly, from 30.2% to 8.4% ($P < .001$). The proportion of FSWs who reported ever undergoing an HIV test increased from 63.9% to 92.4% over the period. A higher proportion of FSWs also reported having obtained their test results after being tested: 54.6% in the first survey versus 80.7% in the second survey ($P < .001$). The proportion of FSWs reporting interest in knowing their HIV status increased from 59.4% in the earlier round to 80% in the subsequent round ($P < .001$; Table 3).

Discussion

Samastha was a demonstration project operating at scale, testing the feasibility of rural prevention interventions for future scale-up and integration. The project started with mapping of villages within which FSWs were concentrated in order to focus project activities. Similarly, in an earlier study in South Africa, Weir et al. designed and implemented the “PLACE” method (priorities for
local AIDS control efforts) for identifying high-risk populations, based on available contextual and epidemiological information obtained from key informant interviews. This strategy ensured high levels of FSW coverage within each district.

A major proportion of the rural FSWs were single (59.6%) and illiterate (63.5%). Similar demographic profiles of FSWs emerged from integrated behavioral and biological assessments in Karnataka. Pallikadavath et al also documented illiteracy to be a contributory factor to the rural HIV epidemic in India. Dandona et al in their study on the demography and sex work characteristics of FSWs in Andhra Pradesh observed an illiteracy rate of 74.7%, which was associated with vulnerability to HIV. Rural woman who are illiterate, and single as a result of being widowed, divorced, or deserted are vulnerable to engage in sex work. Becker et al reported a 7-fold increased risk of being HIV infected among widows in Bagalkot district, in northern Karnataka.

Overall, 20.9% of rural FSWs in the program were *devadasis*. This is consistent with the findings of O’Neil et al who reported 23%, but much higher than the proportion of *devadasis* (6%) reported in studies covering FSWs in urban settings. The *devadasi* tradition in India entails a religious rite in which girls and young women are dedicated to perform various temple duties, including provision of sexual services to priests and patrons of the temple.

We found the home to be the most common place for sex work (61.3%), again a typical feature of rural-based sex work. In contrast, the place of solicitation most commonly reported in urban areas is on the street or in public places. The mean duration of sex work reported by 44.5% of the FSWs in our program was 2 to 4 years, similar to that reported from southern Karnataka and in other districts. The mean weekly client volume reported by more than half of the FSWs in our program was less than 5, while only 17% reported such low weekly client volumes in urban areas. However, the mean monthly client volume in our program area of about 24 was similar to other program settings, suggesting that rural sex work has certain days with higher client volumes.

The activities in our program were scaled up rapidly. The coverage of outreach, distribution of condoms and referrals for STI and HIV counseling and testing services increased significantly over the project period. There was significant decline in reported rates of partner refusal to use

| Table 3. Changes in Selected Behavioral Parameters Among Female Sex Workers Over the Project Period. |
|-------------------------------------------------|-------------------------------------------------|
| Baseline PBS (2008); n = 374 | Final PBS (2011); n = 275 |
| Condom use during last sex act with any partner | 226 60.4 (55.5-65.4) | 200 72.4 (67.1-77.6) |
| Condom breakage during last use | 113 30.2 (25.6-34.9) | 23 8.4 (5.1-11.6) |
| Reasons for nonuse of condoms | | |
| Partner refusal | 159 42.5 (37.5-47.5) | 91 33.1 (27.5-38.6) |
| Either partner being drunk | 112 29.9 (25.3-34.6) | 69 25.1 (20.0-30.2) |
| Nonavailability of condoms | 111 29.7 (25.1-34.3) | 69 25.1 (20.0-30.2) |
| HIV testing | | |
| Interest in knowing one’s HIV status | 222 59.4 (54.4-64.3) | 220 80.0 (75.3-84.7) |
| Ever tested for HIV | 239 63.9 (59.0-68.7) | 254 92.4 (89.2-95.5) |
| Ever obtained HIV test results | 204 54.6 (50.4-58.8) | 222 80.7 (75.9-85.6) |

Abbreviations: PBS, polling booth survey; CI, confidence interval; HIV, human immunodeficiency virus.

*Source of data: Polling booth surveys.*
condoms and of condom breakage. One in four FSWs, however, reported instances of nonavailability of the condoms when needed, and this is an issue of concern. The stigma associated with keeping condoms ready for use in home settings has been reported earlier and is an issue that needs further attention.20,21

Providing peer educators with the skills and tools to plan outreach and services gives them a greater sense of ownership and improves program performance.22-24 More than 80% of FSWs reported receiving condoms as per need every month, which is similar to the achievement of a urban sex worker intervention strategy in Karnataka.18 Successful maintenance of high rates of condom supply and use has also been demonstrated in the context of a structural intervention program in the brothels of Sonagachi in Kolkata, eastern India.25 However, while the Sonagachi intervention was conducted in an organized, largely brothel-based setting, the geographical distribution of FSWs in our program areas was highly dispersed, with more than half of the FSWs operating from home.

The proportion of FSWs who complained of symptoms suggestive of STIs declined suggesting a decline in STI incidence. Government-run primary health centers, which were the sites for STI service delivery, appeared to overcome concerns about being recognized or stigmatized within the village community, and were more accessible, thus contributing to improved health-seeking behavior among FSWs.

This program resulted in important behavioral changes among FSWs. It is shown that respondents tend to report more stigmatized behaviors in PBS than in face-to-face interviews.26 The proportion of FSWs reporting condom use during the last sex act with any partner increased significantly, similar to results from other such prevention programs.5,18 Another beneficial effect was an increase in the proportion of FSWs being tested for HIV and collecting their results. Knowing one’s HIV status enables improved access to antiretroviral treatment, since one of the major barriers to accessing antiretroviral therapy is fear of adverse consequences of disclosure of HIV status.27

One of the limitations of our study is that the PBS survey was conducted 6 months after program initiation, which could have resulted in an underestimation of the magnitude of changes. Another limitation is the lack of biological data linked to PBS. We are therefore unable to demonstrate the direct impact of intervention in terms of reduced STI prevalence among the FSWs. Also, the absence of a control group to compare the different changes could constitute yet another limitation of our study. Finally, the presence of the Avahan project in the urban locations in the same districts could have had some complementary effects.28,29

The Samastha project represents an innovative model for rural outreach and care that can be applied not just to HIV/AIDS prevention and care but to other health problems. Community-based link workers provide the vital connection between those in the community who needed services and the formal health system, even for a health issue embedded with stigma and discrimination. In rural areas, the dispersion across geography, the hidden nature of sex work within communities, and the stigma associated with condoms and HIV, pose challenges to effective outreach programs. Furthermore, FSWs who are mobile and change their location frequently in search for clients are difficult to contact, follow up, empower, and treat. Despite these obstacles, the Samastha project represents a model that could address some of the major challenges that India and many other countries face in scaling up HIV prevention programs and services in rural areas.

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Declaration of Conflicting Interests

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