

Decline in unprotected sex & sexually transmitted infections (STIs) among female sex workers from repeated behavioural & biological surveys in three southern States of India

Rajatashuvra Adhikary, Abhishek Gautam, Satya Ranjan Lenka, Prabuddhagopal Goswami, Lakshmi Ramakrishnan, Bitra George, Mandar K. Mainkar*, S. Thilakavathi**, G.N.V. Brahmanam⁺ & Ramesh R. Paranjape*

*Family Health International, 360, New Delhi, *National AIDS Research Institute (ICMR), Pune, **National Institute of Epidemiology (ICMR), Chennai & ⁺National Institute of Nutrition (ICMR), Hyderabad, India*

Received August 2, 2010

Background & objectives: Since 2003, *Avahan* the India AIDS Initiative, has been working with female sex workers (FSW) in Andhra Pradesh (AP), Maharashtra (MH) and Tamil Nadu (TN) using a package of preventive services. Two rounds (R1 and R2) of Integrated Behavioural and Biological Assessment (IBBA) surveys were done to measure changes in condom use and prevalence of sexually transmitted infections (STIs) among female sex workers (FSWs) in the three Southern States.

Methods: Two rounds of bio-behavioural surveys were conducted among FSWs in selected districts of AP, MH and TN during 2005-2007 and 2009, respectively. Survey districts and methodology were consistent across rounds. Participants were selected through two stage conventional cluster sampling from fixed sites and time-location cluster sampling from floating groups. Information on sexual behaviour was collected by face-to-face interview. Participants provided urine and blood samples for testing of STIs.

Results: At aggregate level, condom use at every sex act with occasional and regular clients, taken as a whole, increased from 66.8 per cent in R1 to 85.2 per cent in R2 (AOR 3.5, $P<0.001$). Levels of HIV and syphilis declined from 14.1 to 11.9 per cent (AOR 0.9, $P<0.5$) and 10.8 to 5.0 per cent (AOR 0.4, $P<0.001$), respectively. Odds of using condom among FSWs who availed *Avahan* services was significantly more than those who did not ($P<0.01$).

Interpretation & conclusions: An increase in consistent condom use along with decrease in STIs was observed among FSWs. The increase in safer sexual practices was more among those exposed to *Avahan* interventions.

Key words Clients - condom use - female sex workers - IBBA - interventions - sexually transmitted infections

According to National AIDS Control Organization (NACO), in 2007 there were 2.31 million (1.8-2.9 million) people living with HIV/AIDS in India with an estimated adult HIV prevalence of 0.34 per cent (0.25-0.43%)¹. The overall HIV prevalence among different population groups continues to portray the concentrated epidemic in India, with a high prevalence among high risk groups like injecting drug users (IDUs) (7.26%), men having sex with men (MSM) (7.41%), female sex workers (FSWs) (5.06%) and low prevalence among antenatal clinic attendees (0.51%)². In response, NACO has been co-ordinating and implementing targeted and generalized intervention with these high risk groups and other bridge population since 1992 with focus on prevention³.

In India, the HIV/AIDS epidemic is largely concentrated in six States namely Andhra Pradesh (AP), Karnataka (KA), Maharashtra (MH) and Tamil Nadu (TN), Nagaland and Manipur which contribute to 63 per cent of the HIV infected persons in India². FSWs and their clients play a prominent role in driving the HIV epidemic in the country. HIV prevalence among the FSWs is highest in MH but has declined from 54.3 to 17.9 per cent from 2003 to 2007. Similar decreasing trend was seen in AP (20 to 9.7%), KA (14.4 to 5.3%), TN (8.8 to 4.7%), and at the country level (10.3 to 5.1%) over these five years¹.

To support and strengthen the NACO's targeted interventions, in 2003, the Bill & Melinda Gates Foundation initiated *Avahan*, the India AIDS Initiative aiming to slow down the spread of HIV epidemic in the country⁴. Based on the epidemiology of HIV in India and available programme coverage data, *Avahan* decided to work in 83 districts of the six States (Nagaland and Manipur in addition to the four southern States). The main objective of *Avahan* is to deliver a rapidly scaled prevention programme to these high risk groups and control the transmission of the HIV epidemic in the target populations.

The *Avahan* programme's main strategies were designed to achieve high coverage (target of 80%) in the selected geographic areas through delivery of a combination package of proven prevention services addressing proximal and distal determinants of HIV risks. The key programme elements were similar to NACO's and included peer based outreach education, clinical services for treatment of STIs, promotion and distribution of condoms and community mobilization⁵. In the four southern States, *Avahan* programme has

been implemented in 19 districts in AP, 18 districts of KA, 16 districts of MH and 13 districts of TN.

As part of overall evaluation of *Avahan* programme, two rounds of large scale bio-behavioural surveys were conducted during 2005-2007 and 2009. In the current study, data from these two rounds of IBBA surveys among FSWs were used. The main objectives of the analysis were to access the change in (i) characteristics of FSWs and pattern of condom use with commercial and non-commercial partners; (ii) prevalence of HIV and STIs; and (iii) exposure to *Avahan* programme interventions and their association with condom use behaviour.

Material & Methods

Two rounds of cross-sectional IBBA surveys were conducted as a major component of *Avahan*'s monitoring and evaluation strategy which collected information on risk behaviours and biological specimens to test for STIs including HIV. The first round (R1) of IBBA on FSWs was conducted between November 2005 and March 2007, while the second round (R2) was conducted between March and December 2009 in 29 districts where the *Avahan* programme was implemented and covered FSWs and their clients, MSM, transgender and IDUs in the six States. The detail of IBBA methodology is presented elsewhere^{6,7}.

Survey coverage of IBBA for FSWs: Data for the current analysis have been taken from the two rounds of cross-sectional surveys conducted among FSWs in selected districts of AP (8 districts), MH (6 districts) and TN (5 districts). The data from Karnataka have not been included in the current analysis as already published elsewhere⁶. Of the five districts covered in north-east, only one district had FSW group, thus it was not taken for analysis. FSWs aged 18 yr or older, having had paid sex in the last one month were recruited for the study.

Behavioural and biological assessments: Face-to-face interview was conducted using structured questionnaire covering basic demographic characteristics, patterns of sex work, sexual behaviour, condom use with different partners, knowledge on STIs and HIV and exposure to HIV prevention interventions. Venous blood sample (10 ml) was collected from all respondents to test for HIV and syphilis and urine sample for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* infections. Herpes simplex virus type 2 (HSV-2) serology was tested in 10 per cent of random samples, which has not been included in this study.

Seroprevalence of HIV infection was determined by two test algorithms using a screening test of Microlisa HIV and a confirmatory test by Genedia HIV 1/2 ELISA 3.0 (India). Positive syphilis serology detected by rapid plasma reagin (RPR) test was confirmed with *Treponema pallidum* haemagglutination assay (TPHA) and those found positive were deemed as having syphilis. Detection of *N. gonorrhoeae* and *C. trachomatis* in urine samples were performed by nucleic acid amplification test using Gene-Probe APTIMA Combo2 kits (Gene Probe).

Sampling: Respondents were selected using a two stage sampling procedure in both the rounds. Primary sampling units (PSU) were selected using probability proportion to size (PPS) at the first stage from a sampling frame of clusters mapped in each district and then random selection from enlisted respondents available during the fixed time interval specified for the selected cluster at the second stage. FSWs were recruited from public places (street, market, bus stop, cinema hall, *etc.*) using time location cluster sampling and from brothel/home/lodge using conventional cluster sampling. Details of IBBA survey protocol have been published elsewhere⁶.

Field work was conducted by field research agencies after a week of intensive training programme on survey protocol, questionnaire assessments and collection and transport of biological samples.

Statistical analysis: Double-data entry was done using Census and Survey Processing System (CS Pro) version 3.3 Software (India). Appropriate sampling weights were calculated for each level of analysis *i.e.*, State and aggregate. Statistical Packages for Social Sciences (SPSS) version 15.0 (India) was used for data analysis. Bivariate analysis was done to compare differences in profile characteristics of participants between the two rounds of survey. Two-sample t-test and Wald Pearson's chi-square test for independence were used to identify significant changes in profile characteristics between R1 and R2. Multivariate logistic regression was used to assess significant changes in exposure to intervention, prevalence of HIV and other STIs, and condom use with different partner types between the rounds. Profile variables that could be associated with the outcome and the explanatory variables, but are not in the causal pathway of relationship were included as covariates in logistic regression models to generate adjusted odds ratios (AOR) for the different outcome variables. Data from both rounds of survey

were pooled to assess associations between exposure to interventions and condom use outcomes, controlling for plausible confounders.

Key outcome variables: Exposure to intervention among FSWs was defined as having received one of the following *Avahan* programme core services any time in the past: (i) contacted by peer educator/staff of NGO; (ii) visited programme clinic; and (iii) received condoms from peer educator/worker of NGO. For changes in behavioural outcomes between the two survey rounds, zero unprotected sex acts (no sex act without condom everytime with occasional and regular clients, taken together), condom use at last sex act and consistent (every time) condom use with different kind of clients/partners were examined using bivariate and multivariate analysis. The different types of partners of FSWs were defined as follows. Paying clients were occasional clients, who had sex once or a few times more but not recognized by FSW, and regular clients, who repeatedly visited FSW and were known/recognized by her. Non paying partner were main regular partner or husband or steady boy friend of FSW.

Ethical clearance for the study protocol was obtained from the ethical review committee of NACO, ICMR institutes and Protection of Human Subjects Committee of FHI 360. Data collection procedures were conducted in privacy following reception of informed written informed consent. As a benefit to participants, test results for syphilis (using RPR) and treatment for those reactive was provided free of charge through a network of referral clinics in each district.

Results

A total of 7828 FSWs in R1 and 7806 in R2, participated in the IBBA conducted in the three States of India. On an average, participation rates ranged from 66 to 86 per cent in R1 whereas in R2 it varied from 58 to 76 per cent with highest participation in MH and lowest in AP.

Profile characteristics: Overall, the mean age of FSWs increased from 31.0 years in R1 to 31.5 in R2 ($P<0.001$), the increase was also observed in AP and TN (Table I). Literacy has improved in the second survey (37.8% in R1 vs 46.3% in R2, $P<0.001$). Of the three States, more literate respondents were seen in AP and TN in R2 as compared to R1 ($P<0.001$). More than 90 per cent of the FSWs were married in both rounds. At aggregate level, more than half of the respondents

Table I. Socio-demographic and sex work characteristics of FSWs at State and aggregate level in round 1 (R1) and round 2 (R2) IBBA

Profile characteristics	Andhra Pradesh		Maharashtra		Tamil Nadu		Total		P value
	R1 (n=3271)	R2 (n=3225)	R1 (n=2525)	R2 (n=2575)	R1 (n=2032)	R2 (n=2006)	R1 (n=7828)	R2 (n=7806)	
Current age (yr)									
<25	21.5	20.1	20.9	23.1	13.6	10.2*	17.7	16.4	0.2
≥25-29	26.3	28.1	28.4	26.2	22.0	19.4	24.7	24.4	
30-34	21.5	20.1	22.1	20.8	22.3	20.5	21.9	20.3	
35-39	20.6	19.8	12.9	14.9	25.8	27.4	21.7	22.3	
≥40	10.1	12.0	15.8	15.1	16.3	22.6	14.0	16.6	
Mean	29.8	30.1**	30.0	30.0	32.3	33.7*	31.0	31.5	<0.001
Literacy	30.6	41.0**	24.4	25.8	48.4	58.4**	37.8	46.3	<0.001
Ever married	91.4	90.7	79.2	81.4	96.8	95.4	91.7	91.6	0.9
Additional income	41.0	51.7**	6.6	7.6	58.9	76.5**	49.7	55.2	0.008
Local residency	92.8	75.7**	98.1	92.6**	90.2	91.6	92.5	49.1	<0.001
Age started sex work (yr)									
<20	23.7	21.0	31.9	27.8*	9.5	6.8	18.6	16.0	0.05
20-24	32.7	32.6	34.6	34.9	25.1	24.1	29.5	29.4	
25-29	27.0	24.3	21.2	19.2	29.2	28.6	27.0	25.5	
≥30	16.6	22.1	12.2	18.2	36.3	40.4	25.0	29.0	
Mean	23.6	24.8**	22.7	23.8**	27.2	27.8	25.1	25.9	0.03
Duration sex work (yr)									
0-1	12.5	16.1**	18.0	18.6	17.3	12.2**	15.7	14.8	0.2
2-3	25.2	26.3	17.7	20.9	33.9	29.0	27.9	26.8	
4-9	37.8	38.6	32.5	31.3	30.7	36.0	33.6	36.7	
≥10	24.6	18.7	31.5	28.6	18.0	22.8	22.7	21.4	
Mean	6.2	5.4	7.4	6.2**	5.1	5.9**	5.9	5.7	0.09
Street based FSW	55.7	74.3**	31.1	30.7	91.3	95.7*	67.9	78.1	<0.001
Usual place of entertaining clients									
Home	67.2	53.7**	26.7	33.1*	86.1	86.1	68.8	64.4	<0.001
Brothel/lodge/dhaba	16.1	4.9	72.5	66.6	0.9	3.1	18.9	10.9	
Public places	16.8	41.4	0.9	0.3	13.0	10.8	12.2	24.6	
Number of clients per week									
0-4	27.5	11.3**	18.7	14.8	36.0	35.8	29.9	21.5	<0.001
5-9	37.8	37.3	33.7	31.8	44.5	48.9	40.2	41.3	
≥10	34.7	51.5	47.6	53.4	19.6	15.3	29.9	37.1	
Mean	8.6	11.5**	11.9	16.7**	6.6	5.8**	8.2	9.7	<0.001
Currently having a regular partner	77.9	71.6**	31.4	49.5**	76.7	75.2	69.2	70.6	0.4

*P<0.05, **<0.01. Values are expressed as percentages

were having other sources of income in addition to sex work; however, only six to eight per cent FSWs in MH had any additional income. Overall, 92.5 per cent of the participants belonged to the place of interview in the first survey round whereas in the second round nearly half of the FSWs interviewed were non-localities ($P<0.001$). Similar pattern was observed in AP (92.8%

in R1 vs 75.7% in R2, $P<0.01$) and MH (98.1% in R1 vs 92.6% in R2, $P<0.01$).

Mean age of starting commercial sex was around 25 years with a little increase in R2 ($P<0.03$); similar change was observed at State level as well (Table I). With commercial sex starting earliest among MH sex

workers, mean duration of selling sex was longest in MH in both the rounds (7.4 yr in R1 and 6.2 yr in R2). The proportion of FSWs who were selling sex for more than 10 years decreased in all the States except TN where the proportion increased (18.0% in R1 vs 22.8% in R2). The typology of FSWs and place of entertaining clients had undergone significant transitions between the two IBBA rounds. Majority of FSWs solicited clients on streets and entertained them at home except in MH, where they were brothel based (Table I). The proportion of street based sex worker has increased at overall level (67.9% in R1 and 78.1% in R2, $P<0.001$) and in States of AP (55.7% in R1 and 74.3% in R2, $P<0.001$) and TN (91.3% in R1 and 95.7% in R2, $P<0.05$) and remained unchanged in MH. Weekly client volume of FSWs increased from R1 to R2; sharp increase was observed in AP (8.6 in R1 to 11.5 in R2, $P<0.01$) and MH (11.9 in R1 to 16.7 in R2, $P<0.01$). Majority of FSWs had regular partner in both the survey rounds; the proportion increased in MH (31.4% in R1 to 49.5% in R2, $P<0.01$).

Exposure to Avahan programme interventions: Multivariate analysis revealed that at aggregate level, more FSWs were contacted by peer educator/staff of Avahan supported NGOs and received condom from them in R2 as compared to R1 ($P<0.001$) (Table II). More than 50 per cent of them were contacted by peer educator/staff, received condom from them and visited NGO clinic as gathered from R2 data. The increase in exposure to the Avahan programme services was evident in all the survey States except AP, where there was significant decrease to nearly one-third level in all the three programme indicators (Table II). The exposure decreased for non-Avahan programme as well (data not shown). The increase from R1 to R2 was reported maximum from TN and the levels of exposure reached were also highest there (more than 85% for all the programme indicators in R2) (Table II).

Condom use with different types of partners: Both at aggregate and State levels, self reported condom use with occasional and regular clients increased substantially, even though the estimates were already high in R1 (Table II). The levels of condom use was reported maximum from FSWs in MH, reaching 95 per cent and above in all condom use indicators with clients in the second round. Overall, less than 15 per cent of sex acts with occasional and regular clients, taken collectively, were unprotected and the proportion has decreased than before (zero unprotected sex acts with

clients: R1 66.8% to R2 85.2%, AOR 3.5, $P<0.001$). However, consistent condom use with regular partners showed no significant improvement and remained below 20 per cent in all the States in R2 (Table II).

STIs and HIV: Though there was a decline in the overall HIV prevalence from 14.1 per cent in R1 to 11.9 per cent in R2, it was not statistically significant. Except for AP (R1: 17.7%, R2: 13.2%, AOR 0.6, $P<0.01$) there was no significant change in HIV prevalence in MH and TN between the two survey rounds (Table II). The prevalence of HIV among FSWs was more in MH as compared with other States; more than one-fourth of them were HIV positive. Syphilis decreased by more than 50 per cent in the aggregate analysis between R1 and R2 (AOR 0.4, $P<0.001$). The decrease in syphilis prevalence was also evident in all the States (Table II). High titre (1:8 or more) syphilis was low and decreased further in R2 after controlling for profile variables (R1: 2.1%, R2: 2.1%, AOR 0.6, $P<0.003$). The prevalence of both *N. gonorrhoeae* and *C. trachomatis* infection was below five per cent in the studied FSW population (at aggregate level). On controlling confounding variables, the fall in prevalence of these two STIs was evident in MH ($P<0.05$), the change remained insignificant in other States and at overall level (Table II).

Effect of Avahan interventions on condom use: Independent multiple logistic regression models were built to assess the association of having received prevention services from Avahan including ever been contacted by peer educator/staff, having ever received condom from peer educator/NGO worker, and having ever visited programme clinic, on condom use with various type of partners. At aggregate level condom use with paying clients and regular partners was higher among service users than non-users, for all the three Avahan services investigated (AOR>1.5, $P<0.001$ for all condom use indicators). On analysis at State level, in AP, interventions showed improved condom use with clients (AOR>1, $P<0.01$ for all condom use indicators), but have little to do with regular partners (Fig. 1). In MH, there was no obvious difference between those exposed and non-exposed to Avahan interventions in their condom use behaviour. Both clinic visit and peer/staff contact showed no statistical significant effect on most of the condom use indicators (Fig. 2). However, the effect of Avahan interventions among FSWs was highest in TN, where in those who availed services, the likelihood of using condoms with clients and regular partner was two to four times more than who did not (Fig. 3).

Table II. Univariate and multivariate analysis^a of Avahan programme exposure, condom use and STI prevalence among FSWs at State and aggregate level in round 2 (R2) with reference to round1 (R1) IBBA

Outcome variable	Andhra Pradesh R1%, R2% AOR (95% CI)	Maharashtra R1%, R2% AOR (95% CI)	Tamil Nadu R1%, R2% AOR (95% CI)	Total R1%, R2% AOR (95% CI)	P value
Programmatic exposure					
Contacted by a peer educator/ NGO staff	50.3, 33.5 0.5** (0.4 - 0.7)	32.0, 52.7 1.9** (1.5 - 2.4)	57.2, 86.9 4.8** (2.8 - 8.3)	47.6, 56.6 1.5 (1.3 - 1.8)	<0.001
Visited programme clinic	49.3, 30.2 0.4** (0.3 - 0.5)	27.8, 44.8 1.7** (1.3 - 2.1)	56.0, 85.1 4.0** (2.3 - 6.9)	48.6, 53.9 1.0 (0.8 - 1.2)	0.8
Received condom from peer educator/NGO worker	47.2, 33.4 0.6* (0.5 - 0.8)	28.9, 47.3 1.7** (1.4 - 2.2)	54.3, 86.0 4.7** (2.8 - 8.0)	47.3, 56.1 1.4 (1.2 - 1.7)	<0.001
Condom use					
Last condom use with occasional clients	91.1, 97.8 4.3** (2.9 - 6.1)	96.8, 99.7 8.0** (3.4 - 19.2)	92.8, 97.9 3.8** (1.9 - 7.8)	92.9, 98.0 4.5 (3.3 - 6.1)	<0.001
Consistent condom use with occasional clients	70.8, 83.7 2.0** (1.6 - 2.5)	83.3, 96.5 5.0** (3.1 - 8.1)	74.0, 92.7 8.1** (5.2 - 12.8)	74.5, 88.7 2.9 (2.4 - 3.5)	<0.001
Last condom use with regular clients	84.9, 95.8 4.1** (2.8 - 5.9)	94.9, 99.1 3.9** (2.2 - 7.0)	89.9, 95.9 4.1** (1.9 - 8.8)	88.7, 96.2 3.6 (2.6 - 5.1)	<0.001
Consistent condom use with regular clients	63.4, 83.4 2.8** (2.2 - 3.5)	78.3, 94.5 4.6** (3.0 - 6.9)	69.9, 88.5 6.8** (4.5 - 10.2)	68.7, 86.9 3.4 (2.8 - 4.1)	<0.001
Zero unprotected sex with clients	59.4, 81.8 3.1** (2.5 - 3.8)	76.2, 94.6 4.8** (3.3 - 7.1)	68.9, 86.7 6.1** (4.1 - 8.9)	66.8, 85.2 3.5 (2.9 - 4.1)	<0.001
Consistent condom use with regular partner	8.9, 8.5 0.8 (0.5 - 1.2)	21.2, 13.7 0.6** (0.4 - 0.9)	11.5, 16.1 1.3 (0.8 - 2.2)	11.3, 12.1 0.9 (0.7 - 1.2)	0.6
STI prevalence					
HIV	17.7, 13.2 0.8** (0.51 - 0.9)	25.8, 27.5 1.2 (0.9 - 1.6)	6.1, 6.1 1.4 (0.8 - 2.4)	14.1, 11.9 0.9 (0.7 - 1.1)	0.5
Syphilis	10.8, 6.1 0.4** (0.3 - 0.6)	15.8, 10.8 0.5** (0.4 - 0.7)	9.7, 2.2 0.2** (0.1 - 0.3)	10.8, 5.0 0.4 (0.3 - 0.5)	<0.001
Syphilis - high titre	3.2, 3.1 0.5** (0.2 - 0.9)	4.2, 3.4 0.5** (0.3 - 0.8)	1.1, 0.5 0.7 (0.2 - 3.1)	2.1, 2.1 0.6 (0.4 - 0.8)	0.003
<i>Neisseria gonorrhoeae</i>	2.2, 2.8 1.2 (0.7 - 2.2)	7.4, 3.9 0.6* (0.4 - 0.9)	0.5, 0.2 0.5 (0.2 - 1.2)	2.3, 1.8 0.9 (0.7 - 1.3)	0.8
<i>Chlamydia trachomatis</i>	3.5, 3.5 0.9 (0.6 - 1.5)	8.0, 6.2 0.7* (0.5 - 0.9)	2.0, 1.4 0.5 (0.09 - 2.8)	3.5, 3.0 0.9 (0.7 - 1.2)	0.3

*P<0.05, **<0.01. AOR, adjusted odds ratio

^aControlled variables: district, current age, literacy, marital status, having additional source of income, residency status, duration in sex work, age at first commercial sex, usual place of solicitation

Discussion

Significant change was observed between the two rounds in the mean age, literacy, proportion reporting having additional source of income, residency status, age of starting sex work, typology, place of entertaining clients and weekly clientele. Both at overall and State levels these changes between the two rounds of IBBA

survey are suggestive of the dynamics of the changing universe of the FSW population. Not having additional source of income make FSWs more vulnerable^{7,8} and in Maharashtra it was observed that majority of FSWs were brothel based and very few of them reported having additional source of income. The increasing proportion of public places as solicitation site and home as place of entertaining clients, reaching them

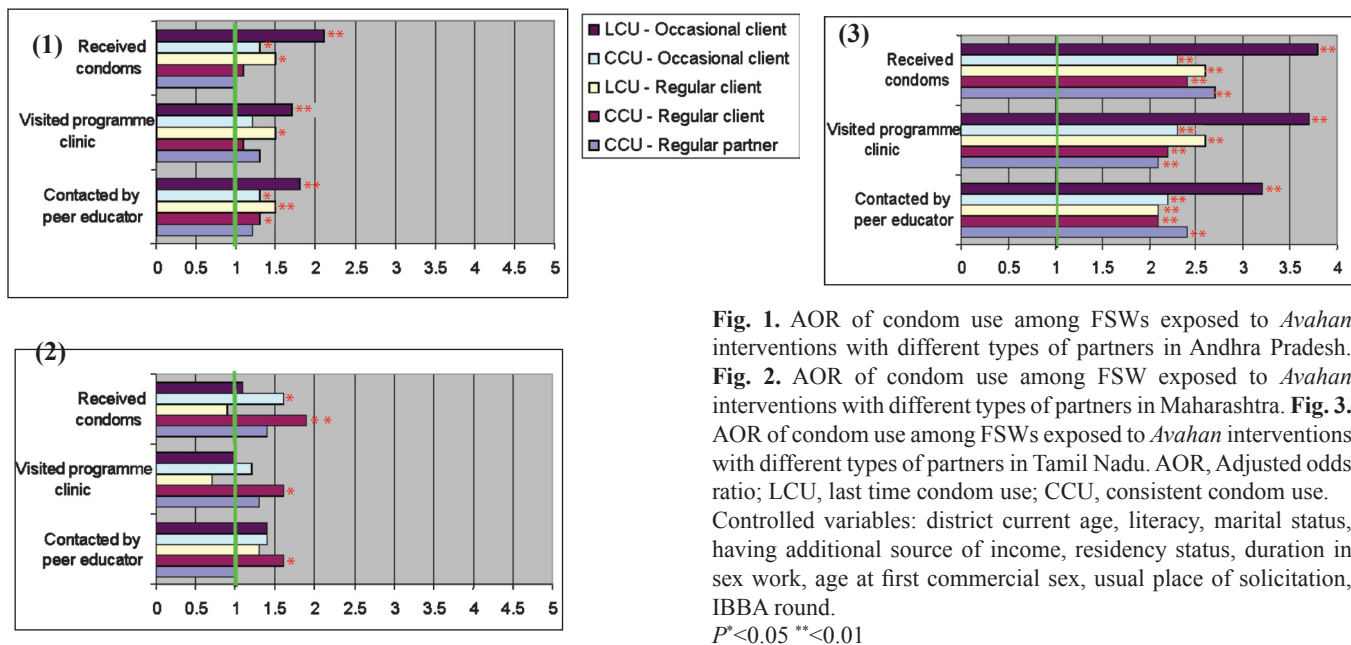


Fig. 1. AOR of condom use among FSWs exposed to *Avahan* interventions with different types of partners in Andhra Pradesh. **Fig. 2.** AOR of condom use among FSW exposed to *Avahan* interventions with different types of partners in Maharashtra. **Fig. 3.** AOR of condom use among FSWs exposed to *Avahan* interventions with different types of partners in Tamil Nadu. AOR, Adjusted odds ratio; LCU, last time condom use; CCU, consistent condom use. Controlled variables: district current age, literacy, marital status, having additional source of income, residency status, duration in sex work, age at first commercial sex, usual place of solicitation, IBBA round. $P^* < 0.05$ $** < 0.01$

by programme staff is more challenging and strategy for one to one contact becomes more imperative. The group norm characteristic of brothel which help in negotiating condom use with clients would also be lacking among the street based FSWs⁹. As the number of clients entertained by FSWs in a week has increased over time, it becomes more important to ensure that condoms are used consistently.

A substantial increase was seen in consistent condom use and last time condom use with all types of commercial partners. High level of condom use among FSWs in high HIV prevalent States is also suggested by United Nations General Assembly Special Session (UNGASS) report for 2010¹⁰. The low condom use among regular partners may be due to the fact that there is a greater degree of trust, honesty and commitment with the spouse, boy friend, lover or living-in partner and the negotiation of using condom would be difficult with them¹¹.

The exposure to intervention shows that uptake of services has increased significantly in R2 as compared to R1 but still there were more than 40 per cent of sampled sex workers not covered by the intervention. Of the three surveyed States, TN showed high programme coverage in terms of proportion of FSW receiving *Avahan* HIV prevention services. Decrease in exposure to *Avahan* and other interventions in AP is a matter of concern necessitating detailed investigation. One plausible reason of the low exposure reporting

could be due to the difference in the branding of the intervention by different implementing partners in the State. Further investigation of the exposure data is required to understand the low level of reported coverage in case of AP.

The aggregate level analysis on the pooled data of both rounds (R1 and R2) supports the argument that contact by peer educators/NGO staff, visiting *Avahan* programme clinics or receiving condoms from peer educators/NGO workers are likely to have increased consistent condom use among FSWs. Similar results were also seen in a study in Kenya which showed that peer-mediated interventions were associated with an increase in protected sex¹². Association between *Avahan* interventions and condom use was also evident in TN, which was supported by evidence of increased programme coverage and condom use in the State. In AP, in spite of declined coverage by *Avahan* programme, there was an increase in reported condom use. Since there is a scope for scaling up of coverage in AP, further increase in condom use and decrease in STIs and HIV can be expected¹³. In MH, despite that *Avahan* has reached to only half of the sampled population, condom use rates were very high irrespective of their exposure to interventions. This might be due to intervention by any other NGO, external factors like socio-economic development and exposure to mass media, or biased responses or measurement error of exposure. Since *Avahan*

interventions had not much effect on condom use with regular partners, interventions should be re-strategize to improve condom use with them.

The State level estimate of HIV detected in IBBA was higher than the NACO's HIV sentinel surveillance (HSS) 2007 data¹, which may be due to difference in methodology, representativeness and coverage of both types of surveys. Both IBBA and HSS demonstrated that HIV prevalence among FSWs was highest in MH. Studies on IBBA have shown that the high prevalence of HIV among the FSWs in MH was mainly due to the high prevalence in specifically two district of the State viz. Mumbai and Thane¹⁴. Both at the aggregate and State levels, prevalence of HIV was not changed significantly. On the other hand, level of syphilis has come down remarkably in all the States and aggregate to half or less. Even high titre syphilis, chlamydial and gonorrhoeal infections which are better markers of recent sexual behaviour, decreased after controlling for profile variables in MH and at aggregate level (significant only for high titre syphilis) suggesting that sexual health promotion programmes and services might have reached the targeted group, and increased condom use and better health seeking practices, might have contributed to reductions in transmission of STIs and HIV. Sentinel surveillance data also showed among FSWs, a decline in south Indian States reflecting the impact of interventions².

The IBBA survey and the comparison of the two rounds had several limitations. The mobile and dynamic nature of the population made the comparison of two rounds extremely difficult; this has been addressed this by controlling for changes in socio-demographic and sexual behaviour variables. This is a usual problem with serial cross-sectional surveys of such a dynamic population¹⁵. We have not included any non-*Avahan* district as a control group for assessing effectiveness of *Avahan* interventions, which could have measured the difference more accurately. Since the behavioural and exposure indicators were self-reported responses on face, the role of social desirability bias could not be ruled out^{16,17}. Also, round 1 of the IBBA was not a true baseline for evaluation as programme started almost a year before the round 1 survey was conducted.

In conclusion, the two rounds of IBBA reflected an increase in the proportion of FSWs reporting consistent use of condoms coupled with decline in prevalence of STIs. Evidence from the assessment is suggestive that a comprehensive HIV prevention programme among

FSWs can lead to an increase in condom use with commercial clients, and a decrease or at least stabilize STIs and HIV prevalence among them. However, improved strategies are required to increase condom use with regular partners of FSWs. HIV prevention and control programmes should be scaled up to cover the unexposed FSW populations in these States. Concerted efforts which targets the high risk populations must continue and be strengthened.

Acknowledgment

Authors thank to ICMR institutes which implemented IBBA in their State, professional research agencies AC Nielsen ORG MARG, GfK Mode, TNS India and CORT which carried out field data collection for the study, *Avahan* State implementing partners, NGOs and community members for their co-operation and the FSWs in each State for their participation, and also acknowledge Dr Guy Morineau, Regional Technical Advisor, FHI360, for his assistance in reviewing the paper. This research and the *Avahan* programme were funded by the Bill & Melinda Gates Foundation.

References

1. *HIV sentinel surveillance and HIV estimation in India 2007*. A technical brief. New Delhi: National AIDS Control Organization, Ministry of Health and Family Welfare, Government of India; 2008.
2. HIV/AIDS situation in India. National AIDS Control Programme. Available from: http://india.gov.in/sectors/health_family/national_aids.php, accessed on July 1, 2010.
3. National AIDS Control Organization, India. National AIDS Control Programme Phase III (2007-12). 2006. Available from: http://www.nacoonline.org/Quick_Links/Publication/NGO_Targeted_Interventions/, accessed on July 1, 2010.
4. Avahan: India AIDS Initiative. Available from: <http://www.gatefoundation.org/avahan/pages/overview.aspx>.
5. *Avahan-The India AIDS initiative: The business of HIV prevention at scale*. New Delhi: Bill and Melinda Gates Foundation; 2010.
6. Ramesh BM, Beattie TSH, Shajy I, Washington R, Jagannathan L, Reza-Paul S, *et al*. Changes in risk behaviors and prevalence of sexually transmitted infections following HIV preventive interventions among female sex workers in five districts in Karnataka state, south India. *Sex Transm Infect* 2010; 86 (Suppl 1): i17-i24.
7. Saidel T, Adhikary R, Mainkar M, Dale J, Loo V, Rahman M, *et al*. Baseline integrated behavioural and biological assessment among most at-risk populations in six high-prevalence states of India: design and implementation challenges. *AIDS* 2008; 22 (Suppl 5): S17-34.
8. Ranawaka CD. Alternate income generation for commercial sex workers. In: 15th International Conference on AIDS 2004 July 11-16: Bangkok, Thailand.
9. Esu-Williams E. Clients and commercial sex work. HIV and AIDS: The global inter-connection. Available from: <http://www.undp.org/hiv/publications/book/bkchap09.htm>, accessed on July 10, 2010.

10. Dandona R, Dandona L, Gutierrez JP, Kumar AG, McPherson S, Samuels F, *et al*. High risk of HIV in non-brothel based female sex workers in India. *BMC Public Health* 2005; 5 : 87.
11. UNAIDS (2010) UNGASS Country Progress Report, India, 2010. Available from: http://data.unaids.org/pub/Report/2010/india_2010_country_progress_report_en.pdf, accessed on July 10, 2010.
12. Varga C. Sexual decision-making and negotiation in the midst of AIDS: Youth in KwaZulu-Natal, South Africa. *Health Transition Rev* 1997; 7 (Suppl 3): 45-67.
13. Luchters S, Chersich MF, Rinyiru A, Barasa M, King'ola1 N, Mandaliya K, *et al*. Impact of five years of peer-mediated interventions on sexual behavior and sexually transmitted infections among female sex workers in Mombasa, Kenya. *BMC Public Health* 2008; 8 : 143.
14. Mainkar MM, Pardeshi DB, Dale J, Deshpande S, Khazi S, Gautam A, *et al*. Targeted Interventions of *Avahan* program and their association with intermediate outcomes among female sex workers in Maharashtra, India. *BMC Public Health* 2011; 11 (Suppl 6): S2.
15. Aral SO, Blanchard J, Lipshutz J. STD/HIV prevention intervention: efficacy, effectiveness and population impact. *Sex Transm Infect* 2008; 84 : ii1-ii3.
16. Blankenship KM, Burroway R, Reed E. Factors associated with awareness and utilization of a community mobilization intervention for female sex workers in AP, India. *Sex Transm Infect* 2010; 86 (Suppl 1): i69-i75.
17. Bradley J, Moses S, Blanchard JF, Rajaram S, Ramesh BM, Verma S, *et al*. Assessing reported condom use among female sex workers in southern India through examination of condom availability. *Sex Transm Infect* 2010; 86 : i44-8.

Reprint requests: Dr Rajatashuvra Adhikary/Abhishek Gautam, FHI360, H-5 (Ground Floor), Green Park Extension, New Delhi 110 016, India
e-mail: radhikary@fhi360.org/agautam@fhi360.org