

Increases in self-reported consistent condom use among male clients of female sex workers following exposure to an integrated behaviour change programme in four states in southern India

Varja Lipovsek,¹ Amajit Mukherjee,² Deepa Navin,² Pritpal Marjara,³ Aseem Sharma,² Kali Prosad Roy²

¹Population Services International, Research Department, Washington DC, USA ²Population Services International, Research Department, New Delhi, India ³National AIDS Control Organisation, Ministry of Health & Family Welfare, New Delhi, India

Correspondence to

Amajit Mukherjee, Population Services International, Tower A, Building No. 10, DLF Cyber City, Gurgaon, India; amajit@psi.org.in

Accepted 28 October 2009

ABSTRACT

Purpose As part of the Avahan India AIDS Initiative, a behaviour change communication programme sought to increase consistent condom use (CCU) among male clients of female sex workers (FSWs) in four Indian states through the use of outdoor static promotional materials, interpersonal communication and mid-media activities. This paper presents key findings related to programme coverage levels, trends over time in self-reported condom use, and correlations between levels of exposure to programme activities and self-reported condom use.

Methods Five stratified two-stage cluster sample surveys were conducted between April 2006 and November 2008 (sample sizes ranged from 1741 to 2041). The independent samples were composed of clients of FSWs in selected clusters. Multivariate logistic regression was used to model whether behavioural outcomes varied between baseline and endline, and whether they varied with levels of exposure to the intervention.

Results Over two-thirds of men in each survey round recalled one or two of the main intervention channels. An increase in CCU with FSWs was found between baseline and endline (63.6% vs 86.5; $p < 0.01$). Men exposed to two intervention channels reported higher CCU than men exposed to none or only static outdoor media (89.4% vs 82.0%, $p < 0.05$). This trend was sustained for condom use at last sex (96.2% vs 92.6%, $p < 0.05$).

Conclusion Evaluation suggests that a multi-channel behavioural intervention delivered at sites where FSWs are solicited can increase CCU among male clients of FSWs. Further research is needed on the dynamics of exposure to multiple communication channels and the contributions of complementary interventions.

INTRODUCTION

India's estimated adult HIV prevalence rate is 0.36% translating into approximately 2.4 million cases of HIV/AIDS—more than twice as many as the rest of South and Southeast Asia combined.¹ According to the National AIDS Control Organisation (NACO), heterosexual sex is the transmission route for 87% of reported AIDS cases.² In 2007, it was estimated that 63% of all HIV-positive people lived in the four southern states of Andhra Pradesh, Karnataka, Maharashtra, and Tamil Nadu.³ Commercial sex is widely available in India.⁴ A 2006 NACO survey of

the general population found that more than 3% of sexually active men reported having sex with a commercial sexual partner in the previous year.⁵ High HIV prevalence (14.0%) among female sex workers (FSWs) in the four southern states indicates that their sexual networks may be contributing substantially to the spread of HIV in India.⁶ In response to this situation, the government of India devised a strategy for addressing high-risk groups and bridge populations, among them FSWs and their clients.⁷ Avahan, a Bill and Melinda Gates Foundation-supported initiative, oversees the implementation of relevant programmes in the four southern states most affected by HIV.⁸ Under this initiative, Population Services International (PSI)/India developed and implemented an HIV prevention programme that sought to increase consistent condom use among male clients of FSWs.

The PSI/Avahan intervention was an integrated behaviour change communication programme that used multiple media channels (interpersonal communication (IPC), outdoor static promotional materials and mid-media activities) in 100 hotspots (venues where FSWs are solicited) in the four states.⁹ PSI/Avahan delivered messages around consistent condom use and changing the materials every 3 months; another component of the programme introduced affordable condoms in more than 65 000 retail outlets. The two primary mid-media activities were street theatre and interactive game shows, and trained PSI/Avahan representatives conducted small group and one-on-one discussions following these activities. Posters displayed in hotspots and point-of-purchase material at retail outlets selling condoms reinforced the themes of the campaign. Quantitative and qualitative research, particularly regarding hypothesised determinants of condom use, guided messaging during the programme cycle.⁹ The programme was conducted from November 2004 through September 2008, and was estimated to have reached approximately 700 000 men monthly. Further programme description can be found in the Annex (web supplement).

This paper addresses three questions. First, what levels of exposure to the PSI/Avahan communication campaign were reached in the target population over time? Second, did consistent condom use increase over time? Third, was consistent condom use associated with level of programme exposure?



This paper is freely available online under the BMJ Journals unlocked scheme, see <http://sti.bmj.com/site/about/unlocked.xhtml>

METHODS**Sample and design**

The study protocol was approved by an ad hoc ethical committee chaired by the Indian Council of Medical Research. Cross-sectional surveys of clients of sex workers were conducted at hotspots across the four states in April 2006, December 2006, May 2007, February 2008 and November 2008. The sampling frame for the April 2006 survey was based on an existing list of hotspots compiled by PSI/Avahan's implementing partners; it was updated on an annual basis.⁹ Stratified two-stage cluster sampling surveys were conducted with hotspots defined as the primary sampling units (PSUs). States were regarded as strata, although Maharashtra was divided into two strata: Mumbai (due to its size) and the rest of the state. Baseline (April 2006) and endline (November 2008) surveys were conducted for programme evaluation purposes, while the three intermediate rounds provided programme monitoring data. The target sample sizes for baseline and endline were 2400 individuals per round (480 per strata); the target sample size for monitoring was 1800 per round (360 per strata). The samples also allowed for comparisons across time within strata (calculating a 15% change in main behavioural indicator over time); significance level (alpha) was set at 0.05 and power (beta) at 80%.

The PSUs were selected by probability-proportionate-to-size sampling; estimate of the FSW population served as a proxy since the size of the client population was unknown. In each round 30 hotspots per strata were selected; completed interview quotas were set for each PSU. Interviews were conducted between 10 am and 7 pm on all days of the week (qualitative investigations prior to data collection suggested no difference between weekday and weekend population). For logistical reasons (poor visibility in evening hours and safety concerns for the interviewers), the data collection terminated at 7 pm. If necessary, the research team returned to the same site the following day to complete the assigned quota. Trained interviewers were stationed at selected points in the hotspots and instructed to approach every fifth man passing by during a specified timeframe to avoid introducing selection bias based on interviewer's judgments. Men were first read a description of the study. Those willing to participate were asked for informed consent and then were screened for eligibility. Enrolment was restricted to men aged 18 and older who 'had paid sex with a female sex worker during the past 12 months.'

Measures

Socio-demographic characteristics measured were age, duration of residence in the city where the respondent was interviewed, number of days spent in that city in the last month, educational attainment, marital status, socio-economic status, current occupation, living arrangements, alcohol consumption, types of sexual partners in the past 12 months and places where the respondent usually goes to meet FSWs. The survey also addressed determinants of condom use; this information was used to guide programmatic decision-making.⁹

The main behavioural outcome, condom use during paid sex with an FSW, was measured in two ways: condom use at last sex with an FSW (dichotomous yes/no answer) and consistent condom use with FSWs in the last year. The latter was a dichotomous composite measure whereby a respondent was classified as a consistent user if he (a) reported having used a condom at last sex with an FSW, (b) reported always using condoms with such partners in the past 12 months and (c) confirmed that there were no exceptions to having always used a condom with an FSW in the last 12 months.

Exposure to the intervention was measured by asking the respondent whether he recalled seeing or participating in any of the three main programme activities—outdoor static media, mid-media or IPC—in the past 3 months. In the final round, respondents were asked about exposure to outdoor static media for the previous 6 months. Recall was aided by showing respondents pictures of the promotional materials and activities. Since only 3.9% of respondents in the final round reported no exposure to any of the three main programme activities (data not shown), the decision was made to assess exposure using the following exposure categories: none/outdoor static; IPC *or* mid-media in addition to outdoor static; IPC *and* mid-media in addition to outdoor static. Thus, respondents in all three exposure categories may have seen outdoor static media, and comparisons between exposure categories serve to highlight the contributions of IPC and mid-media channels to encouraging condom use.

Analysis

Only eligible men who completed the full behavioural questionnaire were included in the analyses. All analyses were conducted using Stata V.10.0 software (Stata Corporation, College Station, Texas). Bivariate methods (*F* test, χ^2) were used to compare population characteristics across time and to test associations between socio-demographic characteristics and behavioural outcomes of interest. Data were unweighted as estimates of client population size do not exist. Multivariate logistic regression for complex survey design (*svy* commands in Stata) was used to model whether, after controlling for population characteristics, the behavioural outcomes varied from baseline to follow-up, as well as whether they varied with levels of exposure to the PSI/Avahan intervention.¹⁰ Relevant population characteristics were included as controls in the multivariate models; these are listed in footnotes to tables 1,2. Goodness-of-fit tests appropriate for survey data were performed to ensure the appropriateness of the models. To facilitate interpretation, OR obtained through regression models were converted into adjusted proportions, which are the expected proportions of outcome variables after controlling for differences in population characteristics.¹¹

RESULTS**Sample description**

Table 3 shows population characteristics across the five survey rounds for the samples obtained (April 2006 *n*=2401; December 2006 *n*=1756; May 2007 *n*=1741; February 2008 *n*=1779; and November 2008 *n*=2382). The tests of significance are unadjusted bivariate tests.

The population overall appears quite similar across survey rounds. The mean age was between 29 and 31 years. The majority of respondents across the five rounds had resided since birth in the cities where they were interviewed; another 20%–30% had been residents for at least 2 years. Respondents appeared to not travel much outside of the cities where they were interviewed, with a mean of 26–27 days in the last month spent there. The majority of men in all rounds were married and living with their wives, while 33%–41% were unmarried. More than three-quarters of men in all survey rounds were living with family (wife or family of origin). In addition to FSWs, respondents had other sexual partners: about two-thirds had wives (measured in rounds four and five only); smaller proportions had girlfriends and fiancés. Most respondents across rounds had finished secondary education or higher; the most common occupation was 'skilled worker.' Approximately half the sample reported drinking alcohol on a weekly basis or more often;

Table 1 Adjusted proportions* from logistic regression analyses of behavioural outcomes related to condom use among men who have had commercial sex in the last 12 months, by survey round and geographic location (statistical difference shown between baseline and endline)

	Baseline Apr 2006	Round 2 Dec 2006	Round 3 May 2007	Round 4 Feb 2008	Endline Nov 2008	Base vs end†
All areas combined (n)	(2401)	(1756)	(1741)	(1779)	(2382)	
Consistent condom use with FSW in last 12 months (composite of 3 items below)	63.6	70.9	81.4	81.9	86.5	**
Used condom last time sex with FSW	89.9	91.6	92.2	94.5	95.3	**
Used condom with FSW every time in past 12 months	72.6	75.2	83.3	83.1	88.4	**
No occasion when condom not used with FSW in past 12 months	63.6	70.9	81.4	81.9	86.5	**
Andhra Pradesh (n)	(480)	(354)	(351)	(357)	(447)	
Consistent condom use with FSW in last 12 months (composite of 3 items below)	63.8	64.9	79.3	82.6	76.1	*
Used condom last time sex with FSW	93.9	90.9	93.8	95.2	92.1	ns
Used condom with FSW every time in past 12 months	71.7	70.2	81.6	83.9	78.7	ns
No occasion when condom not used with FSW in past 12 months	63.8	64.9	79.3	82.6	76.1	*
Karnataka (n)	(481)	(337)	(351)	(350)	(473)	
Consistent condom use with FSW in last 12 months (composite of 3 items below)	51.0	66.0	70.5	69.0	81.1	**
Used condom last time sex with FSW	88.5	84.6	81.4	89.9	90.6	ns
Used condom with FSW every time in past 12 months	62.8	66.2	70.3	68.8	84.8	**
No occasion when condom not used with FSW in past 12 months	51.0	66.0	70.5	69.0	81.1	**
Tamil Nadu (n)	(480)	(352)	(344)	(357)	(473)	
Consistent condom use with FSW in last 12 months (composite of 3 items below)	40.1	55.0	67.6	70.1	79.3	**
Used condom last time sex with FSW	71.4	82.6	83.0	86.5	93.2	**
Used condom with FSW every time in past 12 months	49.7	56.9	68.7	70.4	80.4	**
No occasion when condom not used with FSW in past 12 months	40.1	55.0	67.6	70.1	79.3	**
Maharashtra (except Mumbai) (n)	(480)	(336)	(325)	(355)	(498)	
Consistent condom use with FSW in last 12 months (composite of 3 items below)	84.2	86.2	97.9	93.6	95.7	**
Used condom last time sex with FSW	97.0	98.3	99.8	99.3	99.5	*
Used condom with FSW every time in past 12 months	90.2	92.5	98.4	94.5	96.0	*
No occasion when condom not used with FSW in past 12 months	84.2	86.2	97.9	93.6	95.7	**
Mumbai (n)	(480)	(377)	(370)	(360)	(491)	
Consistent condom use with FSW in last 12 months (composite of 3 items below)	70.8	76.5	81.4	83.3	94.1	**
Used condom last time sex with FSW	90.0	95.9	94.6	94.8	97.5	*
Used condom with FSW every time in past 12 months	77.3	81.6	85.3	84.7	95.5	**
No occasion when condom not used with FSW in past 12 months	70.8	76.5	81.4	83.3	94.1	**

*Logistic regression models are adjusted for variables found to vary significantly over time at bivariate level: age, state where the study was conducted (for combined sample only), mobility, living in regional capital, duration of residence in city, marital status, socio-economic status, living arrangement, consumption of alcohol, other sexual partners in past 12 months (any other non-spousal non-commercial female partners), place where female sex workers (FSWs) are usually met, has seen condom advertisements other than those for PSI/Avahan-promoted 'Masti' condoms in past 6 months.

†* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ns, not significant.

one-third drank less than once a month or never. Across rounds, the most common location for meeting an FSW was a brothel followed by a bus stand or railway station. Regarding exposure to PSI/Avahan's mid-media and IPC activities, over two-thirds of the sample in each round reported recalling one or both of these intervention channels in the previous 3 months. Mid-media

reached a little more than two-thirds of respondents in every round but the last, when reported exposure fell to 58%. Recall of IPC activities ranged from a low of 34.3% to a high of 74.0% and was 57.0% at endline. Static outdoor media was seen by at least two-thirds of the sample in every round; in the final round, when recall was measured for the last 6 months, exposure reached 92%.

Table 2 Adjusted proportions from logistic regression testing the association between different intensities of exposure to Population Services International (PSI)/Avahan interventions in the previous 3 months and selected behaviours among men who have had commercial sex in the last 12 months*, †, ‡

	Baseline (Apr 2006)	Exposure at endline (Nov 2008) vs baseline			Pairwise comparisons within endline (Nov 2008)	
		None/outdoor static	IPC or mid-media	IPC and mid-media	None/outdoor static vs IPC or mid-media	None/outdoor static vs IPC and mid-media
All areas combined (n)	(2401)	(722)	(585)	(1075)		
Consistent condom use with FSW in last 12 months (composite)§	64.3	82.0**	86.4**	89.4**	ns	*
Used condom last time sex with FSW	89.9	92.6	94.8*	96.2**	ns	*
Andhra Pradesh (n)	(480)	(163)	(150)	(134)		
Consistent condom use with FSW in last 12 months (composite)	63.2	71.0	81.0**	76.8	ns	ns
Used condom last time sex with FSW	92.8	88.6	94.0	92.2	ns	ns
Karnataka (n)	(481)	(155)	(116)	(202)		
Consistent condom use with FSW in last 12 months (composite)	50.0	71.8**	78.5**	85.7**	ns	*
Used condom last time sex with FSW	88.3	87.5	87.6	91.7	ns	ns
Tamil Nadu (N)	(480)	(74)	(111)	(288)		
Consistent condom use with FSW in last 12 months (composite)	40.7	84.5**	81.2**	80.8**	ns	ns
Used condom last time sex with FSW	74.8	92.1*	92.6*	94.3**	ns	ns
Maharashtra (except Mumbai) (N)	(480)	(270)	(67)	(161)		
Consistent condom use with FSW in last 12 months (composite)	86.3	96.3**	94.0	97.0*	ns	ns
Used condom last time sex with FSW	96.0	99.6	100.0	98.1	ns	ns
Mumbai (n)	(480)	(60)	(141)	(290)		
Consistent condom use with FSW in last 12 months (composite)	70.7	88.3	93.0**	96.5**	ns	*
Used condom last time sex with FSW	91.3	92.9	97.3	99.1*	ns	*

*Logistic regression models are adjusted for variables found to be significantly correlated with the outcomes of interest at the bivariate level: age, state where the study was conducted (for combined sample only), mobility, living in regional capital, duration of residence in city, marital status, socio-economic status, living arrangement, consumption of alcohol, other sexual partners in past 12 months (any other non-spousal non-commercial female partners), place where female sex workers (FSWs) are usually met, has seen condom advertisements other than those for PSI/Avahan-promoted 'Masti' condoms in past 6 months.

†Exposure categories are 'none/outdoor static' (does not recall intervention or recalls only outdoor static media); 'interpersonal communication (IPC) or mid-media' (recalls either IPC or mid-media, in addition to outdoor static media); and 'IPC and mid-media' (recalls IPC and mid-media in addition to outdoor static media).

‡* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ns, not significant.

§Composite measure includes only those who answered positively to: (a) used condom last time sex with FSW, (b) used condom with FSW every time in past 12 months and (c) no occasion when condom not used with FSW in past 12 months.

Trends over time

Table 1 shows trends over time for the behaviours of interest—the composite consistent condom use variable and three component variables—after controlling for significant population characteristics. Pairwise comparisons between baseline and endline values are presented in the final column. In the combined sample (all strata), the composite indicator 'consistent condom use with FSW' rose significantly across survey rounds from 63.6% to 86.5%; all of the component indicators were also significantly higher at endline as compared to the baseline.

Among the five geographical areas, consistent condom use was the lowest at baseline in Tamil Nadu (at 40.1%) and nearly doubled there by endline (79.3%). The highest consistent condom use at both baseline and endline was measured in Maharashtra, with a baseline proportion of 84.2% and an endline proportion of 95.7%. In Andhra Pradesh, consistent condom use increased from 63.8% to 76.1%; in Karnataka, from 51.0% to 81.1%; and in Mumbai, from 70.9% to 94.1%. The increases in consistent condom use in all five strata were statistically significant.

Association with programme exposure

Table 2 presents correlations between behaviours of interest and levels of exposure to the PSI/Avahan intervention. Pairwise comparisons between baseline and the three exposure categories

are shown, with statistically significant findings indicated following the relevant endline data points. In addition, pairwise comparisons between 'none/outdoor static' and 'IPC or mid-media' are shown in a fourth endline column, while the final endline column provides pairwise comparisons between 'none/outdoor static' and 'IPC and mid-media.'

At programme level (all strata combined), consistent condom use was significantly higher in all endline exposure categories as compared to the baseline. In addition, respondents who had been exposed to both IPC and mid-media reported significantly higher consistent condom use than those in the none/outdoor static category (89.4% vs 82.0%). There was no difference between those who were exposed to none/outdoor static and those exposed to IPC or mid-media. Condom use at last sex with an FSW was reported to be significantly higher for those exposed to one or both channels at endline than for the baseline cohort. At endline, there was no difference between those who were exposed to none/outdoor static and those exposed to IPC or mid-media; however those exposed both channels reported significantly higher condom use at last sex than those exposed to none/outdoor static (96.2% vs 92.6%).

The most notable findings for specific geographical areas are for Karnataka and Mumbai. In Karnataka, all consistent condom use endline exposure categories were significantly different from the baseline. Within the endline sample, those exposed to two

Table 3 Selected population characteristics and exposure to Population Services International (PSI)/Avahan intervention among men in project sites aged 18+ who have had commercial sex in the last 12 months, by survey round (unadjusted proportions and means)

	Baseline Apr 2006	Round 2 Dec 2006	Round 3 May 2007	Round 4 Feb 2008	Endline Nov 2008	Sig*
Response rate†						
Number of men approached	12490	12272	17628	20761	20850	
Number consenting to interview	9786	2949	6374	6985	6437	
Number eligible	2401	1856	1799	1849	2627	
Number completed full questionnaire (n)	2401	1756	1741	1779	2382	
Response rate (%)	24.5	59.5	27.3	25.4	37.0	
Mean age (years)	29.6	29.3	29.2	29.7	30.7	p<0.001
Duration of residence in city of interview	%	%	%	%	%	
Since birth	66.8	57.3	56.8	53.1	53.1	p<0.001
2 years+ but not since birth	19.8	23.9	29.9	30.5	25.9	
Less than 2 years/doesn't live in city	13.4	18.8	13.4	16.4	21.1	
Mobility						
Mean no of days spent in city of interview in last month	27.2	26.4	27.6	26.7	26.1	p<0.001
Marital status	%	%	%	%	%	
Unmarried	34.6	41.4	38.3	38.1	33.0	p<0.001
Married, not living with wife	13.2	8.5	10.8	13.2	14.6	
Married and living with wife	52.2	50.1	51.0	48.7	52.4	
Sexual partners in the past 12 months (in addition to FSW)‡	%	%	%	%	%	
Wife	-	-	-	61.5	66.3	NA
Girlfriend	19.9	30.8	29.3	26.8	25.9	
Fiancé	3.8	22.8	9.9	6.2	4.5	
Other§	2.0	5.5	2.4	3.3	2.0	
Mean number of visits to FSW in the last 30 days	-	-	-	6.4	5.2	NA
Living arrangement	%	%	%	%	%	
Living alone/with friends	17.4	19.2	18.0	26.2	21.5	p<0.001
Living with family	82.6	80.8	82.0	73.8	78.5	
Highest level of education attained	%	%	%	%	%	
None	8.8	9.0	5.0	8.8	8.7	p<0.001
Up to 9 years (primary)	43.2	33.4	42.5	46.0	36.5	
Secondary school or higher	47.9	57.6	52.4	45.3	54.8	
Occupation	%	%	%	%	%	
Unskilled worker	16.8	24.3	24.8	24.9	23.7	p<0.001
Skilled worker	41.9	31.8	37.0	39.0	33.4	
Petty trader	27.8	23.3	23.1	24.2	24.3	
Other	13.4	20.5	15.2	11.9	18.7	
Alcohol consumption	%	%	%	%	%	
Once a week or more	48.8	34.5	52.8	47.5	45.9	p<0.001
At least once a month	24.6	28.6	23.6	25.6	22.5	
Less often/never	26.7	37.0	23.6	27.0	31.6	
Place where usually meet FSW	%	%	%	%	%	
Brothel	38.7	37.3	39.8	42.7	43.0	p<0.001
Hotel/lodge	13.5	13.1	13.9	12.0	11.8	
At their home	22.8	18.3	13.3	18.2	22.5	
Bus stand/railway station	25.0	31.3	33.0	27.1	22.7	

Continued

Table 3 Continued

	Baseline Apr 2006	Round 2 Dec 2006	Round 3 May 2007	Round 4 Feb 2008	Endline Nov 2008	Sig*
Exposure to project in last 3 months by type of communication channels	%	%	%	%	%	
Mid-media	-	61.0	70.9	70.0	58.0	NA
IPC	-	38.0	46.4	74.0	57.0	
Static outdoor¶	-	71.0	69.3	63.0	92.0	
Level of exposure to project in last 3 months (recall of communication channels)	%	%	%	%	%	
Does not recall intervention or recalls only outdoor static media	-	31.2	29.1	19.1	30.0	NA**
Recalls IPC or mid-media in addition to outdoor static	-	34.6	24.6	16.7	24.6	
Recalls IPC and mid-media in addition to outdoor static	-	34.3	46.3	64.2	45.1	

FSW, female sex worker; IPC, interpersonal communication.

*For continuous variables 'age' and 'mobility', the significance of the *F*-statistic is shown; for all other variables, the significance of the χ^2 is shown.

†Response rate is calculated as the number of men who completed the full questionnaire divided by the number of consenting men multiplied by 100.

‡The first three rounds did not ask about 'wife' as a sexual partner.

§Includes transgender partners and men.

¶Exposure to outdoor media in the final round was measured for the last 6 months.

**Exposure categories are not compared over time because the precise mix of programme components differed slightly between rounds.

channels reported significantly higher consistent condom use as compared to those in the none/outdoor static category. In Mumbai, those exposed to one or two media channels at endline registered higher consistent condom use as compared to the baseline. Among endline categories, those exposed to two media channels reported significantly higher consistent condom use as compared to those in the none/outdoor static category. Also men exposed to two media channels registered significantly higher condom use at last sex as compared to the baseline, and their reported condom use at last sex was significantly higher than that for the none/outdoor static endline category.

DISCUSSION

This paper set out to answer three questions related to the PSI/Avahan intervention targeting male clients of FSWs. Regarding the first question about levels of programme exposure, analyses reveal that exposure was considerable and sustained, with well over half of respondents in all survey rounds recalling mid-media, IPC or both, while static outdoor media was seen by at least two-thirds of the sample in every round.

As for whether self-reported condom use increased over time, it is notable that condom use at last sex had a very high value at baseline (89.9% in the combined sample) and that 'consistent' condom use measured by a single question without further probing was 72.6% at baseline. PSI anticipated such high baseline measures: either some behaviour change might have already taken place since the programme had been underway for approximately a year or social desirability bias could have influenced reported condom use. The composite measure of consistent condom use resulted in considerably lower baseline proportion (63.6%); it rose to 86.5% at endline. Even assuming that social desirability bias (or other self-reporting bias) contributed to this result, the increase is considerable. The study did not employ a biological component so it is not possible to correlate reported levels of consistent condom use with levels of STI or HIV infection. However, another study that documented a 9-year decline in HIV incidence among male STI patients in Maharashtra found self-reported condom use with FSWs to be significantly associated with lower HIV incidence.¹²

Regarding the third key question, results suggest that even with the high baseline values exposure to a combination of PSI/Avahan communication channels was associated with increased condom use. In the full sample, respondents with exposure to both mid-media and IPC at endline reported significantly higher consistent condom use than those exposed to either outdoor static media or nothing at all. In contrast, for respondents who experienced one communication channel other than outdoor static media, the difference from the none/outdoor static group was not statistically significant. Condom use at last sex with a FSW followed a similar pattern, with exposure to IPC and mid-media correlating with a statistically significant increase in condom use but not exposure to only one channel. By geographical location, Karnataka and Mumbai followed this pattern for consistent condom use and Mumbai for condom use at last sex as well. The variability in significance at the geographic level could be a function of the smaller sample sizes.

The high baseline levels of reported consistent condom use with FSWs present both a programmatic and analytical challenge: indicators with such high initial levels may be difficult to change and, when the changes are small, prohibitively large sample sizes are needed to detect significance. It is of note that the findings are in line with condom use levels measured among clients of FSWs by NACO, but much higher than those reported in another study in some of the same states.² That study found only 28% consistent condom use.¹³ One possible explanation for the difference could relate to recruitment and data collection methods. In the Subramanian *et al* study, key informants, including FSWs and local store owners, identified known clients of FSWs and then accompanied team members when they approached those men about being in the study. That study also included a biological testing component, with consenting participants taken to a private setting where the samples were collected and the questionnaire was administered. A respondent who is recruited in such a manner and who agrees to go elsewhere to provide biological specimens might be less inclined to over-report condom use, or he might differ in other fundamental ways from a respondent who agrees to complete a behavioural questionnaire on the spot, as in the PSI/Avahan and NACO

studies (ie, he might be less inclined to use condoms with FSWs for reasons unknown to the study). Since surveys with biological components are unlikely to become the norm in tracking behaviour change, it is important to measure self-reported condom use in ways that minimise the potential for over-reporting.¹⁴ In our study, a composite indicator provided lower and presumably more accurate measures of consistent condom use at baseline and endline than the measures obtained through a single question.

This study has several limitations. First, baseline values were likely influenced by more than a year of programming. Second, as exposure to the intervention was measured on the basis of a 3-month recall period, it is not possible to assess the cumulative effect of the programme over its lifespan; thus, results observed could be due to other factors. A possibly important factor is the effect of other interventions occurring in the same areas and same timeframe. Third, because estimates of client population size are not available, data could not be weighted at the analysis stage. Fourth, since data collection was confined to daylight hours, the sample may not be representative of the night-time population. Fifth, as with all studies based on cross-sectional data and self-reported behavioural outcomes, the direction of causal relationships cannot always be determined and the measures are subject to reporting errors and biases.

Of highest concern in relation to programmatic decision-making is the question of whether increases in consistent condom use over time can be attributed to the PSI/Avahan intervention. While the design of this study makes it difficult to obtain definitive evidence of programme impact, the following observations support the hypothesis that PSI/Avahan encouraged greater condom use among clients of FSWs. First, a geographically stable population reported consistently high exposure to the initiative over a 2.5-year period; second, anecdotal evidence suggests that no other major interventions were concurrently targeting the population of interest. However, in the same timeframe and in the same programme areas, the availability of condoms doubled¹⁵ and other partners of the Avahan initiative implemented programmes to increase condom use among FSWs.¹⁶ It is likely that these interventions contributed to some degree to the observed increase in condom use among clients of FSW.

The question, therefore, becomes whether the PSI/Avahan programme also contributed to the condom use increase. In this context, we find the correlations between levels of exposure and levels of condom use to be the most compelling evidence of PSI/Avahan's effectiveness. Men who experienced either IPC or mid-media, but not both, did not differ significantly from men in the lowest exposure category (none/outdoor static) on either of two key measures of condom use. On the other hand, exposure to IPC and mid-media appeared to tip the balance: men in this highest exposure category in the combined sample reported significantly higher consistent condom use than men in the lowest exposure category, as well as significantly higher condom use at last sex with a FSW. These findings lead us to conclude that a programme such as PSI/Avahan has the potential to increase a high-risk population's willingness to use condoms with FSWs. The positive associations with programme exposure correlate with findings from other studies—for example, Subramanian *et al* found that clients of FSWs were less than half as likely to report inconsistent condom use if they had been exposed to advertisements for condoms and other HIV-related interventions (2008).¹³

This study offers important lessons to implementers and evaluators of HIV prevention programmes. First, it demonstrates the advantages of using a composite measure of consistent

Key messages

- ▶ Male clients of female sex workers (FSWs) are an important target group for preventing HIV transmission in four southern states of India.
- ▶ Data show positive associations between increased consistent condom use (CCU) and high levels of exposure to a communication intervention promoting CCU to clients of FSWs.
- ▶ In surveys measuring self-reported condom use, it is advantageous to use a composite measure of CCU to minimise behavioural over-reporting.

condom use over a single-item measure. Second, it highlights the need to better capture the effect of a programme over its lifespan as well as the synergistic effects of concurrent programmes. To this end, better measures could be created; however, a more significant improvement would be a study design that permitted comparisons between intervention areas and control areas over time. Nevertheless, the current evaluation suggests that a behavioural communication intervention delivered at sites where FSWs are solicited can be successful in increasing consistent condom use among male clients of FSWs. Further research is warranted to explore the dynamics of exposure to multiple behaviour change communication channels, as well as the contributions of various complementary interventions in the overall goal of increasing condom use among FSW and their clients.

Contributors VL developed the concept for the paper; conducted literature review; primary author of the text; provided technical input and guidance for data analyses. AM participated in data collection and monitoring of field work; reviewer of the text; conducted preliminary data analyses. DN participated in data collection and monitoring of field work; provided support to data analyses. PM initiated quantitative surveys under the Avahan project. AS participated in data collection and monitoring of field work; provided support to data analyses. KPR participated in data collection and monitoring of field work; provided input into secondary literature review and conducted primary analyses for the paper.

Funding This research was funded by the Bill & Melinda Gates Foundation. The views expressed herein are those of the authors and do not necessarily reflect the official policy or position of the Bill & Melinda Gates Foundation.

Competing interests None.

Ethics approval This study was conducted with the approval of the Indian Council of Medical Research.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

1. UNAIDS/WHO. *AIDS Epidemic Update: December 2007*. Geneva, Switzerland.
2. National AIDS Control Organization, Ministry of Health and Family Welfare, Government of India. Female Sex Workers and Their Clients. National Behavioural Surveillance Survey, New Delhi. 2006. [http://www.nacoonline.org/upload/NACO%20PDF/Female_Sex_Workers_\(FSWs\)_and_Their_Clients.pdf](http://www.nacoonline.org/upload/NACO%20PDF/Female_Sex_Workers_(FSWs)_and_Their_Clients.pdf). (Accessed 16 February 2009).
3. National AIDS Control Organization, Ministry of Health and Family Welfare, Government of India. HIV Sentinel Surveillance and HIV Estimation in India, New Delhi. 2007. http://www.nacoonline.org/upload/Publication/M&E%20Surveillance,%20Research/HIV%20Sentinel%20Surveillance%20and%20HIV%20Estimation%202007_A%20Technical%20Brief (Accessed 2 June 2009).
4. Dandona L, Dandona G, Kumar, *et al*. Risk factors associated with HIV in a population-based study in Andhra Pradesh state of India. *Int J Epidemiol* 2008;**37**:1274–86.
5. National AIDS Control Organization, Ministry of Health and Family Welfare, Government of India. General Population. *National Behavioural Surveillance Survey*, New Delhi. 2006. http://www.nacoonline.org/upload/NACO%20PDF/General_Population.pdf (Accessed 16 February 2009).
6. Ramesh BM, Moses S, Washington R, *et al*. Determinants of HIV prevalence among female sex workers in four south Indian states: analysis of cross-sectional surveys in twenty-three districts. *AIDS* 2008;**22**(Suppl 5):S35–S44.

7. **National AIDS Control Organization, India. (2006).** National AIDS control programme phase III (2007-12), 2006. http://www.nacoonline.org/Quick_Links/Publication/NGO_Targeted_Interventions/. (Accessed 2 June 2009).
8. **Avahan (2008).** Avahan, the India AIDS Initiative — the Business of HIV prevention at Scale. New Delhi, India: The Bill & Melinda Gates Foundation. http://www.gatesfoundation.org/avahan/Documents/Avahan_HIVPrevention.pdf (Accessed 3 June 2009).
9. **Ward D,** Hess R, Lefebvre C. Key Components in Planning, Implementing and Monitoring a Behavior Change Communication Campaign that Increased Condom Use Among Male Clients of Sex Workers in Southern India. *Cases in Public Health Communication & Marketing* 2008;**2**:105–25.
10. **McDowell A,** Pitblado J. From the help desk: It's all about the sampling. *Stata Journal* 2002;**2**:2.
11. **Garrett M.** Enhancements for calculation of adjusted means and adjusted proportions. StataCorp. In Stata Technical Bulletin Reprints. College Station, TX: StataCorp 1998:111–23.
12. **Mehendale S,** Gupte N, Paranjape R, *et al.* Declining HIV incidence among patients attending sexually transmitted infection clinics in Pune, India. *J Acquir Immune Defic Syndr* 2007;**45**:564–9.
13. **Subramanian T,** Gupte M, Paranjape R, *et al.* HIV, sexually transmitted infections and sexual behaviour of male clients of female sex workers in Andhra Pradesh, Tamil Nadu and Maharashtra, India: results of a cross-sectional survey. *AIDS* 2008;**22**(Suppl 5): S69–S79.
14. **Cleland J,** Boerma J, Crael M, *et al.* Monitoring sexual behaviour in general populations: a synthesis of lessons of the past decade. *Sex Transm Infect* **80**(Suppl II):i1–7.
15. **Piot B,** Mukherjee A, Navin D, *et al.* Lot quality assurance sampling for monitoring coverage and quality of a targeted condom social marketing programme in traditional and non-traditional outlets in India. *Sex Transm Infect* 2010;**86**(Suppl 1): i56–61.
16. **Lowndes CM,** Alary M, Verma S, *et al.* Assessment of intervention outcome in the absence of baseline data: 'reconstruction' of condom use time trends using retrospective analysis of survey data. *Sex Transm Infect* 2010;**86**(Suppl 1):i49–55.