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

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Objective: To characterize and describe patterns of HIV, sexually transmitted infections (STI) and sexual behaviour of male clients of female sex workers (FSW).

Methods: A cross-sectional study was conducted among 4821 clients of FSW from 12 districts in three states in India: Andhra Pradesh, Maharashtra and Tamil Nadu. A structured questionnaire was administered to elicit demographic characteristics and sexual behavioural patterns. Blood and urine samples were tested for HIV, syphilis and herpes simplex type 2 serology, gonococal and chlamydial infection.

Results: The median age of clients surveyed was 30 years; 57% were married and 64% had a steady sexual partner; 61% had sex with more than one FSW and 39% had four or more sexual encounters in the past month. The prevalence of HIV ranged from 2.0% to 10.9%, syphilis ranged from 3.1% to 10.1%; gonorrhoea and chlamydia ranged between 0% and 4.5%. Clients older than 30 years [odds ratio (OR) 1.65; 95% confidence interval (CI) 1.33–2.05] and having a different mix of commercial and non-commercial partners (OR 1.56; 95% CI 1.25–1.96) had a higher volume of sex acts with FSW. Inconsistent condom use with FSW was significantly associated with older clients (OR 4.2; 95% CI 3.33–5.29), illiteracy (OR 1.39; 95% CI 1.14–1.69), age <18 years at first paid sex (OR 1.83; 95% CI 1.24–2.70) and having different FSW partners in the past month (OR 1.64; 95% CI 1.23–2.18).

Conclusion: Clients of FSW studied here constitute a significant bridge group for HIV and other STI, because of their high volume of different sexual partners and very low consistent condom use. HIV prevention programmes need to address male clients.

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Introduction

Heterosexual commercial sex is a major driver of the HIV epidemic globally and within India [1]. Clients of female sex workers (FSW) are defined as a bridge population as they play an important role linking FSW with general population women [2–5]. Studies show that clients of FSW are at greater risk of acquiring sexually transmitted infections (STI), and spreading HIV and STI to sexual partners including wives and girlfriends [3–5].

Limited studies have been conducted with clients of FSW and the patterns of HIV and STI in them. Whereas data in India on clients exist from two rounds of national behavioural surveillance surveys (BSS) and sentinel surveillance of men attending STI clinics, there is no large-scale community-based study on HIV or STI prevalence among clients [6,7].

In India, the current National AIDS Control Programme phase III calls for expanding coverage among bridge populations, truckers and migrants, with a strong focus on condom social marketing, STI and HIV testing, treatment and care services [8]. Avahan, the India AIDS Initiative of the Bill and Melinda Gates Foundation, which commenced in 2003, focuses on high-risk groups, including the clients of FSW, in order to slow HIV transmission [9]. The Integrated Behavioural and Biological Assessment (IBBA), an independent large-scale cross-sectional survey was carried out in 2005–2007 as part of an overall evaluation strategy of the Avahan programme [10]. This paper reports on the profile, prevalence of HIV and STI and related risk behaviours of clients of FSW from three states in south India using data from the IBBA.

Methods

Detailed methodologies used during IBBA are described in a companion paper on IBBA methodology in this supplement [11]. In brief, IBBA among male clients of FSW was carried out between October 2006 and June 2007 in 12 districts in three Indian states: five districts in Andhra Pradesh, four districts in Maharashtra, and three in Tamil Nadu. Clients of FSW, operationally defined as men between 18 and 60 years of age who had sex with FSW in exchange for money within the past month were eligible for participation. A sample size of 400 clients per district was fixed in accordance with parameters described in the IBBA methods paper [11].

Sampling approaches

As male clients of FSW are a mobile group and not fixed to any venue at any given time, a time location cluster (TLC) sampling approach was used to capture different types of clients within a district [12]. The sampling universe included different types of solicitation sites such as street-based sites, home-based sites, brothels/brothel areas and lodges, as primary sampling units. As mapping of solicitation points for the development of a sampling frame had already been completed for the IBBA FSW surveys, the same sampling frames were used to develop the sampling frame for clients survey.

As the overriding consideration was to produce population-based estimates, the sampling approach adopted was a probability-based method. Given the few examples in the literature using probability-based methods for this group, different sampling approaches were piloted.

The final method utilized was a triangulation method in which participants were recruited at sites of solicitation ('hot spots'). FSW, other key informants such as pimps and local store owners and survey team observations identified and approached men known to be clients of FSW for recruitment. This method in piloting was more successful (i.e. lower refusal rate) as clients were more willing to admit being a client when approached by a team that included a person known to the client.

The selection of respondents was done through a two-stage cluster sampling procedure. The TLC were selected by systematic random sampling (without replacement) by probability proportional to the estimated measure of size of clients or that of FSW as a proxy. The number of clients to be sampled in a selected cluster was proportional to the measure of its size. In the selected clusters, respondents were chosen through simple random sampling methods. If the number of clients identified at the beginning of the sampling at each site was less than the required number, all were approached; following this when other clients arrived they were approached for IBBA, until the allotted sample size for that TLC was achieved. The information for calculating selection probabilities and weights, and refusal rates was recorded in a cluster information sheet.

Data collection

Following recruitment, all respondents were taken to a private setting away from the solicitation site for interview and biological sample collection. Urine samples alone had to be collected before sex, as the likelihood of false positive STI results (using highly sensitive polymerase chain reaction methods) increase when samples are collected after sex with FSW. For behavioural assessment, face-to-face interviews with structured questionnaires were used to gather information on sociodemographic characteristics, sexual history and practices, condom usage, mobility, STI history and current symptoms and exposure to HIV interventions in the district. Respondents were asked about different types of non-paid sexual partners such as a female regular or steady partner (spouse, lover or girlfriend) and female casual partners (other than steady partners).

Laboratory methods

Blood and urine samples were collected from each respondent. Blood was tested for HIV, syphilis (rapid plasma reagin and confirmation by *Treponema pallidum* haemagglutination assay) and herpes simplex virus type 2 using standard serological tests, and urine was tested with a nucleic acid amplification assay (Gen-Probe Aptima) for the detection of *Neisseria gonorrhoeae* and *Chlamydia trachomatis* [11].

Ethical issues and consent process

Ethical clearances were obtained from all levels before the survey. Written informed consent was obtained for behavioural and biological components. Respondents were informed that rapid plasma reagin results for syphilis would be made available to them. By using a coded number system all the study participants were referred to existing networks of clinics to get syphilis results and treatment if found positive. For the benefit of the study participants, clinical assessments were conducted by the IBBA clinic doctor at the time of biological sample collection; and syndromic treatment for STI was provided, and whenever possible participants were referred to local service providers for other STI treatment.

Data management and analysis

Data of clients who completed both the behavioural and biological components were considered for analysis. All data sets were analysed by using the 'complex samples' module of SPSS (version 14) for estimation of proportion, mean values and preparation of cross tables. For regression analysis, survey commands of STATA (version 8.2) were used. All estimates were weighted for unequal selection probability [11]. District level weights were the inverse of the inclusion probabilities. Data sets from districts were aggregated and weighted at the global level using district-wise client estimates for all parameters analysed.

A number of variables relating to partner types and sexual behaviours were defined and analysed to characterize client behaviours. For partner mix, clients were categorized into those having: (1) only commercial partners; (2) commercial and a main steady female partner; and (3) commercial, main steady and female casual partners. Consistent condom use was defined as generally using condoms at every sexual act.

Chi-square tests were used as tests for proportions and to examine associations of different factors with positive HIV and STI test results. Based on these univariate analyses, multivariate logistic regression models were performed to study factors associated with having gonorrhoea, chlamydia and syphilis. As the prevalence of gonorrhoea and chlamydia was low, the 'relogit' procedure of STATA version 8.2 was used for analysis. This analysis was restricted to 4232 respondents for whom urine samples were collected.

A multivariate ordinal logistic regression analysis was performed for the volume of sex acts with FSW in the past month as the dependent variable to identify the factors associated with clients' higher volume of sex acts with FSW [13,14]. The number of sex acts was defined as an ordinal variable; a series of three models were examined, namely category 1 versus 2, 3 and 4; categories 1 and 2 versus 3 and 4, and categories 1, 2 and 3 versus 4. Factors associated with inconsistent condom use with commercial partners were analysed using multivariate logistic regression. Independent variables were selected and included in these models on the basis of a conceptual and theoretical understanding of risk factors that were collected in the survey as well as having resulted in significant associations in the univariate analysis.

Results

A total of 13 391 clients of FSW were identified and approached for participation in the study. Of these, 4821 completed both behavioural and biological components. Response rates varied between 24% and 53% in the districts covered (Table 1). Qualitative examination revealed that the main reasons for refusal were largely related to lack of time, as clients were in the midst of work or rushing for important personal activities, could not spare the time to participate, or feared being recognized as having gone to sex workers. In homes and brothels, refusals were also due to the unwillingness of clients to give urine samples before sex with the FSW because of time constraints.

Sociodemographic characteristics

The profiles of the male clients are summarized in Table 1. Nearly a third of the respondents were less than 25 years of age and most (83%) were below 40 years. Nearly half the clients recruited were labourers (49%); others were businessmen (11%), transport workers (12%) and students (4%). This was largely the pattern across the study districts. More than half of the clients were married (57%); a larger proportion in districts of Andhra Pradesh were married (60–71%), whereas the proportion of never married was higher in districts of Maharashtra and Tamil Nadu (35–53%).

Sexual behaviour of clients

Overall, the mean age at sexual debut was 19 years and the mean age at first paid sex was 21 years (Table 2). Sixty-four per cent of clients had non-paying female sexual partners such as a regular or steady partner. Overall, 27% of clients had no other sex partners other than a FSW; 47% had a commercial and main partner; 27% had commercial, main and casual partners. Approximately 61% of the clients had sex with more than one FSW partner last month, and 39% had engaged in four or more sexual acts with FSW last month. Reported consistent condom use with FSW was

Table 1. District-wise sociodemographic profile of clients of female sex workers.

	Andhra Pradesh					Maharashtra				Tamil Nadu			
	East Godavari	Guntur	Hyderabad	Visakhapatnam	Warangal	Mumbai	Parbhani	Pune	Yevatmal	Chennai	Madurai	Salem	All
Approached	1440	1685	1264	1308	1219	811	788	917	757	977	1133	1092	13 391
Completed behavioural	469	437	429	458	431	407	407	406	405	409	401	396	5055
Completed both[a] (N)	409	401	406	402	402	394	404	401	399	406	401	396	4821
Response rate (%)	28	24	32	31	33	49	51	44	53	42	35	36	36
Age (years, %)													
<25	30.9	26.7	26.2	32.6	33.5	33.9	46.1	44.4	32.6	22.2	44.3	16.1	31.1
25–29	20.4	17.9	29.0	33.0	20.5	22.7	23.3	19.1	27.1	22.9	21.0	25.8	22.9
30–39	31.7	34.0	25.3	28.0	30.8	29.0	22.7	25.6	29.5	31.8	19.6	39.1	29.3
40 or above	17.0	21.5	19.5	6.4	15.2	14.4	8.0	10.9	10.9	23.1	15.1	19.0	16.7
Mean age (years)	30.0	31.3	30.5	28.0	29.7	29.6	27.1	28.0	29.1	32.5	28.5	32.1	30.2
Can read and write (%)	58.4	63.2	80.2	78.7	88.4	85.2	68.9	87.3	81.1	64.2	80.8	77.8	74.2
Occupation (%)													
Non-agricultural/agricultural/ casual labour	27.9	26.2	32.1	16.8	25.0	6.3	10.8	19.3	24.6	58.2	25.7	52.5	28.2
Skilled/semiskilled labour	13.5	5.3	10.9	24.1	10.3	28.1	16.2	25.1	17.5	9.5	49.4	14.0	20.4
Businessmen	9.5	15.4	17.5	11.2	17.2	19.2	13.5	10.2	19.2	2.7	5.1	9.6	11.4
Transport drivers/helpers	13.4	13.2	10.6	20.9	16.0	11.4	5.9	5.3	8.6	18.2	3.4	10.4	12.3
Service	9.7	5.7	12.5	16.3	9.4	11.4	4.4	9.8	6.6	0.3	1.7	2.4	7.1
Cultivator	5.4	4.3	2.1	2.8	3.9	5.5	5.0	8.2	5.2	0.2	2.1	1.2	3.5
Student	1.5	5.1	5.3	5.2	7.6	3.1	5.5	2.9	4.4	2.6	10.4	3.3	4.2
Unemployed	0.2	0	2.3	0	1.2	5.4	7.1	3.5	1.6	5.0	0.4	5.8	3.0
Others	19.1	24.8	6.6	2.7	9.4	9.7	31.7	15.6	12.2	3.4	1.9	0.8	9.8
Marital status (%)													
Never married	28.0	21.9	31.5	37.9	25.8	52.8	46.0	51.1	39.3	34.8	50.1	38.5	39.7
Married	70.2	70.2	63.0	59.7	71.3	42.7	51.4	47.4	57.3	61.6	49.7	57.1	56.8
Separated/divorced/widower	1.8	8.0	5.5	2.4	2.9	4.3	2.6	1.0	3.5	3.4	0.2	4.4	3.4
Others	0	0	0	0	0	0.2	0	0.5	0	0.2	0	0	0.1

[a]Completed both behavioural questionnaire and biological specimens collection.

Table 2. District-wise pattern of sexual behaviour of clients of female sex workers.

	Andhra Pradesh					Maharashtra				Tamil Nadu			
	East Godavari	Guntur	Hyderabad	Visakhapatnam	Warangal	Mumbai	Parbhani	Pune	Yevatmal	Chennai	Madurai	Salem	All
N	409	401	406	402	402	394	404	401	399	406	401	396	4821
Mean age at first sex (years)	18.8	18.2	19.0	18.2	17.7	19.4	18.9	18.9	19.4	20.1	19.9	20.8	19.3
Mean age at first paid sex (years)	20.3	19.3	19.9	19.5	19.4	20.5	20.1	21.7	21.4	22.0	21.3	22.8	20.8
Have main sexual partner (%)	77.7	73.7	66.2	82.6	86.4	48.1	70.2	62.9	75.9	61.8	65.9	58.3	64.4
Partner mix (%)													
Have only commercial partner	11.7	13.4	19.4	13.4	8.4	45.0	21.9	26.4	17.4	29.9	22.3	38.4	26.7
Have commercial and main partner	39.0	41.2	47.0	65.2	40.5	41.2	52.1	55.3	46.4	55.6	41.2	45.0	46.6
Have commercial, main and casual partner	49.3	45.4	33.6	21.3	51.1	13.7	26.0	18.3	36.2	14.5	36.5	16.7	26.6
No. of different FSW partners (last month) (%)													
1	38.7	24.1	29.9	47.6	20.5	38.9	50.9	57.8	32.4	34.3	55.2	29.9	38.8
2	38.1	33.2	32.3	27.0	27.8	34.4	25.8	22.7	38.3	45.2	27.2	41.0	34.9
3	11.9	14.9	14.3	15.7	14.8	9.1	14.9	9.0	12.5	10.1	9.1	16.1	11.5
4 or more	11.3	27.9	23.5	9.7	37.0	17.6	8.4	10.5	16.7	10.4	8.6	12.9	14.8
No. of sex acts with FSW (last month) (%)													
1	7.3	14.3	22.6	25.2	10.6	31.6	26.9	50.2	16.9	14.2	29.1	13.9	21.9
2	21.3	20.1	23.8	32.1	22.4	24.9	28.1	24.0	28.3	28.4	31.6	15.0	25.3
3	15.5	22.9	16.5	14.5	13.6	11.1	18.4	10.0	11.6	10.7	14.6	16.9	14.0
4 or more	55.9	42.7	37.1	28.2	53.4	32.5	26.6	15.8	43.2	46.8	24.7	54.2	38.8
Condom use (%)													
Consistent condom use with FSW	30.6	28.1	18.3	26.9	18.1	23.2	58.6	59.3	29.6	24.1	27.7	29.5	27.9
Consistent condom use with main regular female partner	1.2	0	0	4.1	1.2	8.6	12.8	5.1	7.3	2.4	13.8	7.6	5.0
Last time condom use with other casual partners	51.4	43.6	27.9	48.6	59.4	51.3	31.0	59.4	26.8	55.1	41.8	71.1	47.7
Bought sex from FSW when travelled in past year (%)	53.9	54.3	52.4	56.1	58.0	32.5	43.2	17.5	48.3	25.5	57.4	34.8	41.5
Sexual practices (%)													
Had anal sex with male or transgender in past 6 months	1.4	4.2	0.9	16.0	5.8	15.8	10.1	5.0	4.8	3.1	13.2	7.0	8.3
Had anal sex with a FSW	5.1	7.9	8.9	12.2	4.5	23.3	12.4	17.7	10.4	15.7	10.0	5.0	13.3
Had anal sex with main regular female partner	2.4	0.3	2.5	5.1	1.6	15.2	6.4	7.3	9.1	4.5	4.4	2.0	6.2
Feel at risk of HIV (%)	22.5	55.6	59.6	54.4	56.2	26.1	51.6	31.2	39.3	7.2	44.8	13.7	31.4
Ever taken HIV test (%)	14.7	26.2	13.9	26.2	31.5	10.9	6.2	10.5	8.1	7.6	8.8	8.5	13.1

FSW, Female sex worker.

28%. Consistent condom use with FSW was highest among clients in districts of Maharashtra (59%), whereas it was lower among clients in districts of Andhra Pradesh (18%). Overall, 5% of clients reported consistent condom use with main regular female partners ranging from 0 to 16% across districts (Table 2). Anal sex was reported by 13% of clients, approximately 6% with a regular female partner and approximately 8% with male or transgender partners in the past 6 months (Table 2).

Prevalence of HIV and sexually transmitted infections

HIV prevalence ranged from 6.0% to 10.9% in districts of Maharashtra, 2.4% to 8.3% in districts of Andhra Pradesh and 2.0% to 4.2% in districts of Tamil Nadu (Table 3). The prevalence of reactive syphilis serology was between 3.1% and 10.1% in districts of Andhra Pradesh and 3.9% to 7.8% in districts of Maharashtra. The prevalence of chlamydia was low in all districts, whereas gonorrhoea was found only in a few districts of Andhra Pradesh and Maharashtra at low levels. The prevalence of herpes simplex virus type 2 was lower in districts of Tamil Nadu and Maharashtra (10.2–26.8%) but higher in districts of Andhra Pradesh except in Warangal (18.9%).

Risk factors associated with HIV/sexually transmitted infections

Univariate analysis revealed no associations between HIV positivity and sexual debut, age at first paid sex, partner mix, number of different FSW partners and volume of sex acts with FSW. A similar analysis revealed that greater partner mix was significantly associated with having syphilis; 6.3% of clients were positive for syphilis among those who had sex with commercial, main regular and casual sex partners compared with 3% among clients having sex with only a commercial sex partner ($P = 0.024$) (data not shown). In a multivariate logistic regression, analysis of factors associated with syphilis, gonorrhoea and chlamydia yielded few significant results. Demographic characteristics, age at first paid sex, marital status, partner mix, number of FSW partners in the past month, anal sex, consistent condom use, having tested for HIV and place of solicitation of FSW were not significant predictive factors for gonorrhoea or chlamydia. When applying the same model for syphilis, only ever having tested for HIV [odds ratio (OR) 1.85; 95% confidence interval (CI) 1.06–3.23] was significantly predictive of positivity for syphilis (data not shown).

Factors associated with high volume of sex acts with female sex workers

The multivariate ordinal logistic regression model indicated that increased age of clients aged 25–29 years (OR 1.37; 95% CI 1.11–1.69), clients 30 years or more (OR 1.65; 95% CI 1.33–2.05) and those having bought sex from FSW during travel (OR 1.29; 95% CI 1.11–1.50) were significantly associated with the volume of sex acts. Similarly clients with a wider partner mix of

Table 3. District-wise prevalence of HIV and sexually transmitted infections of clients of female sex workers.

	Andhra Pradesh					Maharashtra				Tamil Nadu		
	East Godavari	Guntur	Hyderabad	Visakhapatnam	Warangal	Mumbai	Parbhani	Pune	Yevatmal	Chennai	Madurai	Salem
Sexually transmitted infections												
N	409	401	406	402	402	394	404	401	399	406	401	396
HIV positive (%)	8.3	6.6	2.4	8.0	6.7	9.1	6.4	6.0	10.9	2.0	2.5	4.2
Reactive syphilis serology (RPR and TPHA+) (%)	4.8	10.1	3.1	3.4	5.5	3.9	4.0	6.0	7.8	4.7	3.5	3.5
N	354	220	301	238	339	394	404	401	399	406	401	396
Positive urine for *N. gonorrhoeae* (%)	0	0	0	1.3	1.6	0.9	0.7	0.1	0.9	0	0	0
Positive urine for *C. trachomatis* (%)	0.9	0.8	2.1	0.4	0.4	4.5	3.6	3.0	1.6	1.2	0	1.0
N	43	42	41	41	35	51	43	40	58	44	40	45
HSV-2[a] positive serology (%)	44.8	69.2	27.4	78.0	18.9	26.8	13.7	19.0	21.1	19.6	10.2	22.3

HSV-2, Herpes simplex virus type 2; RPR, rapid plasma reagin; TPHA, *T. pallidum* haemagglutination assay.
[a]Based on a random sample of 10% of sera specimens.

Table 4. Ordinal logistic regression of factors associated with volume of sex acts with female sex workers by clients in the past month.

Factors associated with volume of sex acts with FSW in past month	Volume of sex acts with FSW (%)				OR (95% CI)	*P* value
	1	2	3	4+		
All[a]						
Current age (years)						
<25	26.0	25.6	13.3	35.1	1.00	
25–29	21.5	26.2	15.0	37.3	1.37 (1.11–1.69)	<0.01
30 and above	19.3	24.7	14.0	42.1	1.65 (1.33–2.05)	<0.001
All						
Can read and write						
Yes	23.8	26.1	13.2	36.9	1.00	
No	16.3	23.0	16.4	44.4	1.14 (0.95–1.36)	0.15
All						
Bought sex from FSW at places travelled (past year)						
No	22.5	27.6	12.9	37.0	1.00	
Yes	20.9	22.1	15.6	41.0	1.29 (1.11–1.50)	0.001
All						
Age at first paid sex						
25 and above	23.7	27.0	13.9	35.3	1.00	
20–24	22.5	26.5	13.0	38.0	1.15 (0.91–1.45)	0.25
18–19	21.5	23.4	15.0	40.1	1.42 (1.08–1.87)	0.01
<18	16.1	22.8	16.6	44.5	1.28 (0.93–1.78)	0.13
All						
Partner mix						
Only commercial	22.1	28.8	13.4	35.7	1.00	
Commercial and main partner	27.0	25.6	14.1	33.4	0.96 (0.80–1.14)	0.61
Commercial, main and casual partners	12.8	21.3	14.5	51.4	1.56 (1.25–1.96)	<0.001
All						
Consistent condom use with FSW						
Yes	26.3	27.3	13.6	32.7	1.00	
No	20.2	24.5	14.1	41.2	1.44 (1.23–1.68)	<0.001
Ever had anal sex with FSW						
No	21.0	27.1	14.1	37.9	1.00	
1 vs 2, 3 & 4						
Yes	27.7	13.8	13.6	44.9	1.01 (0.74–1.39)	0.94
1 & 2 vs 3 & 4						
Yes					1.48 (1.14–1.92)	<0.01
1, 2 & 3 vs 4						
Yes					1.33 (1.03–1.71)	0.03
All						
Ever done HIV test previously						
No	22.7	25.2	13.8	38.2	1.00	
Yes	16.4	25.8	15.2	42.6	1.21 (1.01–1.45)	0.04
All						
Type of locale						
Fixed (brothel/lodge/home)	20.3	28.0	13.5	38.3	1.00	
Street	24.0	21.6	14.8	39.6	1.15 (0.96–1.38)	0.13

CI, Confidence interval; FSW, female sex worker; OR, odds ratio.
[a]'All' represents all contrasts namely 1 vs 2, 3, & 4 or more; 1 & 2 vs 3 & 4 or more and 1, 2, & 3 vs 4 or more categories of response variable (no. of clients with different FSW in the past month).

commercial, main and casual partners had a significantly greater volume of sex acts with FSW (OR 1.56; 95% CI 1.25–1.96; Table 4).

Factors associated with inconsistent condom use with female sex workers

In another multivariate logistic regression analysis clients aged 25–29 years (OR 2.15; 95% CI 1.74–2.67) and over 30 years (OR 4.20; 95% CI 3.33–5.29) and illiterate individuals (OR 1.39; 95% CI 1.14–1.69) were significant predictors of inconsistent condom use with FSW (Table 5). Clients with four or more different FSW partners in the past month (OR 1.64; 95% CI 1.23–2.18) and those who ever had anal sex with FSW (OR 1.63; 95% CI 1.27–2.08) were significantly associated with inconsistent condom use with FSW. The model also showed that earlier age (<18 years) at first paid sex (OR 1.83; 95% CI 1.24–2.70) was significantly associated with inconsistent condom use. Exposure to advertisements on condoms, messages on STI and interventions, were found to reduce the inconsistent use of condoms with FSW (OR 0.46; 95% CI 0.69–0.31).

Discussion

The findings from the IBBA presented here are the first large-scale study, using probability-based sampling, of clients of FSW providing data on behavioural risk and the

Table 5. Multivariate regression of factors associated with inconsistent condom use by clients with female sex workers.

Factor/category	% Who inconsistently used condoms	OR for inconsistent condom use with FSW (95% CI)	*P* value
Current age, years			
<25	56.2	1.00	
25–29	73.2	2.15 (1.74–2.67)	<0.001
30 and above	82.3	4.20 (3.33–5.29)	<0.001
Can read and write			
Yes	69.9	1.00	
No	78.2	1.39 (1.14–1.69)	0.001
Bought sex from FSW from places travelled in past year			
No	71.2	1.00	
Yes	73.3	1.11 (0.93–1.32)	0.25
Age at first paid sex, years			
25 and above	77.3	1.00	
20–24	72.0	1.23 (0.94–1.62)	0.13
18–19	71.2	1.83 (1.37–2.45)	<0.001
<18	67.5	1.83 (1.24–2.70)	0.002
Have a main steady female sexual partner			
Yes	76.9	1.00	
No	63.4	0.45 (0.31–0.65)	<0.001
Partner mix of female partners			
Only commercial partner	63.4	1.00	
Commercial and main regular partner	75.1	0.69 (0.46–1.05)	0.08
Commercial, main regular and casual partners	75.5	1.35 (0.99–1.86)	0.06
No. of different FSW had sex with in past one month			
1	70.0	1.00	
2	71.1	1.05 (0.88–1.26)	0.58
3	75.1	1.12 (0.85–1.47)	0.41
4 or more	77.5	1.64 (1.23–2.18)	0.001
Ever had anal sex			
No	69.7	1.00	
Yes	82.0	1.63 (1.27–2.08)	<0.001
Ever done HIV test previously			
No	72.0	1.00	
Yes	72.9	1.25 (0.97–1.62)	0.08
Feel at risk of being infected with HIV			
No	72.7	1.00	
Yes	70.7	1.15 (0.94–1.40)	0.17
Exposure[a]			
No	85.1	1.00	
Yes	71.1	0.46 (0.31–0.69)	<0.001
Type of locale solicited FSW from			
Street	74.2	1.00	
Brothel/lodge/home	69.2	0.50 (0.41–0.61)	<0.001

CI, Confidence interval; FSW, female sex worker; OR, odds ratio.
[a]Exposure = heard/seen advertisement on condom, messages on sexually transmitted infection and key clinic in past 6 months.

prevalence of STI and HIV at the district level. In spite of the crucial role of clients of FSW in the transmission of STI and HIV, they have been a difficult group to study systematically as a result of the challenges in sampling experienced.

The main limitation of the current study is the high refusal rate among the clients of FSW. As described earlier, the main reasons for refusal were related to availability and lack of time among those approached. Although it was not quantified, refusal to an extent was related to clients wanting to hide being identified as having bought sex from FSW. Urine samples in the present study were strictly collected before sex with FSW so as to prevent any cross-contamination of urethral samples to avoid false positive STI results. The collection of urine samples from recruited clients before having sex was difficult and contributed to the high refusal rate, as clients found it inconvenient and disruptive of the sexual encounter with a FSW. As the profile of refusals was not collected during the study, it could not be identified whether non-response was systematic across all districts.

In other studies in which participation rates were higher [3,15,16], the sampling of clients was done after the client had sex with a FSW, primarily from venue-based locations, with previous permission taken from gate-keepers/managers and with the support of FSW. In the present study, however, entire districts were covered, with sampling from FSW solicitation sites, including public

places, brothels, homes and other venues, and the role of FSW was restricted to helping with the identification of 'true clients'.

Sampling from mapped sex venues was also attempted in the present study while piloting different sampling approaches, but was found to have limited scope for being representative as data on sex venues were generally not available or were difficult to obtain when sex happens in public places (e.g. parks); furthermore, when sex venues were homes, previous permissions from sex workers had to be taken, and recruitment was more dependent on sex workers who were willing to recruit their regular clients more than occasional clients and was therefore biased. Other methods such as respondent-driven sampling [17] were also attempted but were not successful and the reasons for this could be that male clients are not well networked or are unwilling or unable to recruit other clients for reasons such as lack of interest, stigma, embarrassment, or privacy concerns. An 'intercept' method was also attempted in which men were randomly approached at solicitation sites and asked a series of questions to build rapport; a screening questionnaire was then used to determine eligibility as 'true clients' of FSW according to the operational definition given earlier. This method produced the highest refusals, with 40% of men refusing to answer the screening questionnaire citing lack of time. Among those who agreed to be screened, only 15% reported being a client of a FSW. Although it was not clear whether this represented the true proportion of men paying FSW for sex, it pointed to the likelihood of men wanting to hide their commercial sex behaviour from the survey team.

Given our sampling approach of recruiting clients known by sex workers and other stakeholders in the area, it is very likely that the sample consists of only 'true clients' and those who would have had a higher frequency of purchasing sex from FSW. This coupled with the operational definition of paid sex in the past month suggest that the clients in the present study are likely to represent frequent sex worker users and a subgroup of higher risk clients.

Despite a high refusal rate, the similarity in the mean age of clients, age at first sex, age at first paid sex in the survey districts across states indicates that non-response may be random. This issue of non-response will be explored further in future surveys and papers to ascertain the extent of systematic non-response. The age structure of clients captured in IBBA is similar to the age structure of clients of FSW captured in the national BSS [6]; other profile characteristics suggests that the IBBA among clients of FSW has captured a good representation of clients in different occupations and having a mix of commercial and non-commercial partners. In comparison with other studies from Senegal [18] and Peru [19] among clients, which were based on non-probability sampling or clinic-based methods [20], the findings presented here have a better scope for making generalizations about clients' behaviours and prevalence in the areas covered, as well as for other areas in India that have similar sociocultural and demographic characteristics, to inform HIV prevention efforts.

Clients of FSW in the present study had a similar age at sexual debut as in the national BSS [6] and a majority were married and/or had sex with partners other than a spouse. A survey among hot spots conducted in 2006 among clients in four states of India, defined as those who bought sex from FSW in the past year, also shows that both married and unmarried men purchase sex [21].

The range of HIV prevalence among clients of FSW (2.0–10.9%) in the IBBA districts was similar to the 4.88% reported by another study in India [22]. The variation in HIV prevalence in different districts was also consistent with the HIV prevalence among FSW from these same districts [23]. In comparison with other studies [4,24,25], our study showed a lower prevalence of both gonorrhoea and chlamydia among clients. A concurrent survey among FSW in these same districts also revealed a low prevalence of these infections [23]. Whether the low prevalence among clients is a reflection of the low disease burden of *N. gonorrhoeae* and *C. trachomatis* among FSW has to be evaluated further.

Key findings of the current study are that nearly two-thirds of the clients had visited two or more FSW partners in the past one month, and a significant proportion of clients had a wider partner mix that included a main partner and casual partner in addition to the FSW. Some previous studies have suggested patterns of concurrent partnerships to be a significant factor in determining the rate of spread of HIV and STI in populations [26]. More recently a study of clients of indoor commercial sex workers [27] showed that clients having concurrent sexual relationships with more than one FSW and with other types of partners fall into a higher category of risk and are more likely to spread HIV and STI. In the current study, clients with a wider partner mix had a significantly higher volume of sex acts with FSW, and only a third consistently used condoms with FSW. Coupled with the low consistent condom use with steady partners, this is indicative of the significant potential for vertical transmission of HIV and STI and further spread in the general population. These findings suggest a core subset of high-risk clients, for whom messages on consistent condom use with non-regular partners need to be reinforced, otherwise they could continue to be a source for transmitting HIV/STI infections.

Another key finding from the present study is that older clients, in particular those over 30 years and followed by those over 25 years, are less likely to use condoms consistently. This could mean that prevention pro-

grammes thus far have not been sufficiently scaled up to reach these older clients or they have been more successful in reaching younger men on condom use behaviours. There are, however, indications from this study that messages on condoms and STI can improve rates of consistent condom use among clients of FSW. It is to be noted that condom use in the current study was assessed based on self-reported condom use only, and therefore may be biased as a result of the social desirability response associated with self-reported behaviours. An additional limitation of the condom use behaviour data in the current study is that it was not asked with respect to a specific time reference period.

As the current study was part of a larger evaluation effort for the Avahan programme in India [10,28], the findings from this study will contribute to modelling the impact of the HIV epidemic in the country and provide information for programmatic decision making. The clients of FSW in the current study may belong to a higher risk category of clients for the reasons described above. The patterns of risk behaviour identified in this study are indicative of a potentially key high-risk group and important bridges for transmission of HIV and STI to regular female partners. The findings presented here have important programmatic implications and necessitate more targeted prevention strategies with a core segment of high-risk clients. Innovative condom use messages need to focus specifically among high-risk segments for reinforcing consistent condom use with non-regular partners from further funnelling of the epidemic. In spite of the limitations, the IBBA among clients of FSW is one of few studies on clients, a vital data resource for India, providing important data on risk behaviours and biological estimates for modelling the transmission patterns and to inform HIV prevention programmes for core bridge groups [29].

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