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**Contraceptive practices, sexual and reproductive health needs of HIV positive and negative female sex workers in Goa, India**

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**Abstract** (250 words)

**Objectives:** In India, female sex workers (FSWs), suffer from high HIV prevalence and abortions. Contraceptive use among general population women is well understood. However, FSWs contraceptives practices and reproductive health needs are under-researched. We investigated contraceptive practices among HIV positive and negative FSWs in Goa, India and explored its association with socio-demographic and sex work related factors.

**Methods:** Cross-sectional study using respondent driven sampling recruited 326 FSWs. They completed an interviewer-administered questionnaire and were screened for STI/HIV. Multivariable logistic regression was used to explore factors associated with sterilisation relative to no contraception.

**Results:** HIV prevalence was high (26%). Of the 59 FSWs planning pregnancy, 33% were HIV positive and 5-7% had Gonorrhoea, Chlamydia and Trichomonas. 25% and 65% FSWs screened positive for Syphilis and Herpes simplex virus type 2 antibodies respectively. Among the 260 FSWs analyzed for contraceptive use, 39% did not use contraceptives and 26% had experienced abortion. Half the FSWs had undergone sterilisation, only 5% used condoms for contraception. Among HIV positive FSWs, 45% did not use contraceptives. Sterilisation was independently associated with older age, illiteracy, having an intimate non-paying male partner, having children and financial autonomy. Exposure to National AIDS Control Organisation's (NACO) HIV prevention interventions was reported by 34% FSWs and was not significantly associated with contraceptive use (adjusted odds ratio 1.4, 95% CI 0.7-2.9).

**Conclusion:** HIV prevention interventions should promote contraception, especially among young and HIV positive FSWs. Integrating HIV treatment and care services with HIV prevention interventions is vital to avert HIV positive births.

## Key Messages

- Among female sex workers (FSWs) in Goa, India lifetime abortions and HIV prevalence was high and contraceptive use among young and HIV positive FSWs was low.
- Sterilisation was independently associated with older age, illiteracy, having an intimate non-paying male partner, having children and financial autonomy.
- HIV prevention interventions should promote contraceptives among young and HIV positive FSWs.
- Integrating HIV prevention interventions with HIV treatment and care services is vital to avert HIV positive births and improve maternal and child health.

## **Introduction**

In India, maternal mortality and HIV/AIDS continue to be major public health challenges. In 2005, India had the largest number of maternal deaths globally i.e. 117,000.<sup>1</sup> Of the 27 million pregnancies annually, 189,000 are estimated to occur in HIV positive women resulting in 56,700 HIV infected infants.<sup>2</sup> Approximately 0.6%-1.27% adult urban females engage in sex work.<sup>3</sup> The HIV epidemic is concentrated among high risk groups like female sex workers (FSWs), with HIV prevalence of 5.1%.<sup>4</sup> However, there are pockets of high HIV prevalence among FSWs with variation in mean HIV prevalence between states (0-17.9%).<sup>4</sup> Since 2004 Goa, a state in the West of India, has been excluded from the surveillance due to the demolition of its red-light area Baina.<sup>4-5</sup> Our study conducted in Goa in the aftermath of demolition showed HIV prevalence among FSWs was 25%.<sup>6</sup> Prevalence of other sexually transmitted infections (STI) among FSWs is also high.<sup>6-7</sup> STI/HIV can cause adverse pregnancy outcomes including stillbirth, congenital syphilis and mother-to-child-transmission of HIV.<sup>8</sup> Besides, multiple sexual partners increases FSWs vulnerability to unintended pregnancies and abortions.<sup>9-10</sup> Unsafe abortions in the presence of STIs can lead to sepsis, pelvic inflammatory disease and infertility.<sup>11</sup> In 2006 the National AIDS Control Organisation's (NACO) started the Prevention of Parent-to-Child Transmission (PPTCT) program which focuses on prevention of HIV positive births i.e. prevention of unintended pregnancies, prenatal HIV transmission and providing care and treatment to HIV-infected women, their infants and families.<sup>2</sup> However the coverage of PPTCT is limited.<sup>12</sup>

Contraception is a highly cost-effective HIV prevention strategy.<sup>13-14</sup> Effective contraception can not only prevent vertical HIV transmission but also avert abortion and pregnancy-related morbidity and mortality.<sup>15</sup> Condoms, if used consistently and appropriately, offer dual

protection from HIV and pregnancy. Currently the NACO's HIV prevention interventions among FSWs promotes condoms primarily for HIV prevention.<sup>4</sup>

In India, contraceptive use among the general population women is 56%.<sup>16</sup> The national Reproductive and Child Health Programme (RCHP) focuses on increasing access to contraception and improving child health.<sup>17</sup> The national household survey (NFHS) has shown that socio-demographic factors like age, education etc affects contraceptive use among general population women.<sup>16</sup> However, there is limited evidence on factors affecting contraceptive use among FSWs.

As represented in the conceptual framework in Figure 1, we hypothesize that among the FSWs, in addition to the factors known to be associated with contraceptive use among general population women in India (i.e. '*a priori factors*') (Figure 1: column 1), contraceptive use is also likely to be associated with sex work (SW) related factors (Figure 1: column 2), and the effect of the known factors is likely to be mediated by the SW-related factors. In this paper, we describe the contraceptive practices of HIV positive and negative FSWs in Goa, India and investigate the extent to which contraceptive use is associated with SW-related factors, after adjusting for socio-demographic factors.

## **Materials and Methods**

### **Study setting**

This study was conducted in Goa, India. FSWs largely operated in the Baina red-light area in the southern Goa until its demolition in June 2003.<sup>5</sup> This study was conducted in collaboration with *Positive People*; a non-governmental organisation working with FSWs in Goa. Recruitment of FSWs took place from December 2004-December 2005.

**Study population**

FSWs were defined as women currently providing sexual services in exchange for goods or money.

**Recruitment procedure**

Post-demolition rapid ethnographic mapping, participant observation and key informant interviews were used to describe the re-organisation of SW in Goa. Emerging sites and networks of FSWs were identified. FSWs were recruited using respondent driven sampling (RDS), a variant of snow-ball method where the recruitment chain begins with "seeds" (members of the target population).<sup>18</sup> The research staff purposively selected seeds, identified from various networks during mapping, to ensure representation based on key variables (age, ethnicity, type and sites of SW). All seeds were asked to recruit three other FSWs from their network to the study. All seeds and subsequent recruits were given three pre-numbered coupons (i.e. questionnaire id and network size mentioned by the FSWs during her interview) to refer other FSWs. FSWs were asked to give one coupon to each recruit they referred for study participation. An interviewer documented the referred recruits questionnaire id and relationship with the FSWs on the returned coupons. This enabled documenting network details of the FSWs. Participants recruited further participants in successive "waves". In RDS, the recommendation is to allow sufficient waves of recruitment to achieve "equilibrium" in the composition of the sample with respect to key variables. We undertook 6-8 waves, usually sufficient in such research.<sup>18</sup> Incentives were provided both for participating and for recruiting others, with a limit of three recruits per study participant [100Rs (\$2.50)] for participating and a further sum of 50Rs (\$1.25) for each successfully recruited referral]. Details of data collection are described elsewhere.<sup>6,19-20</sup>

## **Data collection**

### **Structured Administered Interviews**

The questionnaire was developed, translated and piloted in four Indian languages (Hindi, Konkani, Kannada, and Telegu). It covered five domains: socio-demographic factors; SW and sexual risk factors; gender disadvantage (experience of violence, freedom to quit sex trade and financial autonomy); reproductive and mental health; and suicidal behaviour.<sup>21-25</sup> The reproductive health section explored details about pregnancy, therapeutic abortions (henceforth referred to as abortions), children, and contraceptive behaviour. During the formative stages of the study, abortion, sexual assault, and rape were identified as sensitive issues with a risk of desirability bias in responses. To reduce misclassification bias, a confidential voting method was introduced to collect responses to sensitive questions.<sup>26</sup>

Trained female interviewers administered the questionnaire to the participants in a variety of settings such as hired rooms, drop-in centers, project vehicle and clinics. Interviews lasted for approximately 60 minutes. The first and last authors closely supervised and trained the interviewers, and checked all the questionnaire responses for consistency. Data was double entered into Microsoft Access database (Microsoft, Redmond, Washington, USA) and underwent range and consistency check.

### **Laboratory Data**

Participants self-sampled for vaginal specimen using a Dacron swab. One vaginal swab was inserted into a sterile universal container for testing of *Chlamydia trachomatis* and *Neisseria gonorrhoea* by polymerase chain reaction (Amplicor, Roche Molecular Systems, Alameda, California, USA) and the other was inserted into an InPouch TV culture kit (Biomed Diagnostic, San Jose, CA, USA) to screen for *Trichomonas vaginalis* by culture (InPouch,



Biomed Diagnostics, San Jose, California, USA). Five dried blood spots were taken onto filter paper and tested for HIV antibody according to the WHO protocol and herpes simplex virus 2 (HSV-2) using ELISA test HerpeSelect (Focus Technologies, Cypress, California, USA). A further blood spot was placed into the testing well in the syphicheck (Qualpro, Diagnostics, Goa, India) rapid treponema specific test. The reagent was added and the rapid test was read after 5 minutes. This test is an indicator of lifetime exposure to syphilis. Details of the laboratory tests have been described in detail elsewhere.<sup>6</sup> The laboratory had external quality control.

### **Ethical considerations**

Ethical approval was obtained from the Independent Ethics Commission, Mumbai and University College London's Ethics Committee. A community advisory board comprising of FSWs, members close to the sex worker community, *gharwallis* (brothel keepers), local NGO members and peer educators was set up. All the study participants and their partners were treated presumptively for bacterial STIs and provided treatment based on laboratory tests results. HIV results were anonymous. However, voluntary counseling and testing was made available to all participants.

### **Analysis**

Weights for analysis, the inverse of approximate selection probabilities, were calculated to reduce potential recruitment bias due to social network size, age, ethnicity using RDS Analysis Tool 5.4.0 (Cornell University, USA). Analyses incorporating these weights were performed using Stata 10 (STATA Corp. Tx USA), through survey analysis functions.

Contraceptive use was defined as the use of any modern method of contraception. FSWs who reported using only condoms for contraception, but did not use or were inconsistent (used sometimes) in condom use with their clients and intimate non-paying male partner (henceforth referred to as intimate partner) were considered non-users of contraception. Women not using contraception because of pregnancy or plans to have a child, were menopausal or had undergone hysterectomy were excluded from analysis of factors associated with contraception use.

We conducted chi-square tests to explore the association between contraceptive use (no contraception, female sterilisation (referred to henceforth as sterilisation) or reversible contraception) and '*a priori factor*'<sup>16</sup> (Figure 1: 1st column) and SW-related factor (Figure 1: 2<sup>nd</sup> column). We treated variables 'intimate partner' and 'financial autonomy' as SW-related factors because FSWs' financial autonomy could be affected due to their family or pimps/brothel-owners. During the formative stages of our study, key informants reported that the FSWs' intimate partner is likely to be involved with sex trade, offering FSWs protection from their clients or pimps. We then calculated the odds ratios (OR) separately for sterilisation and reversible contraception relative to no contraception.

Multiple adjusted logistic regression models were built based on the conceptual framework (Figure 1). Due to small numbers of FSWs using reversible contraceptives, these analyses were performed only for the outcome variable 'sterilisation relative to no contraception'. The *a priori* factors that were significant with  $p < 0.2$  in univariate analysis were included in a logistic regression model selection procedure using stepwise backward selection procedure to form our base model. The interaction terms between age and marital status, and age and number of children were explored but were not significant and were dropped from the model.

Next, the association of the outcome variable with each SW-related factor (Figure 1: 2<sup>nd</sup> column) was assessed after adjusting for the base model. Finally, all the SW-related factors were included in logistic regression model selection procedure using stepwise backward selection procedure ( $p < 0.2$ ), including the base model with certainty.

## **Results**

A total of 326 FSWs from 35 different networks identified during mapping were recruited throughout Goa. Of the 59 purposively selected seeds, 35 seeds recruited FSWs into the study. Through our extensive mapping we became aware that we were unable to recruit FSWs from 4-5 networks because they did not self identify as sex workers. We recruited up to 6 waves, with recruitment networks comprising 2 to 30 participants. The study sample was representative of the key sites and types of SW identified during mapping.

### **Contraceptive Practices**

Of the total 326 FSWs, we excluded 66 FSWs from the contraceptive use analysis because they were not in need of contraception: 59 were planning pregnancy, 4 were pregnant, 1 had undergone hysterectomy and 2 were menopausal. Compared to the other FSWs they were more likely to be young (61.5% vs 31.4%,  $p < 0.001$ ), without children (45.5% vs 12.4%,  $p < 0.001$ ), literate (31% vs 19.5%,  $p = 0.05$ ) and originally from Andhra Pradesh, a neighbouring state of Goa (21% vs 7.3%,  $p = 0.006$ ). The socio-demographic characteristics and reproductive health indicators of the FSWs are presented in Table 1, separately for entire sample, and those included in the analyses of contraceptive use. The majority of the FSWs were aged between 20-35 years, illiterate, married, and had experienced pregnancy. Twenty-five percent of the entire sample had experienced abortion. Consistent condom use with clients was reported by 74% FSWs.

Among the 260 FSWs, 39% did not use any form of contraception. Half the FSWs had undergone sterilisation; use of reversible contraceptives was low (8%) (Table 1). The majority (73%) of FSWs had an intimate non-paying male partner and 67% of these never used condoms with intimate non-paying male partner. Although 26% FSWs reported using condoms 'for contraception', only a small proportion of FSWs (5%) 'always' used condoms with their intimate non-paying male partner and clients and were considered users of condoms for contraception.

Older age, illiteracy, being married, and having children were univariately associated with sterilisation (relative to no contraception) (Table 2). There was weak evidence that reversible contraceptives use was greater in non-Kannada FSW and those with non-SW-related income (Table 2). Several SW-related factors were univariately associated with sterilisation (Table 3). The only SW-related factor associated with reversible contraception use (relative to no contraception) was having an intimate partner.

### **Factors associated with sterilisation relative to no contraception**

Age, literacy, marital status, number of children, and debt formed our base model (Table 2). After adjusting for the base model, sterilisation was associated, both singly (Table 3) and together (Table 4), with SW-related factors like having an intimate partner and financial autonomy. Exposure to HIV prevention interventions was reported by 34% FSWs and was not significantly associated with sterilisation, OR adjusting for base model [1.4 (95% CI 0.7-2.9)].

### **Perceptions towards Contraception and Condom Use**

When asked about condom use with clients for HIV prevention, 102 (39%) women responded that there was no need to use condoms for HIV prevention if using other contraceptives. Among these women, 15% FSWs who were not using condoms with their clients had undergone sterilisation.

### **HIV, STI and pregnancy**

The HIV prevalence among 259 women was 24% (95%CI: 18-29) [Table 1]. 45% of these HIV positive women were not using contraception, 42% had undergone sterilisation and 13% were using reversible contraceptives. The prevalence of other STI was high: 29% (95%CI:22-35) tested positive for lifetime syphilis and 54% (95%CI:48-60%) for HSV-2 antibodies, 8% (95%CI: 4-11) had *Chlamydia trachomatis*, 10% (95%CI:6-14) had *Neisseria gonorrhoea*, 8% (95%CI: 5-12) had *Trichomonas vaginalis*.

The prevalence of HIV and other STI among the 59 FSWs who were planning to have a child was also high: 33% were HIV positive, 6% had *Chlamydia trachomatis*, 4% had *Neisseria gonorrhoea*, 7% had *Trichomonas vaginalis*, 25% tested positive for lifetime syphilis and 65% tested positive for HSV-2 antibodies.

### **Discussion**

To our knowledge, this is the first study in India that examines contraceptive practices among HIV positive and negative FSWs, and factors associated with contraceptive use among FSWs. HIV prevalence was high and contraceptive use among young FSWs (under 25 years) and HIV positive FSWs was low (36% and 55% respectively). Similar to another FSWs study,<sup>9-10</sup> lifetime abortions were high. Half of the FSWs had undergone sterilisation and few used

reversible contraceptives. Sterilisation was independently associated with older age, illiteracy, having an intimate partner or children and financial autonomy. Several FSWs planning pregnancy were HIV positive or had other STI indicating the need for integrating HIV treatment and care programs with HIV prevention interventions among FSWs.

The contraceptive use among FSWs was higher (61%) in comparison to the general population women in Goa (48.2%) and India (56.3%).<sup>16</sup> Sterilisation use among FSWs at 50% was much higher than that reported in Goa (25.8%) and India (37.3%). The greater use of contraception in our study may be due to the higher rate of sterilisation reported among the Kannada FSWs (i.e. women of Karnataka ethnic origin) who formed the majority of our sample. In India, the median age for women to undergo sterilisation is 25.5 years<sup>16</sup> and use of sterilisation is particularly high (65%) in the State of Karnataka.<sup>16</sup> The use of reversible contraceptives among FSWs was low, perhaps explaining the high rate of abortions.

Sterilisation was largely associated with socio-demographic factors, although association was seen with SW-related factors like having intimate partner and financial autonomy. Sterilisation was associated with similar socio-demographic factors as among general population women i.e. older age, children and illiteracy. Similar to the situation in Goa, our study showed an inverse relationship between literacy and contraceptive use because illiterate women are more likely to undergo sterilisation.<sup>16</sup> Having an intimate partner was associated with sterilisation. Our study has also shown that FSWs with an intimate partner were less likely to have HIV<sup>6</sup> suggesting that having an intimate partner could be a marker of social support for some FSWs. The association of financial autonomy and sterilisation indicates that FSWs' ability to make reproductive health choices is associated with their freedom to spend money as they wish. Lifetime exposure to HIV prevention interventions was not associated

with sterilisation. However, exposure to HIV prevention was associated with increased knowledge of HIV and condom use with clients in our study population.<sup>6</sup> Peer-led FSWs interventions and community mobilization<sup>27-29</sup> increases FSWs access and utilization of health services.<sup>27,29</sup> Promoting contraceptives through peer-led interventions could improve contraceptive use among FSWs. The involvement of pimps and brothel keepers improves condom use among FSWs.<sup>28</sup> Efforts should be made to involve these gatekeepers to promote contraception among FSWs and its effects must be explored.

Similar to the NFHS data,<sup>16</sup> condoms were the most used reversible contraceptive among the FSWs. HIV prevention interventions should promote condoms for dual protection from HIV and abortions, especially among young FSWs. However, our qualitative work indicates that FSWs do not use condoms with their intimate partner to differentiate their relationship from clients. Among women at-risk of HIV, the World Health Organisation recommends promotion of hormonal contraceptives (HC) but emphasizes the need to advice consistent condom use to prevent HIV/STI.<sup>30</sup> HIV prevention interventions should collaborate with the RCHP to improve FSWs' access to contraceptives, particularly HC. Condom use for HIV prevention should be emphasised among FSWs who have undergone sterilisation.

Peer-led HIV prevention interventions should encourage HIV positive FSWs planning pregnancy to seek treatment and care to prevent neo-natal HIV transmission. They should encourage pregnant FSWs to screen for HIV and syphilis in the antenatal period. Same-day screening and treatment for syphilis with single dose of benzathine penicillin is clinically and cost-effective.<sup>31</sup> Besides, FSWs undergoing abortions, IUD insertion, planning pregnancy should be given presumptive antibiotics prophylaxis for treatable STI.

A potential limitation of our study is that it was conducted in the aftermath of demolition of the red-light area. However, we conducted extensive mapping post-demolition to identify the re-organisation of SW. We used chain sampling to recruit participants and used weights to give an approximately unbiased analysis. We were able to recruit FSWs engaged in different types of SW and from different areas identified during mapping. However, this is not a true probability sample survey and the confidence intervals and p-values derived through RDS should be viewed as approximate. We were unable to thoroughly explore if any factors were associated with the use of reversible contraceptives due to their low use in this setting. The lack of significant associations with reversible contraceptive use might simply reflect low power. Associations with sterilisation should not be interpreted as its predictors as our study is cross-sectional thus making it difficult to determine the direction of effect.

India has a large group of women who engage in sex work.<sup>3</sup> The HIV prevention interventions should promote contraceptives, especially among HIV positive and young FSWs. The integration of NACO's HIV prevention interventions with its PPTCT program can avert HIV positive births. The impact of integration of the RCHP and PPTCT programs with HIV prevention interventions could enhance their public health impact and should be evaluated for feasibility, and effectiveness in reducing reproductive ill-health and HIV positive births among FSWs.



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## **Contributors**

SW participated in the implementation of the study, data collection, had full access to all the data for the study, interpretation of the data, wrote the manuscript drafts, and took the final responsibility for the decision to submit for publication. FC participated in the design of the study, interpretation of the data and critical appraisal of all the drafts of the manuscripts. AC guided and PW supported the statistical analysis and were involved in the critical appraisal of all the drafts of the manuscripts. DM participated in the design of the study, interpretation of the data and critical appraisal of all the drafts of the manuscripts. MS designed and implemented the study, was involved in interpretation of the data, and the critical appraisal of the drafts of the manuscripts. The design and implementation of the study was independent of the funding body and the findings do not reflect the opinions of Wellcome Trust.

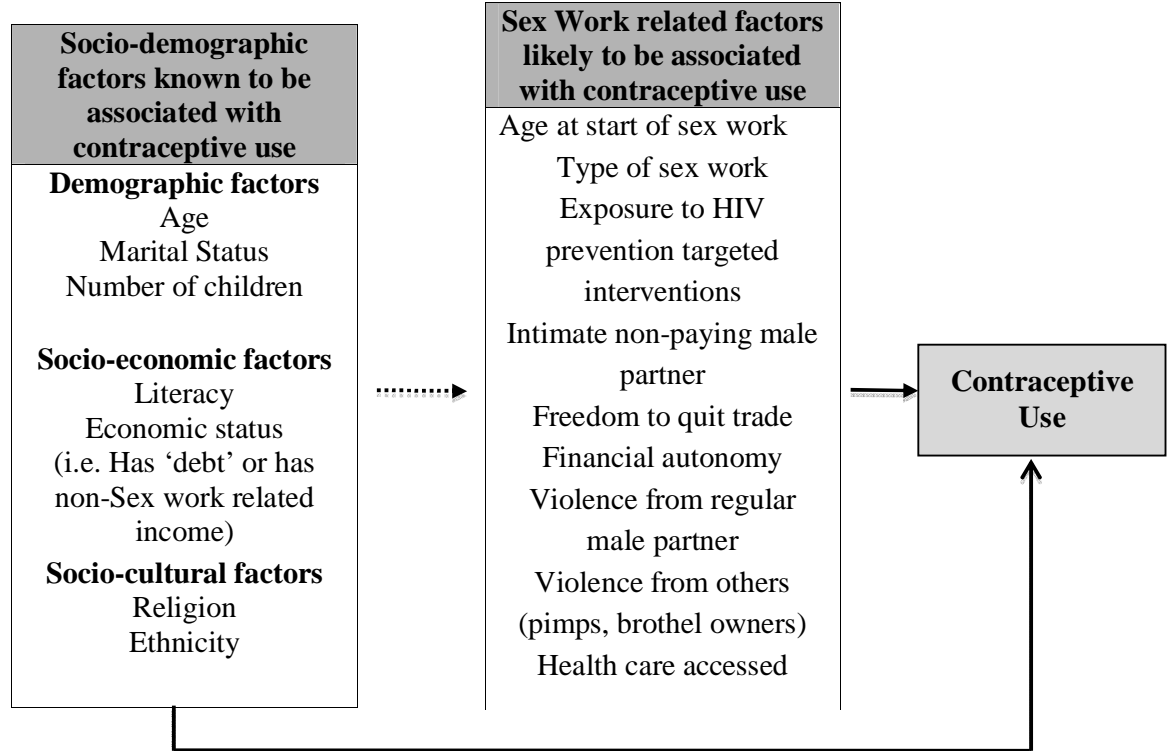
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**Figure 1. Framework of the Factors Associated with Contraceptive Use Among Female Sex Workers**



**Table 1. Demographic and reproductive health indicators among the female sex workers in a cross-sectional study conducted in Goa, India**

Factor	Entire Sample		Excluding pregnant women, those trying for pregnancy, menopausal or had hysterectomy	
	Number (n=326) <sup>‡</sup>	Weighted % [95% CI]	Number (n=260) <sup>‡</sup>	Weighted % [95% CI]
<b>Age</b>				
	</=25	135	38 [32-43]	93
	26-35	122	39 [34-45]	108
	>/=36	69	23 [18-28]	59
<b>Ethnicity</b>				
	Kannada (Karnataka)	200	72 [67-76]	163
	Telegu (Andhra Pradesh)	37	10 [7-13]	21
	Goa	54	11 [8-14]	47
	Other	35	7 [5-10]	29
<b>Religion</b>				
	Hindus	225	73 [68-78]	175
	Christians	41	10 [7-13]	35
	Muslims	60	17 [13-21]	50
<b>Literacy</b>				
	Literate	87	22 [18-26]	63
	Illiterate	239	78 [74-82]	197
<b>Number of Children</b>				
	None	72	19 [15-23]	43
	1-3	229	73 [68-78]	192
	>3	25	8 [5-11]	25
<b>Marital Status</b>				
	Previously married	101	32 [26-37]	88
	Married	134	40 [35-46]	102
	Never Married	91	28 [23-33]	70
<b>Intimate non-paying male partner</b>				
	Yes	247	76 [71-81]	189
<b>Ever pregnant</b>				
	Yes	298	91 [88-95]	240
<b>Lifetime abortion (n=326)</b>				
	Yes	90	25 [20-30]	72
<b>Contraceptive Use</b>				
	None	103	29 [24-34]	103
	Oral Pills	9	2.0 [0.3-3.0]	9
	Intrauterine Device	3	0.6 [0.09-1.3]	3
	Condom	14	4.0 [2-6.5]	14
	Female Sterilisation	131	43.0 [37-49]	131
	Pregnant/planning child	66	20 (16-25)	-
<b>Condom use with intimate non-paying male partner</b>		(n=247) <sup>†</sup>		(n=189) <sup>†</sup>
	Never	181	74 [68-79]	126
	Always	27	11 [6-15]	27
	Sometimes	39	16 [11-20]	36
<b>HIV positive</b>		(n=325)		(n=259)
		77	26 [21-31]	55
<b>Consistent condom use with clients</b>				
		237	74.4 [69.3-78.9]	192
				73.8 [68.2-77.8]

<sup>‡</sup> N is 326 when entire sample is included in the analysis and N is 260 when women not using contraceptives for reasons like want to have a child, hysterectomy, menopausal or pregnant are excluded from the analysis and are the N's for the above-mentioned columns unless specified otherwise. <sup>†</sup> Only for those women who reported having a regular male partner.



**Table 2: Association of type of contraception used with socio-demographic, reproductive and sexual health indicators, among female sex workers in Goa India, reporting unadjusted estimates of association (OR=odds ratios) for each of sterilisation and reversible methods versus no contraception, and for sterilisation, multivariate (adjusted) estimates derived from Base Model (n=260)**

Factor	N	*No Contraception %	*Sterilisation Contraceptives %	* <sup>†</sup> Reversible Contraceptives %	<sup>‡</sup> Unadjusted OR (95% CI) ( <sup>†</sup> Reversible vs. No Contraception) N=129	<sup>‡</sup> Unadjusted OR (95% CI) (Sterilisation vs. No Contraception) N=234	<sup>§</sup> Adjusted OR (95% CI) (Sterilisation vs. No Contraception) N=234
<b>Age (years)</b>			p<0.001		p=0.4	p<0.001	p<0.001
<=25	93	64	24	12	1	1	1
26-35	108	26	64	10	1.9 (0.7-5.0)	5.8 (2.9-11.5)	4.6 (2.1-10.0)
>=36	59	27	68	5	0.9 (0.2-3.8)	5.9 (2.7-12.9)	3.9 (1.6-9.6)
<b>Ethnicity</b>			p<0.001		p=0.13	p=0.002	-
Kannada (Karnataka)	163	32	63	5	1	1	-
Telegu (Andhra Pradesh)	21	33	38	29	4.6 (1.2-17.4)	0.7 (0.2-1.9)	-
Goa	47	53	32	15	1.7 (0.6-5.3)	0.4 (0.2-0.8)	-
Other	29	65	21	14	1.1 (0.3-3.9)	0.2 (0.07-0.5)	-
<b>Religion</b>			p=0.31		p=0.6	p=0.1	-
Hindus	175	38	51	11	1	1	-
Christians	35	54	37	9	0.6 (0.1-2.2)	0.5 (0.2-1.1)	-
Muslims	50	36	56	8	0.7 (0.2-2.3)	1.1 (0.6-2.3)	-
<b>Literacy</b>			p<0.001		p=0.5	p<0.001	p=0.001
Literate	63	67	20	13	1	1	1
illiterate	197	31	60	9	1.4 (0.5-3.8)	5.2 (2.5-10.6)	4.1 (1.7-9.9)
<b>Marital Status</b>			p=0.0006		p=0.7	p=0.0004	p=0.02
Married/ Previously Married	190	32	59	9	1	1	1
Never Married	70	61	26	13	0.9 (0.3-2.3)	0.3 (0.2-0.6)	0.4 (0.2-0.9)
<b>Children</b>			p<0.001		p=0.8	p<0.001	p=0.004
None	43	74	9	16	1	1	1
1+	217	31	61	8	1.1 (0.4-3.1)	15.4 (4.5-52.9)	5.9 (1.7-19.6)
<b>Current debt</b>			p=0.22		p=0.6	p=0.09	p=0.1
No	121	46	43	11	1	1	1
Yes	139	34	57	9	1.2 (0.5-3.1)	1.6 (0.9-2.7)	1.7 (0.9-3.3)
<b>Non-sex work related income</b>			p=0.24		p=0.1	p=0.1	-
No	114	45	48	7	1	1	-
Yes	146	36	52	12	2.1 (0.8-5.6)	1.4 (0.8-2.3)	-

\*Percentages presented in the table 2 are weighted row percentages <sup>†</sup>Oral pills, Intra-uterine device, condom, were categorized as reversible contraceptives. <sup>‡</sup>Univariate analysis of *a priori* factors with type of contraceptive used. <sup>§</sup>All socio-economic variables explored in univariate analysis were included in a stepwise backward model selection procedure (p<0.2 for inclusion with outcome variable coded as no contraception and sterilisation) and the selected model presented forms our base model.

**Table 3. Association of type of contraception used with sex work related factors (reporting unadjusted estimates of association (ORs) for each of sterilisation and reversible methods versus no contraception), and for sterilisation, estimates (ORs) adjusted for Base Model [N=260]**

Factors	N	*No Contraception %	*Sterilisation Contraceptives %	**Reversible Contraceptives %	‡ Unadjusted OR (95% CI) (†Reversible vs. No Contraception) N=129	‡ Unadjusted OR (95% CI) (Sterilisation vs. No contraception) N=233	‡ Adjusted OR (95% CI) (Sterilisation vs. No contraception) N=233
<b>Age at start of SW</b>			p=0.003		p=0.76	p=0.003	p=0.5
<=20	119	50	38	12	1	1	1
>20	141	30	61	9	0.9 (0.4-2.2)	2.3 (1.3-4.0)	1.2 (0.6-2.5)
<b>Mode of SW</b>			p=0.001		p=0.97	p=0.001	p=0.7
Independent	233	36	54	10	1	1	1
§Contract	27	70	15	15	1.0 (0.3-3.6)	0.1 (0.04-0.5)	0.7 (0.1-4.5)
<b>Exposure to HIV prevention Intervention</b>			p=0.8		p=0.8	p=0.6	p=0.3
Yes	82	40	49	11	1	1	1
No	177	39	51	10	0.9 (0.3-2.4)	1.1 (0.6-2.0)	1.4 (0.7-2.9)
<b>Intimate non-paying male partner</b>			p=0.002		p=0.003	p=0.002	p=0.003
No	71	56	41	3	1	1	1
Yes	189	33	54	13	9.9 (2.2-46.0)	2.5 (1.3-4.6)	3.0 (1.4-6.3)
<b>Free to quit trade</b>			p=0.05		p=0.4	p=0.02	p=0.04
No	24	63	29	8	1	1	1
Yes	236	37	53	10	1.9 (0.4-8.9)	3.1 (1.2-8.2)	3.8 (1.1-13.3)
<b>Financial autonomy</b>			p=0.1		p=0.5	p=0.04	p=0.003
No	86	46	44	10	1	1	1
Yes	174	36	54	10	1.3 (0.5-3.5)	1.8 (1.0-3.2)	2.9 (1.4-5.8)
<b>Violence by intimate non-paying male partner</b>			p=0.4		p=0.3	p=0.63	p=0.2
No	175	40	51	9	1	1	1
Yes	85	39	48	13	1.5 (0.5-3.8)	0.8 (0.5-1.5)	0.6 (0.3-1.3)
<b>Violence from others (pimps, brothel keepers)</b>			p=0.01		p=0.89	p=0.32	p=0.2
No	204	37	54	9	1	1	1
Yes	56	48	36	16	0.95 (0.46-1.96)	0.73 (0.39-1.36)	0.6 (0.3-1.4)
<b>§Health care accessed</b>			p=0.79		-	p=0.6	p=0.8
Government clinics	76	42	49	9	-	1	1
Private clinics	176	38	51	11	-	1.3 (0.7-2.3)	1.9 (0.9-3.9)
None	8	50	50	0	-	1.5 (0.3-6.9)	4.5 (0.4-47.5)

\*Percentages presented in the table 3 are weighted row percentages. <sup>5</sup>SW who worked on contractual basis for a fixed period of time with pimps or brothel keepers. <sup>6</sup>Oral pills, Intra-uterine device, condom, were categorized as reversible contraceptives. <sup>7</sup>Association of each sex work factor with type of contraceptive used. <sup>8</sup>Univariate association of reversible contraception and health care accessed was not explored due to small numbers. <sup>9</sup>Each sex work factor adjusted for base model.

**Table 4. Final composite model of the association of sterilisation vs. no contraception with socio-demographic base model factors and sex work related factors [N=233]**

<b>Factors</b>	<b>Final Model ‡Adjusted OR (95% CI)</b>
<b>AGE</b>	p=0.001
<=25	1
26-35	4.4 (1.9-10.1)
> 35	8.0 (2.8-23.0)
<b>Literacy</b>	p=0.001
Illiterate	4.6 (1.9-11.4)
<b>Marital Status</b>	p=0.1
Never married	0.5 (0.2-1.3)
<b>Number of Children</b>	p=0.001
None	1
1+	9.9 (2.6-37.4)
<b>FSWs who were in debt currently</b>	p=0.05
Yes	1.9 (0.97-3.96)
<b>Intimate non-paying male partner</b>	p=0.01
Yes	2.6 (1.2-5.7)
<b>Violence by Intimate non-paying male partner</b>	p=0.1
Yes	0.5 (0.2-1.2)
<b>Free to quit trade</b>	p=0.1
Yes	2.8 (0.8-9.4)
<b>Financial autonomy</b>	p=0.009
Yes	2.8 (1.3-6.1)

‡ Adjusted odds ratio for the final model which includes the base model and variables related to sex work selected in a stepwise backward model selection procedure, with  $p < 0.2$  for inclusion.