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ORIGINAL ARTICLE

Devising a female sex work typology using data from Karnataka, India

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Background We examine the extent to which an existing sex work typology captures human immunodeficiency virus (HIV) risk in Karnataka and propose a systematic approach for devising evidence-based typologies.

Methods The proposed approach has four stages: (i) identifying main places of solicitation and places of sex; (ii) constructing possible typologies based on either or both of these criteria; (iii) analysing variations in indicators of risk, such as HIV/sexually transmitted infection (STI) prevalence and client volume, across the categories of the typologies; and (iv) identifying the simplest typology that captures the risk variation experienced by female sex workers (FSWs) across different settings. Analysis is based on data from 2312 participants in integrated biological and behavioural assessments of FSWs conducted in Karnataka, India. Logistic regression was used to predict HIV/STI status (high-titre syphilis, gonorrhea or chlamydia) and linear regression to predict client volume.

Results Our analysis suggests that the most appropriate typology in Karnataka consists of the following categories: brothel to brothel (i.e. solicit and have sex in brothels) (11% of sampled FSWs); home to home (32%), street to home (11%), street to rented room (9%), street to lodge (22%), street to street (9%) and other FSWs (8%). Street to lodge FSWs had high HIV (30%) and STI prevalence (27%), followed by brothel to brothel FSWs (34 and 13%, respectively).

Conclusions The proposed typology identifies street to lodge FSWs as being at particularly high risk, which was obscured by the existing typology that distinguishes between FSWs based on place of solicitation alone.

Keywords Typology, type of sex work, sex work, HIV, India

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Introduction

Most human immunodeficiency virus (HIV) transmission in India is heterosexual,[1] and evidence indicates that a substantial proportion of this transmission relates to sexual networks that include female sex workers (FSWs).[2] Understanding the distribution and organization of female sex work is therefore crucial to developing and implementing evidence-based HIV/acquired immunodeficiency syndrome (AIDS) prevention and treatment programmes. Numerous sex work typologies have been proposed.[3] Typology refers to a classification of FSWs into types or categories. In general, these typologies seek to provide a comprehensive description of the settings in which women practice sex work.

Sex work typologies play an extremely important role in HIV programming and research in India. According to India's National AIDS Control Organization (NACO) guidelines, programmers initiating FSW interventions should, prior to programme implementation, conduct mapping in order to collect information on the type of sex work practiced in their area.[4] Sex work typologies or at least distinctions between various types of FSWs are an integral part of most reports and academic articles on sex work. Most surveys conducted among FSWs take into account typology as part of the sampling strategy. Moreover, sex work typology is an important independent variable in most analyses on sex work, as related to sexually transmitted infection (STI)/HIV risk or other issues.[5]

In a previous article, we conducted a comprehensive review of the available literature and found that there is considerable conceptual confusion regarding the typology of female sex work in India.[3] Researchers and programmers from different states use different categorizations of FSWs. Even when the same categories are used, the definitions vary. Confusingly, the same categories may be referred to by different names in different locations. In addition, the criteria used to determine typologies may be different, despite using apparently the same categorization and terminology. Consequently, many of the existing typologies are of limited utility due to their lack of clarity and specificity.

Previous studies conducted in India have used various criteria to distinguish between FSW types: practice;[6] mode of operation;[7] mode of organization;[8] nature of the sex work network;[9] place of sex[10,11] and primary place of solicitation (only references with explicitly specified criteria are listed).[1,4,12] The first four criteria cannot be directly observed, which can pose difficulties in terms of categorizing individual FSWs. Both the place of sex and the place of solicitation are directly observable. NACO argues that the place of solicitation is more useful programmatically, as contacting FSWs at the place of sex can create problems for outreach.[4] The present study attempts to examine the appropriateness of the place of solicitation and the place of sex as criteria for discriminating between FSWs at higher and lower risk of HIV in places where sex work is diverse in its locations of solicitation and/or sex, as is the case throughout South India. Where the sex work industry is less diverse (e.g. Kolkata, where most FSWs work in red-light areas), other criteria have been considered, e.g. earnings[13,14] and level of autonomy from brothel madam.[13,15]

From a programmatic perspective, an underlying assumption is that FSWs working in different environments require specific outreach strategies. Moreover, targeted intervention programmes assume that certain categories of FSWs are at higher risk compared with others and organize their activities by prioritizing their efforts among high-risk FSW groups. Hence, especially when lacking data on FSWs' HIV risk, typologies are often employed as proxy predictors of risk.

None of the existing articles, reports or books identified as part of our review was explicit about how their proposed typology was developed.[3] It appeared that the typologies were developed based on observations of the sex trade and on the FSWs' reports of how the trade is organized, but this process has not been systematically documented. In the initial stages of FSW HIV programming, 'ad-hoc' descriptive typologies will be developed and utilized. However, with time, available data on HIV risk can be incorporated to refine existing typologies and make them more useful programmatically. This can be particularly useful in India, where extensive data regarding the FSW population have been collected.

This article examines the extent to which existing sex work typologies are accurate predictors of HIV risk and proposes a systematic approach for devising evidence-based typologies, especially for places where sex work is diverse in its locations of solicitation and/or of sex.

Methods

Data were derived from cross-sectional integrated biological and behavioural assessment (IBBA) surveys of urban FSWs, conducted in five districts of Karnataka. The districts were selected to reflect the state's geographical heterogeneity, and to include larger urban centres. Within each locality (cluster) of each district the FSWs were first enumerated. Data were collected between 2004 and 2006 (2004 in Mysore district, 2005 in Shimoga, Bellary and Belgaum districts, and 2006 in Bangalore Urban district). The target sample size was 800 FSWs in Bangalore Urban and 400 FSWs in the remaining districts. This sample size was designed to provide 90% power, given 5% alpha error, to detect a 10–15% increase in consistent condom use in subsequent surveys, assuming a baseline prevalence of 50%. Sample size estimates incorporated a 1.7 design effect for time–location sampling and 1.5 for

cluster sampling. Conventional cluster sampling was employed for sites where solicitation took place in non-public places and time–location cluster sampling for solicitation in public places.[12] The study was approved by the institutional review boards of St. John's Medical College, Bangalore, India; The University of Manitoba, Winnipeg, Canada and University College London, London, UK.

Participants were administered a face-to-face questionnaire and were invited to provide venous blood and a urine sample. From a total of 2778 FSWs invited 2312 participated (response rate 83.2%). Serum samples were tested at St. John's Medical College, Bangalore, for HIV antibody (Detect HIV 1/2 system, BioChem ImmunoSystems, Montreal, Canada), with positive ELISA samples confirmed using a recombinant antigen enzyme immunoassay (Genedia HIV 1/2 ELISA 3.0, Green Cross Life Science Corporation, South Korea). Serum was tested for syphilis by Rapid Plasma Reagin (RPR) (Span Diagnostics, Sachin, India) and TPHA (Treponema Pallidum Hemagluttination Assay test; Omega Diagnostics Ltd, Alloa, UK). High-titre syphilis was diagnosed as women who were TPHA positive and had an RPR titre $\geqslant$1:8. Aliquots from urine samples were transported in cold packs to TTK Blood Bank, Bangalore, and tested by polymerase chain reaction (PCR) for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* (specimens collected from Mysore were tested using Amplicor Duplex Neisseria gonorrhoeae (NG)/ Chlamydia trachomatis (CT) PCR, Roche Molecular Diagnostics, Pleasanton, CA, USA; specimens collected from all other districts were tested using APTIMA-Combo 2 PCR, Gen-Probe Inc., San Diego, CA, USA).

All statistical analyses were performed using the survey analysis functions of STATA version 10, to incorporate the survey weights and account for the clustering. The survey weights account for the probability of a FSW to be selected depending on the cluster and district where she was interviewed so that the weighted sample is representative of all FSWs enumerated. During bivariate analysis, survey-adapted Chi-square tests of significance were conducted for categorical dependent variables and *F*-tests for continuous dependent variables. Multivariate analyses consisted of logistic regression for binary dependent variables and linear regression predicting monthly client volume, which was logarithmically transformed to reduce problems from lack of symmetry. Along with typology, other predictors entered in the multivariate models were socio-demographic and behavioural variables, selected either because of significant association with the dependent variable in bivariate analysis at the 0.10 level or as control variables.

Results

Table 1 shows the main places of solicitation and sex, and the overlap between the two. The most common

Table 1 Place of solicitation by place of sex of female sex workers, Karnataka (Weighted/unweighted N, weighted %)

	Place of solicitation							
Place of sex	Home[b]	Rented room	Lodge	*Dhaba*[a]	Brothel	Vehicle	Street	Other	Total
Home	**744.7/686 (31.5)**	1.0/1 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	6.0/6 (0.3)	1.8/1 (0.0)	**249.2/286 (10.5)**	22.1/31 (0.9)	1025.0/1011 (43.3)
Rented room	20.6/22 (0.9)	8.8/9 (0.4)	0.0/0 (0.0)	0.0/0 (0.0)	0.3/1 (0.0)	2.3/2 (0.0)	**202.6/202 (8.6)**	13.6/21 (0.6)	248.2/257 (10.5)
Lodge	18.4/19 (0.8)	1.0/1 (0.0)	3.8/4 (0.2)	0.0/0 (0.0)	0.0/0 (0.0)	2.9/2 (0.1)	**524.5/521 (22.2)**	8.0/10 (0.3)	558.4/557 (23.6)
Dhaba	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	1.2/4 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	1.0/1 (0.0)	1.0/1 (0.0)	3.1/6 (0.1)
Brothel	4.6/3 (0.2)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	**251.5/197 (10.6)**	0.0/0 (0.0)	14.4/17 (0.6)	0.7/1 (0.0)	271.2/218 (11.5)
Vehicle	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	4.8/5 (0.2)	0.0/0 (0.0)	4.8/5 (0.2)
Street	16.8/11 (0.7)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	**214.8/224 (9.1)**	2.2/2 (0.0)	233.8/237 (9.9)
Other	1.2/1 (0.0) (34.1)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	0.0/0 (0.0)	17.5/14 (0.7)	2.3/3 (0.0)	20.9/18 (0.9)
Total	806.2/742	10.7/11 (0.5)	3.8/4 (0.2)	1.2/4 (0.0)	257.9/204 (10.9)	7.0/5 (0.3)	1229.0/1270 (52.0)	49.8/69 (2.1)	2365.0/2309 (100)

[a]*Dhaba* = roadside resting place for truckers and other long-distance motorists.

categories of FSWs are indicated: (i) brothel solicitation and sex (11% of the FSW population sampled); (ii) home solicitation and sex (32%); (iii) street-based solicitation and sex in the home (11%); (iv) street-based solicitation and sex in rented rooms (9%); (v) street-based solicitation and sex in lodges (22%); (vi) street-based solicitation and street-based sex (9%); and (vii) others. FSWs who solicited and/or had sex in public places were referred to as street-based, as this is the most common terminology used in the literature.[1,4] Lodges are hotels that rent rooms on a client-by-client basis; rented rooms refer to rooms rented on the same basis but from within a house. Home to home FSWs are either traditional *Devadasi* FSWs,[16] common in Karnataka, whose occupation is well known by the community (these women therefore have no need to specifically solicit clients) or are women who solicited in public places (or other) in the past, and have now developed their own clientele who they service from their homes.

We considered three possible categorizations of FSWs (Table 2). Typology A distinguished based on the main place of solicitation as suggested by NACO, i.e. home, brothel, street and other. Typology B categorized FSWs in six categories by place of sex, namely home, rented room, lodge, brothel, street and other. Typology C distinguished between seven categories by taking into account first the place of solicitation and then the place of sex, and led to the more comprehensive categorization outlined earlier. The premise of the comparison between the three typologies is that excluding the 'other' category, typologies A and B can be seen as broadly 'nested' within typology C, in that typology A combines categories (iii)–(vi) of typology C into one class, and typology B combines categories (ii) and (iii) of typology C. We therefore focus our subsequent analysis on whether levels of risk among FSWs can be seen to be comparable across categories (iii)–(vi) (in which case typology A may be appropriate) or comparable between categories (ii) and (iii) (in which case typology B may be appropriate).

Table 2 Typologies of female sex work, Karnataka

Typology	Criterion	Type of female sex work	%
Typology A	Place of solicitation	Brothel	10.9
		Home	34.1
		Street	52.0
		Other	3.1
		Total	100.0
		Total *N*	2366
Typology B	Place of sex	Brothel	11.5
		Home	43.3
		Rented room	10.5
		Lodge	23.6
		Street	9.9
		Other	1.2
		Total	100.0
		Total *N*	2368
Typology C	Place of solicitation and place of sex	Brothel to brothel (i)	10.6
		Home to home (ii)	31.5
		Street to home (iii)	10.5
		Street to rented room (iv)	8.6
		Street to lodge (v)	22.2
		Street to street (vi)	9.1
		Other (vii)	7.5
		Total	100.0
		Total *N*	2365

Table 3 presents data on HIV and STI prevalence for various FSW categories, and also monthly client volume, number of occasional and regular clients, monthly unprotected sexual contacts, condom breakage, anal sex, experience of violence and forced sex, alcohol consumption and HIV testing.

As shown in Table 3, the street to lodge and brothel to brothel categories were at highest risk. FSWs who solicited in the street and had sex in lodges had high HIV (30%) and STI (27%) prevalence, relatively high client volume (51 clients per month) and the highest mean number of unprotected sexual contacts (11 per month). Brothel-based FSWs had the highest HIV prevalence (34%) and client volume (94 clients per month), but registered lower STI prevalence (13%) and, due to high reported condom use, the lowest mean number of unprotected sexual contacts (1.4 per month). Brothel (47%) and street to lodge FSWs (42%) also reported the highest alcohol consumption compared with other FSW categories.

Column 9 of Table 3 indicates that the FSW categories distinguished by typology C were significantly different with respect to HIV and STI prevalence, client volume and other risk and vulnerability indicators ($P < 0.001$). Column 10 shows that street solicitation subcategories (iii)–(vi) were significantly different in terms of HIV and STI prevalence, client volume ($P < 0.001$) and some other behavioural factors, suggesting that typology A fails to adequately reflect the variation in risk across FSWs. As indicated in column 11, home to home and street to home FSW categories (ii) and (iii) had significantly different client volume ($P = 0.031$), but similar HIV and STI prevalence, suggesting that typology B also fails to reflect some aspects of variability in risk.

Results of logistic regression predicting HIV prevalence and STI prevalence, and linear regression predicting monthly client volume are shown in Tables 4 and 5. HIV prevalence was employed as a measure of lifetime risk and STI prevalence as a measure of recent risky behaviour. Client volume

Table 3 HIV/STI seropositive status, risk and vulnerability indicators by typology of sex work C, Karnataka

	Brothel to brothel (i)	Home to home (ii)	Street to home (iii)	Street to rented room (iv)	Street to lodge (v)	Street to street (vi)	Other (vii)	*P*-value* (i)–(vii)	*P*-value* (iii)–(vi)	*P*-value* (ii)–(iii)
HIV (%)	34.0	14.0	15.7	12.7	29.6	19.1	11.1	<0.001	<0.001	0.614
High-titre syphilis (%)	3.5	2.3	2.3	6.9	14.2	6.7	4.6	<0.001	0.001	0.987
Gonorrhea (%)	5.4	1.5	2.7	2.0	7.5	2.6	1.7	<0.001	0.003	0.187
Chlamydia (%)	7.8	4.9	6.7	6.5	9.7	3.3	5.8	0.048	0.019	0.317
High-titre syphilis, gonorrhea or chlamydia (%)	13.4	8.1	10.4	14.2	26.8	12.3	11.7	<0.001	<0.001	0.259
Mean monthly client volume	93.9	30.8	37.2	38.5	50.8	39.5	36.6	<0.001	<0.001	0.031
Mean occasional clients out of 10	6.6	5.3	6.2	6.4	6.2	5.9	5.6	<0.001	0.685	0.007
Mean regular clients out of 10	3.4	4.7	3.8	3.6	3.8	4.1	4.4	<0.001	0.685	0.007
Mean number of unprotected sexual contacts per month	1.4	5.5	7.6	5.3	11.2	8.5	6.8	<0.001	0.306	0.239
Experienced condom breakage in last 1 month (%)	13.8	11.4	15.0	20.7	26.7	12.8	26.5	<0.001	0.002	0.174
Ever had anal sex with client (%)	8.3	14.3	11.7	9.5	7.2	16.7	17.6	0.002	0.004	0.373
Physically forced to have sex in the past 1 year (%)[a]	8.8	13.6	13.0	5.6	15.2	16.0	18.9	0.028	0.017	0.855
Drank alcohol at least once per week in the last month (%)[b]	47.3	21.9	32.1	37.5	41.7	31.9	32.6	<0.001	0.337	0.022
Never taken an HIV test (%)	61.3	77.3	71.0	68.2	68.1	73.2	70.3	0.025	0.706	0.099
Total *N*	252	745	249	203	525	215	178			

[a]18.7% missing values (question not asked in Mysore district).
[b]21.5% missing values (question not asked in Mysore district).
**P*-value from test of equality across the range of categories indicated.

Table 4 Logistic regressions predicting HIV and STI status with typology of sex work C as predictor variable, Karnataka

Variable	HIV-seropositive status			High-titre syphilis/gonorrhea/chlamydia		
	Overall *P*-value	OR	95% CI	Overall *P*-value	OR	95% CI
Typology of sex work C						
Home to home (ii)	(i)–(vii)* <0.001	1.0		(i)–(vii)* 0.013	1.0	
Brothel to brothel (i)	(iii)–(vi)* <0.001	2.39	1.33–4.29	(iii)–(vi)* 0.005	1.09	0.41–2.91
Street to home (iii)	(ii)–(iii)* 0.528	1.19	0.70–2.02	(ii)–(iii)* 0.910	1.03	0.60–1.78
Street to rented room (iv)		1.16	0.64–2.09		1.12	0.59–2.12
Street to lodge (v)		2.65	1.77–3.99		2.27	1.37–3.75
Street to street (vi)		1.41	0.83–2.39		1.39	0.68–2.87
Other (vii)		0.77	0.42–1.44		1.26	0.60–2.64
District						
Shimoga	<0.001	1.0		0.073	1.42	0.76–2.63
Belgaum		3.03	1.82–5.04		1.21	0.65–2.24
Bellary		1.41	0.84–2.39		1.0	
Bangalore		1.06	0.59–1.90		2.00	1.10–3.64
Mysore		2.00	1.17–3.44		2.35	1.23–4.47
Marital status						
Married	0.004	1.0		0.088	1.0	
Unmarried		0.89	0.53–1.50		1.49	0.86–2.57
Ex-married		1.57	1.18–2.09		1.48	1.08–2.04
Devadasi[a]		1.32	0.72–2.43		1.28	0.54–3.02
Do other work except sex work						
No	0.796	1.04	0.76–1.42	0.284	1.20	0.86–1.69
Yes		1.0			1.0	
Migrated for sex work						
No	0.346	1.0		0.248	1.33	0.82–2.15
Yes		1.20	0.82–1.75		1.0	
Literacy status						
No	0.322	1.15	0.87–1.53	0.003	1.76	1.21–2.56
Yes		1.0			1.0	
Age	0.028	0.97	0.95–1.00	0.192	0.98	0.96–1.01
Duration in sex work[b]	0.002	1.38	1.13–1.69	0.057	0.81	0.65–1.01
Monthly client volume[b]	0.762	0.93	0.59–1.46	0.048	1.69	1.00–2.84
Inconsistent condom use						
No				0.824	1.0	
Yes					0.96	0.68–1.36

[a]*Devadasi* = woman dedicated to a goddess and engages in sex work.
[b]Variable is logarithmically transformed to increase symmetry.
**P*-value from test of equality across the range of categories indicated.
OR: Odds ratio; CI: Confidence interval.

measured the number of sexual contacts that exposes FSWs to STIs/HIV, in the absence of other protective measures.

As shown in Table 4, street to lodge and brothel FSWs had the highest HIV prevalence after adjusting for other factors, with odds ratios (ORs) of 2.7 [95% confidence interval (CI) 1.8–4.0] and 2.4 (95% CI 1.3–4.3), respectively, relative to home to home FSWs. Street to lodge FSWs were also at highest risk in terms of contracting STIs (high-titre syphilis/gonorrhoea/chlamydia), with adjusted OR 2.3 (95% CI 1.4–3.8) compared with home-based FSWs. Client volume was highest for brothel-based FSWs (adjusted effect = 0.303 relative to home to home, 95% CI

Table 5 Linear regression predicting weekly client volume[a] with typology of sex work C as predictor variable, Karnataka

Variable	Overall *P*-value	Effect size	95% CI
Typology of sex work C			
Home to home (ii)	(i)–(vii)* <0.001	0.0	
Brothel to brothel (i)	(iii)–(iii)* 0.007	0.303	0.208 to 0.399
Street to home (iii)	(ii)–(iii)* 0.059	0.057	−0.002 to 0.116
Street to rented room (iv)		0.095	0.018 to 0.172
Street to lodge (v)		0.186	0.127 to 0.245
Street to street (vi)		0.105	0.030 to 0.181
Other (vii)		0.077	0.012 to 0.142
District			
Shimoga	<0.001	0.0	
Belgaum		0.218	0.143 to 0.293
Bellary		0.153	0.083 to 0.224
Bangalore		0.193	0.136 to 0.249
Mysore		0.077	−0.005 to 0.158
Marital status			
Married	0.017	0.0	
Unmarried		−0.012	−0.080 to 0.056
Ex-married		0.044	0.009 to 0.080
Devadasi[b]		0.078	−0.003 to 0.159
Do other work than sex work			
No	<0.001	0.161	0.121 to 0.200
Yes		0.0	
Literacy status			
No	<0.001	0.074	0.033 to 0.115
Yes		0.0	
Age	<0.001	−0.013	−0.015 to –0.010
Duration in sex work[a]	<0.001	0.058	0.031 to 0.085
R square		0.300	

[a]Variable is logarithmically transformed to increase symmetry.
[b]*Devadasi* = woman dedicated to a goddess and engages in sex work.
**P*-value from test of equality across the range of categories indicated.

0.208–0.399), followed by street to lodge FSWs (adjusted effect = 0.186, 95% CI 0.127–0.245) (Table 5).

In Tables 4 and 5 we also examined the three typologies. Typology C was a significant predictor of HIV ($P < 0.001$) and STI prevalence ($P = 0.013$), and client volume ($P < 0.001$). Moreover, street solicitation subcategories (iii)–(vi) were different in terms of HIV ($P < 0.001$) and STI prevalence ($P = 0.005$), and client volume ($P = 0.007$), after controlling for socio-demographic and behavioural variables. Specifically, street to lodge FSWs experienced the highest risk. Home sex subcategories (ii) and (iii) were somewhat significantly different with respect to client volume ($P = 0.059$). Hence, the multivariate analysis confirmed that typologies A and B are deficient in capturing the variation in risk across FSW categories.

Discussion

In this article, we examine the extent to which the existing sex work typology advanced by NACO in India to inform sex worker HIV prevention programming adequately captures the variation in risk and vulnerability experienced by FSWs working in different settings. Our analysis suggests that from a programmatic perspective the most appropriate typology in Karnataka should distinguish between FSWs based on both the place of solicitation and the place of sex (typology C). This results in a typology that distinguishes between seven main categories of FSWs (Table 2). Categorizing FSWs based on place of solicitation alone, as is currently recommended by NACO, obscures differences in the level of risk experienced by FSWs who solicit clients in the street,

depending on their place of sex. A similar typology scheme was used for a study exploring risk of syphilis in Karnataka that also found street to lodge FSWs were at highest risk.[17]

In addition, we propose a systematic approach for devising evidence-based sex work typologies in the context of HIV that capture the risk variation between FSW types, especially in places where sex work is diverse in its locations of solicitation and/or of sex. The approach we used involved: (i) identifying the main places of solicitation and sex and the possible overlap between the two; (ii) constructing typologies using distinguishing criteria such as the main place of solicitation, the main place of sex or a combination of the two, as suggested by available data on the FSW population; (iii) examining indicators of risk, such as HIV/STI prevalence and client volume, for FSW categories defined by the various typologies; and (iv) identifying the simplest typology that largely captures the variation in risk experienced by women working in different settings.

The typology discriminates between FSWs based on places of solicitation and of sex, in order to meet the outreach requirement of distinguishing between categories of FSWs that can be easily identifiable/observable. Other aspects of the mode of operation of FSWs (e.g. level of autonomy from network operators, level of economic independence, earnings from sex work) are also important predictors of HIV risk. In places where there is good knowledge about the FSW population and detailed information on the economic situation and mode of operation of FSWs can be obtained, more elaborate typologies can be developed.

Although it is generally accepted that women working in brothels are at high risk, both in Karnataka and in other states of India,[18] this article highlights the risk of FSWs that solicit clients in public places and have sex in lodges (street to lodge), and represent 22% of the sampled FSWs. These women experience high HIV and STI prevalence rates even when compared with women who solicit in brothels, despite the fact that they have a substantially lower client volume. This may be because street to lodge FSWs are more difficult to reach by HIV prevention programmes either at the place of solicitation or of sex, compared with brothel-based FSWs, or because of the relatively clandestine nature of lodge-based sex work compared with brothel-based. Geographical analysis suggests (data not shown) that lodges are more common in areas without brothels. Research exploring why this group of women is at particularly high risk should be a high priority. Programmers working in Karnataka state should consider focusing their efforts among this group and developing outreach strategies specifically targeting these FSWs. For example, a study conducted in Nicaragua and aimed at couples having sex in motel rooms found that condoms placed in rooms or handed to clients were more likely to be used than if made available at reception.[19]

It appears that the two extremes in terms of risk associated with sex work settings are the lodge/brothel as the highest risk locations and the own home/rented room as the lowest risk. One possible explanation for this variation is the level of control that can be exercised by FSWs; FSW control is likely to be least in brothels and lodges where the working conditions are controlled by brothel madams or lodge managers and greatest when working from homes or rented rooms where the women work independently. However, there are important differences between brothels and lodges, in terms of the relationship between the level of control of the brothel madam and lodge manager, and the risk that FSWs are exposed to. The relatively low STI prevalence registered in brothels may be not only due to the higher condom use (as reported by FSWs), but also to the higher feasibility of administering presumptive periodic treatment and/or regular STI check-ups in a brothel setting, facilitated by the brothel madams. Of note, there is great variation in HIV risk between street to lodge and street to rented room FSWs, despite the fact that both FSW types solicit clients in public places and entertain them in a place rented by the women on a client-by-client basis, the difference being that lodges are small hotels and the rooms are rented in private houses. Future qualitative studies should explore some of the possible explanations for this variation.

The level of risk experienced by women working in various settings was measured by a variety of indicators, with special focus attributed to HIV and STI prevalence and client volume. Although we realize that unprotected sexual contact is theoretically a better behavioural measure of HIV risk, as it takes into account both client volume and condom use, we used monthly client volume as a main outcome variable, anticipating it would be less subject to social desirability bias than condom use. Although data on HIV prevalence indicate lifetime risk of the different groups of women, it does not necessarily equate to recent risk exposure; infected women could have been infected some time previously, when their place of solicitation and/or sex may have been different. Thus the high HIV prevalence among brothel-based FSWs is likely due to a combination of factors, including their high lifetime risk, high client volume and high HIV prevalence among their clients (reported in client IBBA surveys conducted in Karnataka), despite the high rates of reported condom use and low STI rates.

The appropriateness of the proposed typology for Karnataka depends on the extent to which the IBBA sample is representative of the FSW population in the state. The sample was selected using as a sampling frame previous mapping data, which leads us to believe that the main FSW types were well

represented. However, sex work industry is extremely fluid and in a state of continuous flux. Hotspots in most cities in India either gain or lose in numbers every year. Moreover, the ways in which FSWs operate are continuously changing and evolving in response to legal and contextual factors, as exemplified by the recent rise in phone-based FSWs (i.e. mainly soliciting clients using mobile phones).[1,3] Hence, researchers and programmers working in Karnataka should replicate these analyses using data from later IBBA rounds, in order to ensure that this typology continues to discriminate between women at different risks.

In addition to changes over time, the Indian sex work industry also varies by geographic location. It is unlikely that this typology for Karnataka will be directly transferable to other states in India. However, the approach used here could be applied to data collected from other states (especially in South India, where the sex work organization is very diverse) and be used to help target FSW HIV prevention programmes more appropriately, ensuring that those at particularly high risk of acquiring and transmitting HIV infection are the principal programme recipients.

Based on data from Karnataka we propose a typology to be used by programmers and researchers working in the state. The typology identifies brothel-based FSWs and FSWs who solicit in public places and have sex in lodges as being at highest risk, the latter group being obscured by the existing typology. This is expected to have important implications for enhancing targeted interventions for FSWs in Karnataka.

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KEY MESSAGES

- We examine the extent to which existing sex work typologies are accurate predictors of HIV risk and propose a systematic approach for devising evidence-based typologies, using data from integrated biological and behavioural assessment surveys conducted in Karnataka, India.
- Our analysis suggests that the most appropriate typology in Karnataka consists of brothel to brothel (i.e. solicit and have sex in brothels), home to home, street to home, street to rented room, street to lodge, street to street and other sex workers. Brothel to brothel and street to lodge sex workers are at highest risk for HIV in Karnataka.
- The proposed methodology may be widely applicable, especially in places where sex work is diverse in its locations of solicitation and/or of sex.

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